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Norwegian participation in Horizon 2020 in health, ICT and industry

A study on the potential for increased participation

Tomas Åström, Neil Brown, Bea Mahieu, Anders Håkansson, Peter Varnai and Erik Arnold

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Summary

The Research Council of Norway (RCN) commissioned Technopolis Group to conduct a study on the possibilities to increase participation in Horizon 2020 (H2020), but also in relation to other European Research Area (ERA) activities and future Framework Programmes (FPs). The assignment was to focus on the three topic areas of health, Information and Communications Technology (ICT), and industry.

The study entailed document studies, registry analyses of eCorda (from February 2017) and RCN data, statistics from several sources, interviews, web surveys and international comparisons. Norway's performance was systematically benchmarked with Sweden, Denmark, Finland, Austria and the Netherlands, herein referred to as "comparator countries". The assignment was carried out between February and November 2017.

The context

Since becoming associated with the FPs in 1994, Norway has shown a strong commitment to make the most of its association, and a succession of research white papers, other policy papers and strategies have reiterated that FP participation is key to the internationalisation and long-term competitiveness of Norwegian research and innovation (R&I). The 2014 Strategy for research and innovation cooperation with the EU, released right after the Norwegian government had decided to associate Norway with H2020, spelled out that Norwegian organisations should bring back 2 percent of the competitive funds in H2020. Though emphasised in Norwegian FP policy papers, we understand that the three topic areas of this study were not necessarily selected because they are considered Norwegian strengths in FP-participation terms, but rather because they are thought to hold potential for increased FP participation.

The national FP participation advisory services are pretty much the same in the comparator countries as in Norway, with the possible exception of RCN's new and ambitious Path to EU Excellence competence-building initiative. However, when it comes to financial stimuli, the Norwegian measures are more all-encompassing and more generous than in the comparator countries. In terms of organisational support measures, frequent FP participants in all six countries have long since established internal EU support functions to facilitate FP participation.

In FP7 overall, Norway compared quite favourably relative to the comparator countries in terms of proposal activity (when normalising with the number of researchers per country), but so far in H2020 Norwegian stakeholders have been less active. However, in both FP7 and H2020 Norwegian stakeholders have coordinated multi-partner proposals more often than their counterparts in the comparator countries, and as a result the number of Norwegian coordinators compares favourably with these countries. In FP7, Norway's proposal success rate was higher than for all comparator countries except Denmark and the Netherlands, but in H2020 it is so far lower than for all comparator countries except Finland, thus indicating a negative trend (in relative terms). Norway's multi-partner coordinator success rate in FP7 was above that of all comparator countries except the Netherlands, and so far in H2020, Norway still outperforms all its Nordic neighbours, but not Austria and the Netherlands. This also indicates a (slight) negative trend. The Norwegian projects (in all areas) so far awarded in H2020 have yielded a financial return of 1.8 percent of all funding to H2020 projects. Despite the financial return in H2020 being an improvement over FP7, there is a loss in competitiveness between FP7 and H2020 relative to the comparator countries.

Participants' and non-participants' experiences

Web surveys of FP participants and non-participants reveal that the main perceived barriers to H2020 participation are lack of time, limited administrative support, complex rules for participation, and difficulty to identify relevant calls for proposals. The surveys inform us that differences in opinion are small between the three topic areas, but there are some significant differences between different respondent categories. Thus, multi-partner coordinators experience barriers to a lesser degree, and non-participants to a greater degree, which is to be expected: the more experienced you are, the lower the

perceived barriers. Close to half of all survey respondents claim that the financial incentives for the organisation to participate in H2020 are weak. This may be a clue to why nearly a third of respondents state that the organisation management discourages FP participation, and an almost equal share that there are no incentives (within the organisation) for an individual to take H2020 initiatives. Only one in six participants feel that their H2020 participation is limited by their international network, but twice as high a share of non-participants does. One in three non-participants state that they already have sufficient national funding, whereas approximately one in thirty of those who have been (or are) coordinators in H2020 does. Four in five respondents are deterred by H2020 success rates and almost every other by H2020's insufficient cost coverage.

Just over a quarter of H2020 participants received advice from an NCP in connection with their most recent FP proposal, and most are satisfied with the advice they received. Well over half of H2020 participants received PES2020 financial support from RCN for proposal preparation, and more than three-quarters of coordinators. PES2020 seems to be particularly important for small and medium-sized enterprises (SMEs). RCN's STIM-EU co-funding to institutes in ongoing FP projects and RCN's measures to proactively influence EU-level processes and calls are considered effective as means to motivate H2020 participation. Respondents that have access to an EU support function within the organisation are in general satisfied with its services, but every other higher education institution (HEI) respondent feels that the support function does not provide adequate assistance to ongoing projects.

Stakeholders' perspective

Given that survey respondents suggest that a significant share of non-participants already have sufficient national funding, that the financial incentives for stakeholder organisations are weak, and that H2020 success rates are low, we investigate to what extent this holds true.

To what extent do Norwegian stakeholders have sufficient national funding?

Norwegian HEIs and hospital trusts have quite benign R&D funding situations relative to their counterparts in the comparator countries: higher base funding and less funding won in competition. In contrast, Norwegian research institutes have very low base funding from an international perspective and win the vast majority of their R&D funding in competition. Thus, HEIs and hospital trusts to a large extent have sufficient national public funding, whereas institutes on average do not. (At the level of individual researchers the funding situation obviously can vary a lot.) Moreover, several different sources indicate that ample national public funding (base and competitive funding together) is a strong disincentive to FP participation. This seems to apply to any area, but our covariation analyses suggest that it also applies to the three topic areas.

To what extent are financial incentives for stakeholders weak?

The financial incentives at organisational level seem quite strong for HEIs and hospital trusts (acceptable H2020 cost coverage plus a substantial bonus on H2020 funding granted), but weak for institutes (insufficient cost coverage even with STIM-EU). However, individual researchers rarely seem to directly benefit from these organisational-level incentives (cf. survey results).

To what extent are success rates higher in Norway?

For proposals for basic research, H2020 success rates are in several cases *higher* than RCN's and when not the differences are small, but success rates in regional health authority calls appear to be considerably higher. However, for proposals for collaborative R&I (multi-partner projects), success rates in H2020 are notably lower than in RCN's programmes.

Weaknesses and opportunities

Addressing the weaknesses

Many proposers seem to underestimate the competition they face in H2020. In simple terms, the failed proposals may be placed in either of two broad categories: those that should never have been written,

let alone submitted, and those that came close and that with enhanced advisory services could have been honed to be successful. A disproportionately large share of these proposals has been submitted by SMEs and universities. Moreover, the declining success rates of the Technical-Industrial (TI) institutes in several sub-areas – albeit often from very high levels – are remarkable. There are of course several possible reasons why a proposal fails. Among them are an uncompetitive consortium, that the R&I idea is not leading edge, that the proposal is poorly presented, and/or that the proposal does not capture the essence of the proposal assessment criteria.

Only one in six FP participants that responded to our surveys stated that their H2020 participation is limited by their international network. This contradicts with our analyses, which indicate that a large share of Norwegian proposers appears to be part of **uncompetitive consortia**, or wrong networks if you wish, since their success rates as partners are very low or zero. It is worrying that a large majority of FP participants seem unaware that their international networks oftentimes are not good enough.

National cooperation is also important and there is in several areas an issue with lack of critical mass due to insufficient cooperation between Norwegian stakeholders. Moreover, our analyses show that companies that partner with a Norwegian research institute have a higher overall success rate for multi-partner proposals, suggesting that companies that do so benefit from the international networks and FP expertise of the institute.

There may be an issue with the **quality of Norwegian research**, at least in some areas of health and in ICT, as suggested by bibliometric indicators, previous area-level evaluations and data on innovation performance, as well as by the new OECD review of Norway's innovation policy. However, given that we are only dealing with secondary sources, we cannot draw any definitive conclusions on quality.

Our area-level analyses highlight that the change in nature and focus of R&I in H2020 (compared to FP7) seems to have had an adverse effect on the competitiveness of Norwegian proposers in some sub-areas. In these sub-areas, the **trend in H2020 towards more application-oriented and interdisciplinary R&I** seems to have caught Norwegian researchers unprepared, especially in the universities, but also in the TI institutes; there seems to be a misalignment between their competence and that required to succeed in H2020, or alternatively a failure to fully appreciate the implications of this change.

Past Norwegian FP evaluations show that Norwegian stakeholders with time have become skilled FP participants that have proved capable of achieving high success rates. Our international comparison of FP support measures show that **most countries gradually have focused their financial support measures** (to stakeholders in greatest need, to specific priority areas, etc.) as their researcher communities have built up FP experience, and some countries have completely phased out such support. In contrast, Norway has made its portfolio of support measures more all-encompassing and generous with time.

We cannot help but wonder what the generous support system coupled with the benign base funding system does to the mindset and competitiveness of researchers in HEIs and hospital trusts in the longer term. We believe that it is detrimental to the long-term competitiveness of individual researchers in HEIs and hospital trusts, as well as their employers, to not have to fight overly hard for funding (at least not as hard as their colleagues in most other countries) to fund their research. **International competition, although a short-term pain is a long-term gain.**

The situations for institutes and SMEs are different. Given their very low base funding and H2020's cost model, **institutes need and deserve financial compensation** to maintain their presence in the FPs. Co-funding to institutes is further motivated by institutes being most important for industry's FP participation and long-term access to up-to-date knowledge. **SMEs are worthy of financial support** for different reasons. They are typically the financially most vulnerable stakeholders and there is a constant supply of newly started SMEs that will always need help (advice and co-funding) to learn how to succeed in the FPs. In contrast, large companies usually are not motivated by public financial support measures.

Opportunities for increasing participation

Looking merely at overall H2020 success rates, Norway does quite well relative to the overall average, as well as to the average for the comparator countries. Looking at the topic areas, Norway does very well in industry, average in ICT and poorly in health. The overall picture is the same for proposal success rates and participation success rates. Looking only at multi-partner proposals, Norway's performance in health is average and ICT slightly above average, since we then eliminate the sub-programmes where Norwegian participation is well below average, notably in Excellent Science. The analyses by topic area highlight some areas of Norwegian strengths, which could be used as leverage to increase FP participation, as well as some potential areas of strength. The analyses also identify some sub-programmes where there should be good opportunities for Norwegians to succeed if they put their minds to it, particularly in Excellent Science. Examples of areas of strength include Health ICT and Personalised medicine, genomics and basic health research in health; Communication technology and infrastructure in ICT; and Bioeconomy and Ocean in industry.

Recommendations

Ministries, RCN, Innovation Norway (IN) and stakeholder organisations may want to consider some actions to increase the Norwegian FP participation. The most important of our recommendations are summarised below. Given that PES2020 and STIM-EU will be evaluated in 2018, we propose that implementation of any of the more fundamental recommendations concerning these two measures be put on hold until this evaluation is concluded in autumn of 2018.

To ministries

- Revisit the national 2 percent financial return objective
- Tie a significantly larger share of the base funding of HEIs and regional health authorities/hospital trusts to foreign funding secured
- Increase the competition for researchers in hospital trusts
- Increase resources for STIM-EU to allow for increasing the co-funding percentage
- Decrease resources for PES2020 within a few years
- Increase funding for R&I in ICT

To RCN

- Continue communicating to stakeholders that:
  - H2020 is strongly focused towards application-oriented and interdisciplinary research
  - FP competition is fierce, so submitting half-hearted proposals is a waste of time and energy
  - It is crucial to choose the very best partners possible
  - In Excellent Science, H2020 success rates are not necessarily lower than in RCN's FRIPRO
  - RCN and IN have a range of advisory services and financial support measures for companies
  - Partnering with a Norwegian research institute likely enhances the chances of success for companies engaged in multi-partner proposals
- Use PES2020 to further professionalise EU support functions in larger public-sector stakeholders for another few years before discontinuing this support
- Keep PES2020 for influencing processes and for coordinators of multi-partner proposals and SMEs to produce proposals
- Phase out PES2020 to find calls and partners, as well as for regular partners and "single-partner coordinators" to produce proposals (excluding SMEs)
- Devise a system to identify high-quality Norwegian-coordinated multi-partner proposals that just missed getting funded, and supply them with professional assistance ahead of resubmission

- Keep, or expand, programme-level funding for influencing processes and calls, and selective co-funding to compensate public-sector stakeholders for low cost coverage in JTIs and JUs

To IN

- Continue communicating to companies the same messages as recommended for RCN
- Continue providing SMEs with professional assistance with proposals

To stakeholder organisations

- Develop and implement internal strategies to increase FP participation
- Allocate significant internal resources to professionalise EU support functions
- It is crucial to choose the very best partners possible
- Focus on quality of proposals; there is no point in submitting half-hearted proposals
- Devise internal system to incentivise individuals to take FP initiatives

Sammendrag

Technopolis Group har, på oppdrag for Norges forskningsråd (NFR), gjennomført en studie om mulighetene for å øke deltakelsen i Horisont 2020 (H2020), samt andre aktiviteter innenfor Det europeiske forskningsområdet (ERA) og fremtidige rammeprogrammer (FP). Oppdraget fokuserte på de tre fagområdene helse, informasjons- og kommunikasjonsteknologi (IKT), og industri.

Studien omfattet dokumentstudier, registeranalyser av data fra eCorda (fra februar 2017) og NFR, statistikk fra flere kilder, intervjuer, nettbaserte spørreundersøkelser og internasjonale sammenligninger. Norges prestasjoner ble systematisk sammenlignet med Sverige, Danmark, Finland, Østerrike og Nederland, heretter referert til som «sammenligningsland». Oppdraget ble gjennomført fra februar til november 2017.

Kontekst

Norge ble tilknyttet FP i 1994, og har siden da vært sterkt dedikert til å få mest mulig ut av tilknytningen. En rekke forskningsmeldinger, andre politiske meldinger og strategier har gjentatt at FP-deltakelse har svært stor betydning for internasjonaliseringen og den langsiktige konkurranseevnen til norsk forskning og innovasjon (FoI). «Strategi for forsknings- og innovasjonssamarbeidet med EU», fra 2014, som ble gitt ut rett etter at den norske regjeringen hadde besluttet at Norge skulle tilknyttes H2020, slo fast at norske organisasjoner burde få tilbake 2 prosent av de konkurranseutsatte midlene i H2020. Selv om de tre fagområdene som har vært gjenstand for denne studien blir fremhevet i norske FP-relaterte policydokumenter, forstår vi at de ikke nødvendigvis er blitt valgt ut fordi de blir ansett som sterke norske områder når det gjelder FP-deltakelse, men snarere fordi de har antatt potensial for økt FP-deltakelse.

De nasjonale rådgivningstjenestene for FP-deltakelse er stort sett like i sammenligningslandene som i Norge, med et mulig unntak for NFRs nye og ambisiøse kompetansebyggende initiativ Path to EU Excellence. Når det kommer til økonomisk stimuli, er imidlertid de norske tiltakene mer altomfattende og generøse enn tiltakene i sammenligningslandene. Angående tiltak på organisasjonsnivå, har hyppige FP-deltakere i alle seks land for lengst opprettet interne EU-støttefunksjoner for å legge til rette for FP-deltakelse.

I FP7 kom Norge generelt ganske gunstig ut i forhold til sammenligningslandene med tanke på søknadsaktivitet (når man normaliserer med antall forskere per land). Så langt i H2020 har imidlertid norske interessenter vært mindre aktive. De har derimot, både i FP7 og H2020, koordinert multipartner-søknader oftere enn sine motparter i sammenligningslandene, og som et resultat av dette kommer antallet norske koordinatorer gunstigere ut når man sammenligner med disse landene. I FP7 hadde Norge høyere suksessrate for søknader enn alle sammenligningslandene unntatt Danmark og Nederland, men i H2020 er den så langt lavere enn for alle sammenligningslandene unntatt Finland, noe som indikerer en negativ trend (relativt sett). Suksessraten for multipartner-koordinatorer var høyere for Norge i FP7 enn for alle sammenligningslandene unntatt Nederland, og så langt i H2020 gjør Norge det fortsatt bedre enn alle sine nordiske naboer, men ikke bedre enn Østerrike og Nederland. Dette indikerer ytterligere en (svakt) negativ trend. De norske prosjektene som så langt er blitt innvilget i H2020 (på alle områder) har gitt en økonomisk retur på 1,8 prosent av all finansiering til H2020-prosjekter. Til tross for at den økonomiske returen i H2020 innebærer en forbedring i forhold til FP7, har konkurranseevnen gått ned fra FP7 til H2020 i forhold til sammenligningslandene.

Erfaringer fra deltakere og ikke-deltakere

Spørreundersøkelser rettet mot både FP-deltakere og ikke-deltakere avdekker at det som oppfattes som de største barrierene mot H2020-deltakelse er mangel på tid, begrenset administrativ støtte, komplekse regler for deltakelse, og at det er vanskelig å finne relevante utlysninger. Spørreundersøkelsene viser at oppfatningene varierer lite de tre fagområdene imellom, men at det er betydelige forskjeller mellom ulike respondentkategorier. Koordinatorer opplever færre barrierer, og deltakere flere, noe som er forventet – jo mer erfaren du er, jo lavere barrierer oppfatter du. Nærmere halvparten av alle

respondentene hevder at organisasjonens økonomiske insentiver til å delta i H2020 er svake. Dette kan kanskje forklare hvorfor nesten en tredjedel av respondentene oppgir at organisasjonsledelsen fraråder FP-deltakelse, og at en nesten tilsvarende andel oppgir at det ikke finnes insentiver for enkeltpersoner (innad i organisasjonen) når det gjelder å ta H2020-initiativ. Bare én av seks deltakere opplever at H2020-deltakelsen blir begrenset av det internasjonale nettverket deres, mens en dobbelt så stor andel ikke-deltakere gjør det. Én av tre ikke-deltakere oppgir at de allerede har tilstrekkelig nasjonal finansiering, mens omtrent én av tretti av de som har vært (eller er) koordinatorer i H2020 gjør det samme. Fire av fem respondenter blir avskrekket av suksessratene i H2020, og nesten annenhver blir det av H2020s utilfredsstillende kostnadsdekning.

Litt over en fjerdedel av H2020-deltakerne mottok rådgivning fra en NCP i forbindelse med den nyeste FP-søknaden sin, og de fleste er fornøyd med denne rådgivningen. Godt over halvparten av H2020-deltakerne fikk økonomisk støtte til søknadsforberedelse fra NFR gjennom PES2020, og mer enn tre fjerdedeler av koordinatorene gjorde det samme. PES2020 ser ut til å være spesielt viktig for små og mellomstore bedrifter (SMB-er). NFRs medfinansiering, gjennom STIM-EU, til institutter i pågående FP-prosjekter, og NFRs tiltak for å proaktivt påvirke prosesser og utlysninger på EU-nivå, anses som effektive midler for å motivere til deltakelse i H2020. Respondenter som har tilgang på en EU-støttefunksjon innad i sin egen organisasjon er generelt fornøyd med de tilbudte tjenestene, men annenhver respondent fra universitet og høyskoler (UoH) opplever samtidig at støttefunksjonen ikke tilbyr tilstrekkelig assistanse når det gjelder pågående prosjekter.

Interessentenes perspektiv

Ettersom svarene fra spørreundersøkelsen indikerer at en betydelig andel ikke-deltakere allerede har tilstrekkelig nasjonal finansiering, at de økonomiske insentivene for interessentorganisasjoner er svake, og at suksessratene i H2020 er lave, har vi undersøkt i hvilken grad dette stemmer.

I hvilken grad har norske interessenter tilstrekkelig nasjonal finansiering?

Norske UoH-er og helseforetak er i en ganske god situasjon når det gjelder FoU-finansiering i forhold til sine motparter i sammenligningslandene – de har høyere basisfinansiering og mindre konkurransebasert finansiering. I kontrast til dette har norske forskningsinstitutter veldig lav basisfinansiering i et internasjonalt perspektiv, og vinner mesteparten av FoU-finansieringen i konkurranse. Dermed har UoH-er og helseforetak i høy grad tilstrekkelig nasjonal finansiering fra det offentlige, mens institutter i snitt ikke har det. (På personnivå kan forskernes finansieringssituasjon selvfølgelig variere mye.) Dessuten indikerer flere ulike kilder at rikelig nasjonal finansiering fra det offentlige (basis- og konkurransebasert finansiering til sammen), er et sterkt disinsentiv til FP-deltakelse. Dette ser ut til å gjelde alle områder, men våre analyser av samvariasjon tyder på at det også gjelder de tre utvalgte fagområdene.

I hvilken grad har interessentene svake økonomiske insentiver?

På organisasjonsnivå ser de økonomiske insentivene ut til å være ganske sterke for UoH-er og helseforetak (akseptabel H2020-kostnadsdekning pluss en betydelig bonus på bevilget H2020-finansiering), men svake for institutter (utilstrekkelig kostnadsdekning også med STIM-EU). Det ser imidlertid ut til at individuelle forskere sjelden drar direkte nytte av disse insentivene, som ligger på organisasjonsnivå (jf. resultater fra spørreundersøkelsene).

I hvilken grad er suksessratene høyere i Norge?

For søknader om grunnforskning, er suksessratene i H2020 i flere tilfeller *høyere* enn hos NFR, og når de ikke er det, er forskjellene små. Suksessratene for utlysninger fra regionale helseforetak ser imidlertid ut til å være betydelig høyere. For søknader om multipartner-prosjekter, er suksessratene i H2020 merkbart lavere enn i NFRs programmer.

Svakheter og muligheter

Håndtere svakhetene

Mange søkere ser ut til å undervurdere konkurransen de møter i H2020. Enkelt forklart, kan de mislykkede søknadene plasseres i én av to vide kategorier: de som aldri burde vært skrevet, enn si sendt inn, og de som nesten nådde opp og som med bedre rådgivningstjenester kunne vært skjerpet slik at de lyktes. En uforholdsmessig stor del av disse søknadene er det SMB-er og universiteter som står for. Det er dessuten verdt å legge merke til de dalende suksessratene – riktignok ofte fra veldig høye nivåer – som de teknisk-industrielle (TI) instituttene opplever innenfor flere underområder. Det finnes selvfølgelig flere mulige årsaker til at søknader ikke lykkes, blant annet konsortier med dårlig konkurranseevne, FoI-ideer som ikke ligger i forkant, søknader som er dårlig presentert, og/eller at søknadene ikke fanger essensen av kriteriene for søknadsvurderingen.

Bare én av seks FP-deltakere som besvarte spørreundersøkelsene oppga at deltakelsen deres i H2020 var begrenset av det internasjonale nettverket deres. Dette står i kontrast til våre analyser, som indikerer at en stor andel norske søkere ser ut til å være del av **konsortier med dårlig konkurranseevne**, eller feil nettverk om du vil, ettersom suksessratene deres som partnere er svært lave eller lik null. Det er bekymringsverdig at en stor majoritet av FP-deltakerne ikke ser ut til å være klar over at det internasjonale nettverket deres ofte ikke er godt nok.

Nasjonalt samarbeid er også viktig, og mangel på kritisk masse på grunn av utilstrekkelig samarbeid mellom norske interessenter er et problem innenfor flere områder. Våre analyser viser dessuten at selskaper som går sammen med et norsk forskningsinstitutt samlet sett har en høyere suksessrate for multipartner-søknader, noe som tyder på at selskaper som gjør dette drar nytte av instituttenes internasjonale nettverk og FP-ekspertise.

Kvaliteten på norsk forskning kan være et problem, i hvert fall innenfor IKT og enkelte deler av helseområdet, noe bibliometriske indikatorer, tidligere område-evalueringer og data om innovasjonsprestasjon, samt den nye OECD-vurderingen av Norges innovasjonspolitikk, antyder. Her dreier det seg imidlertid bare om sekundære kilder, så vi kan ikke trekke noen endelige konklusjoner om kvalitet.

Våre område-analyser understreker at endringene i natur og fokus når det gjelder FoI i H2020 (sammenlignet med FP7) ser ut til å ha påvirket norske søkeres konkurranseevne negativt innenfor enkelte underområder. Innenfor disse underområdene ser det ut til at **trenden i H2020, i retning av mer anvendt og tverrfaglig FoI**, har kommet overraskende på norske forskere, særlig ved universitetene, men også ved TI-instituttene. Det ser ut til at forskernes kompetanse og det som kreves for å lykkes i H2020 ikke stemmer helt overens, eller alternativt at forskerne ikke fullt ut forstår hva endringene innebærer.

Tidligere norske FP-evalueringer har vist at norske interessenter over tid har blitt dyktige FP-deltakere som har vist seg å være i stand til å oppnå høye suksessrater. Vår internasjonale sammenligning av FP-relaterte støtteordninger viser at **de fleste land gradvis har fokusert de økonomiske støtteordningene sine** (mot interessenter med størst behov, mot spesifikke prioriterte områder, osv.) etter hvert som forskersamfunnene har opparbeidet seg erfaring med rammeprogrammene. Enkelte land har helt faset ut slik støtte. Norge har derimot gjort sin portefølje av støtteordninger mer altomfattende og generøs med tiden.

Vi kan ikke unngå å spørre oss hva det generøse støttesystemet sammen med det gode basisfinansieringssystemet gjør med tankesettet og konkurranseevnen til forskere ved UoH-er og helseforetak på sikt. Vi tror det er ødeleggende for den langsiktige konkurranseevnen til individuelle forskere ved UoH-er og helseforetak, samt arbeidsgiverne deres, å ikke måtte kjempe så altfor hardt (i det minste ikke så hardt som sine kollegaer i de fleste andre land) om midler til å finansiere forskningen sin. **Selv om internasjonal konkurranse byr på kortsiktig smerte, gir det langsiktig gevinst.**

Situasjonen er en annen for institutter og SMB-er. Gitt instituttenes svært lave basisfinansiering og kostnadsmodellen i H2020, både **trenger og fortjener instituttene økonomisk kompensasjon** for å opprettholde sin tilstedeværelse i rammeprogrammene. Videre er medfinansiering til instituttene motivert av at de er svært viktige for industriens FP-deltakelse og langsiktige tilgang til oppdatert kunnskap. **SMB-ene fortjener økonomisk støtte** av andre årsaker. Vanligvis er SMB-ene de økonomisk mest sårbare interessentene, og det er en konstant tilførsel av nystartede SMB-er som alltid vil ha behov for hjelp (i form av råd og medfinansiering) til å lære hvordan å lykkes i FP-sammenheng. Store selskaper blir derimot vanligvis ikke motivert av offentlige økonomiske støtteordninger.

Muligheter for økt deltakelse

Ser man på de overordnete suksessratene i H2020, gjør Norge det nokså bra både i forhold til det totale gjennomsnittet, og i forhold til gjennomsnittet for sammenligningslandene. Ser man på fagområdene, gjør Norge det veldig bra innenfor industri, gjennomsnittlig innenfor IKT og dårlig innenfor helse. Bildet er det samme når det gjelder suksessratene for søknader og deltakelse. Ser man på multipartner-søknader alene, presterer Norge gjennomsnittlig på helseområdet og litt over gjennomsnittet innenfor IKT, siden vi da eliminerer delprogrammene hvor norsk deltakelse ligger godt under gjennomsnittet, spesielt innenfor Fremragende forskning. Analysene etter fagområde peker på enkelte områder hvor Norge står sterkt, som kunne blitt brukt som løftestang til å øke FP-deltakelsen, samt enkelte områder som potensielt kan bli sterke. Analysene avdekker også enkelte delprogrammer hvor Norge med målrettet innsats burde ha gode muligheter for å lykkes, særlig innenfor Fremragende forskning. Eksempler på sterke områder er IKT i helsesektoren og persontilpasset medisin, genomikk og grunnleggende helseforskning (innenfor helse), kommunikasjonsteknologi og infrastruktur (innenfor IKT), og bioøkonomi og hav (innenfor industri).

Anbefalinger

Departementene, NFR, Innovasjon Norge (IN) og interessentorganisasjonene kan vurdere enkelte tiltak for å øke den norske FP-deltakelsen. Vi oppsummerer de viktigste anbefalingene våre nedenfor. Ettersom PES2020 og STIM-EU skal evalueres i 2018, foreslår vi å utsette implementering av mer fundamentale anbefalinger angående disse to ordningene til denne evalueringen er avsluttet høsten 2018.

Til departementene

- Revider det nasjonale målet om 2 prosent i økonomisk retur
- Koble en betydelig større andel av basisfinansieringen til UoH-er og regionale helseforetak/ helseforetak til sikret utenlandsk finansiering
- Øk konkurransen for forskere innen helseforetak
- Øk ressursene til STIM-EU for å muliggjøre høyere prosentvis medfinansiering
- Reduser midlene til PES2020 innen få år
- Øk finansieringen av FoI innenfor IKT

Til NFR

- Fortsett å kommunisere følgende til interessentene:
  - H2020 har sterkt fokus på anvendt og tverrfaglig forskning
  - Konkurransen i FP er beinhard, så det er bortkastet tid og energi å sende inn halvhjertede søknader
  - Det er helt avgjørende å velge de absolutt beste mulige partnerne
  - Innenfor Fremragende forskning er ikke suksessratene i H2020 nødvendigvis lavere enn i NFRs FRIPRO
  - NFR og IN har en rekke rådgivningstjenester og økonomiske støtteordninger for bedrifter

  - Å gå sammen med et norsk forskningsinstitutt øker sannsynligvis sjansene for å lykkes for bedrifter som er med i multipartner-søknader
- Bruk PES2020 noen få år til for å ytterligere profesjonalisere EU-støttefunksjonene hos større interessenter i offentlig sektor, før denne typen støtte legges ned
- Behold PES2020 til påvirkningsprosesser og til søknadsskriving for koordinatorer i multipartner-søknader og SMB-er
- Fas ut PES2020 til å finne utlysninger og partnere, samt til søknadsskriving for vanlige partnere og koordinatorer i «enkeltpartner-søknader» (unntatt for SMB-er)
- Utarbeid et system for å avdekke norsk-koordinerte multipartner-søknader av høy kvalitet som nesten har nådd opp i konkurransen, og tilby dem profesjonell hjelp i forkant av en ny innsending
- Behold, eller utvid, støtte til påvirkningsprosesser og utlysninger på program-nivå, og utvalgt medfinansiering for å kompensere interessenter i offentlig sektor for den lave kostnadsdekningen i JTI-er og JU-er

Til IN

- Fortsett å formidle, overfor bedrifter, det samme budskapet vi anbefaler for NFR
- Fortsett å gi SMB-er profesjonell hjelp med søknader

Til interessentorganisasjoner

- Utarbeid og implementer interne strategier for å øke FP-deltakelse
- Alloker betydelige interne midler til profesjonalisering av EU-støttefunksjoner
- Det er avgjørende å velge de absolutt beste mulige partnerne
- Ha fokus på søknadskvalitet; det er ikke noe poeng å sende inn halvhjertede søknader
- Utarbeid interne systemer for å insentivere enkeltpersoner til å ta FP-initiativ

1 Introduction

1.1 Assignment

The Research Council of Norway (RCN) commissioned Technopolis Group to conduct a study to produce knowledge on possibilities for increased participation in Horizon 2020 (H2020) in particular, but also in relation to other European Research Area (ERA) activities and future Framework Programmes (FPs). The assignment was to focus on the three topic areas of Health, Information and Communications Technology (ICT), and Industry, and to address the following objectives for each area:

1. To analyse participation patterns in H2020 and place these into a broader context of national research and innovation (R&I) objectives and policies, and national R&I capabilities
2. To analyse the potential for increased participation in the FPs of various groups of research institutions, businesses and public-sector organisations
3. To identify and assess relevant support measures and other actions targeted towards increasing participation in the FPs
4. To provide recommendations on how to increase participation in each of the three areas. Recommendations should apply to the various levels of institutions and actor groups identified in the government's Strategy for research and innovation cooperation with the EU

1.2 Empirical data and methods

The study employed the following data sources and analyses:

- **Document studies**: Policy documents, descriptions of support measures, previous studies and evaluations, FP Work Programmes and call texts etc.
- **Registry analyses**: Quantitative analyses of:
  - eCorda data on FP proposals and projects (dated 28 February 2017)
  - RCN data on proposals and projects (several different datasets extracted by RCN from during spring and summer of 2017, typically without limitations to specific programmes)
  - Statistics from OECD.Stat, UNESCO Institute for Statistics (UIS), Eurostat, Statistics Norway, the R&D statistics bank (*FoU-statistikkbanken*) of the Nordic Institute for Studies in Innovation, Research and Education (NIFU), RCN's HelseOmsorg21-monitor (HO21-monitor), and a range of NIFU reports
  - Bibliometric data from Scimago Journal & Country Rank
  - Patent and trademark data from the World Intellectual Property Organization (WIPO)
- **Interviews**: 29 interviews with RCN's National Contact Points (NCPs), representatives of other Norwegian agencies, representatives of key Norwegian FP stakeholders, as well as ministry and agency representatives in other countries; interviewees are listed in Appendix A
- **Web surveys**: A total of 552 Norwegian FP participants and non-participants responded to a set of web surveys to systematically acquire information on barriers to FP participation and the usefulness of existing FP support measures; Appendix B lists survey questions and provides details on responses
- **International comparisons**: Throughout the study, Norway was benchmarked with Sweden, Denmark, Finland, Austria and the Netherlands – hereinafter referred to as "comparator countries" – in terms of FP participation, FP-related policies and FP-participation support measures. The details of the information on policies and support measures of the comparator countries are presented in Appendix C
- A **Best-practices review** of FP support measures, including **Case studies** of Ireland and Germany, is summarised in the main report, whereas the details are provided in Appendix C

The overall analyses were performed at several levels and in several stages, as well as by priority area. Moreover, the study team was supported by an Advisory Committee (AC) consisting of NCPs, programme officers and representatives of key stakeholders. The team presented its findings to the AC, and received valuable feedback, on three occasions, namely an inception meeting, interim meeting and a validation seminar; Appendix B list AC participation.

The study was carried out between February and November 2017 by a core team consisting of Tomas Åström, Neil Brown, Bea Mahieu, Anders Håkansson, Peter Varnai and Erik Arnold. Tomas Åström was project manager and Erik Arnold quality controller. The team was supported by a number of Technopolis colleagues: Martin Bergman, AnnaKarin Swenning, Johan Flodmark, Martin Wain, Kalle Nielsen, Xavier Potau, Cristina Rosemberg Montes, Jari Romanainen, María del Carmen Calatrava Moreno, Brigitte Tiefenthaler, Stijn Zegel, Sebastian Otte, Judith Vermeer and Loïc Perroud. The main reasons for the large number of contributors was the need for in-depth understanding of policies and FP support measures in a range of countries, and the demands for a range of different qualitative methods.

The team gratefully acknowledges support from a range of stakeholders that have helpfully assisted with this study. These include the members of the Advisory Committee, 29 interviewees, 552 survey respondents, and last by not least Rune Rambæk Schjølberg of RCN.

1.3 Report structure

Following on this brief introductory chapter, **Chapter 2** sets the context for the study (additional details on FP participation are provided in **Appendix D**). **Chapters 3–5** then, for each of the three topic areas, address preconditions for Norwegian FP participation, present past FP participation, and discuss where there may be potential for increasing FP participation. **Chapter 6** outlines the main Norwegian FP-related policies and FP-participation support measures, and compares their key characteristics with policies and support measures of the comparator countries. The chapter also includes a summary of the best-practices review; the details on policies and support measures of the comparator countries, and the best-practices review are provided in **Appendix C**. The chapter further presents an analysis of the covariance between FP participation and national Norwegian funding of R&D, with additional details in **Appendix E**. **Chapter 7** presents Norwegian FP participant's and non-participants' views on barriers and deterrents to FP participation, as well as on the present Norwegian FP support system, with survey questions and details on the results in **Appendix B**). **Chapter 8** draws the conclusions from the previous chapters and discusses the implications of the findings, before rounding off the chapter with recommendations on how Norwegian FP participation could be increased.

2 The context

We commence this chapter by introducing the main features of FP7 and H2020, and note that H2020 has a more pronounced emphasis on innovation than FP7 did. Despite a completely new structure, most previous themes remain present in H2020, albeit some of them in the dominating Societal Challenges pillar, wherein multi-disciplinary and multi-sectoral collaboration is expected while simultaneously enhancing industrial competitiveness and supporting excellent basic research. H2020 aims to foster links between R&I, public and private actors and among European, national and regional R&I systems. We then discuss past Norwegian experiences with the FPs based on previous evaluations to illustrate how the Norwegian R&I community gradually has learnt how to successfully participate in the FPs.

The next section uses statistics to paint an overall picture of the R&I landscapes of Norway and its five comparator countries to assist in interpreting analysis results subsequent presented. We first observe that Norway's economy is quite different from the other countries in that it is strongly dominated by oil and gas, and that the country's manufacturing industry is the smallest. We find that Norway's research intensity is the lowest among the six countries despite an increase in recent years, and that the Norwegian government's share of investments in R&D is the highest and industry's the lowest. The share of R&D that is performed in industry is the lowest in Norway and that performed by government institutions is the highest, where the latter is in part explained by Norway's large institute sector. When it comes to the number of researchers, Norway is in the middle of the six countries (when normalised for total population), with a notable increase over the last decade. In absolute numbers, the increase over the last two decades has been particularly strong in industry and in HEIs. Bibliometric indicators suggest that the average research quality of scientific publications (mainly from HEIs) is lower for Norway than for all comparator countries except one, and data from the European Innovation Scoreboard show that Norway lags behind all comparator countries in terms of overall innovation performance.

The final section of the chapter presents some overarching analyses of the FP participation of Norway and the five comparator countries. In FP7 overall, Norway compared quite favourably in terms of proposal activity, but so far in H2020 Norwegian stakeholders have been less active. In FP7, Norway's proposal success rate was higher than for three of the five comparator countries, but in H2020 it is so far lower than for all comparator countries except one, thus indicating a negative trend relative to the comparator countries.

2.1 The EU FPs over time

The legal basis for the FP is Council resolutions of 14 January 1974 about the coordination of national policies, the definition of science and technology projects of interest to the European Community and the need for the Community to have its own science and technology policy. FP1, launched in 1984, was an extension of existing initiatives in computing and energy. FP2 (1987–1991) concentrated on ICT, energy and materials. FP3 (1990–1994) broadly followed the same pattern, focusing on fewer action lines and besides collaborative research projects introduced also aspects of human capital and mobility. FP1 had a clear industry focus and it was very much "technology push" oriented reflecting the Commission's desire to bridge the technology gap.[1] Subsequent FPs strived to achieve economic impact. The early efforts for ICT and industrial technology development exemplify this trend.

The Maastricht Treaty of 1993 empowered the Commission to attempt to coordinate national R&D policies. Moreover, a major shift in the Commission's approach to R&D policy was introduced in that period presenting a much more holistic view on innovation.[2] Instead of support to single industry sectors, attention was shifted to diffusion and use of new technologies. The EC white paper on Growth, Competitiveness and Employment (1993) and the following communications underlined the importance

[1] E. Arnold et al., "Understanding the Long Term Impact of the Framework Programme", European Commission, DG Research, 2011.

[2] "Growth, Competitiveness, Employment. The Challenges and Ways Forward into the 21st Century, European Commission, 1993; "Green Paper on Innovation", European Commission, 1995.

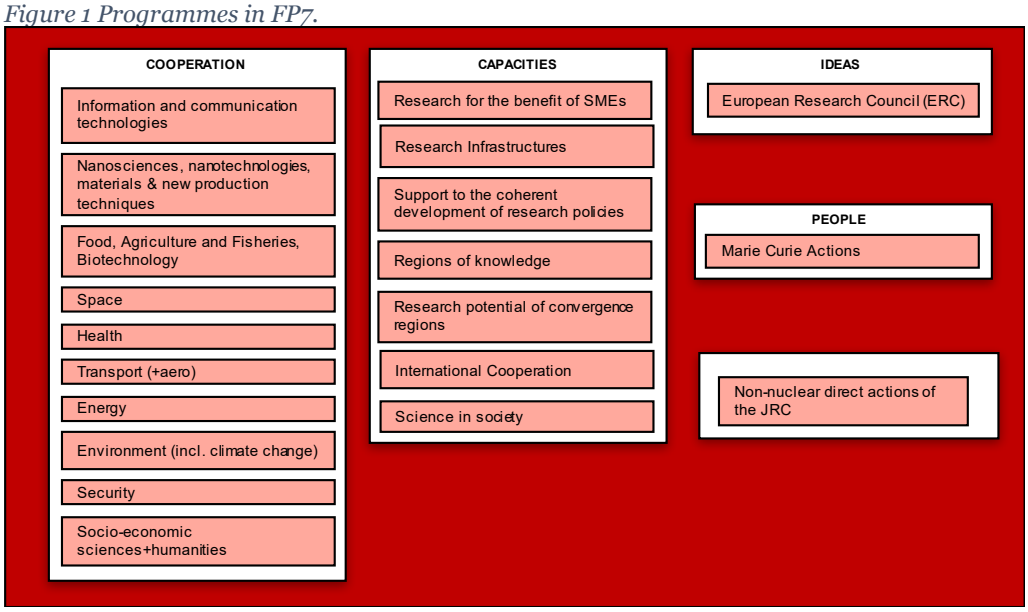
of education and training, increased labour market flexibility, financing of new companies, regulations and technology transfer. Following these lines, FP4 (1994–1998) built on previous initiatives, but extended the scope of the Community R&D programme to basic research, applied research, technology development and demonstration. While FP4 included few socioeconomic aspects, FP5 (1998–2002) marked a clear shift from technologically oriented research to R&I tackling defined societal objectives.

The benefits of the societal focus turned out to be hard to identify, so it was less explicit in FP6, which was specially intended to promote the ERA and increase European R&D competitiveness. It introduced new instruments, including Networks of Excellence aimed at integrating partners' research capacities to promote the excellence of Community research and Integrated Projects, which were large projects to support critical mass in research activities with scientific and technological objectives.

Across FP3–FP6 there was "considerable thematic continuity with major themes either flat or growing in budget terms".[3] The biggest field in terms of funding was ICT-related research with a rather consistent volume but decreasing share of total funds across FPs. Life sciences, biotechnology, food and health benefited from a steady growth in the volume and share of the total FP budget.

FP7 (2007–13) contained another layer of new initiatives, including the creation of the European Research Council (ERC) to support excellent research and a focus on research infrastructure. This period was marked by the launch of Joint Technology Initiatives (JTIs) around key technologies as a framework for public-private partnerships (PPPs) at a European level. Growing numbers of Public-to-Public partnerships were also set up under Article 185 (previously 169) of the Treaty and Joint Programming Initiatives to coordinate Member State thematic research started to operate from 2010. The international dimension was mainstreamed into the specific programmes of FP7 and increased attention was given to SMEs.

Figure 1 Programmes in FP7.



Source: Technopolis.

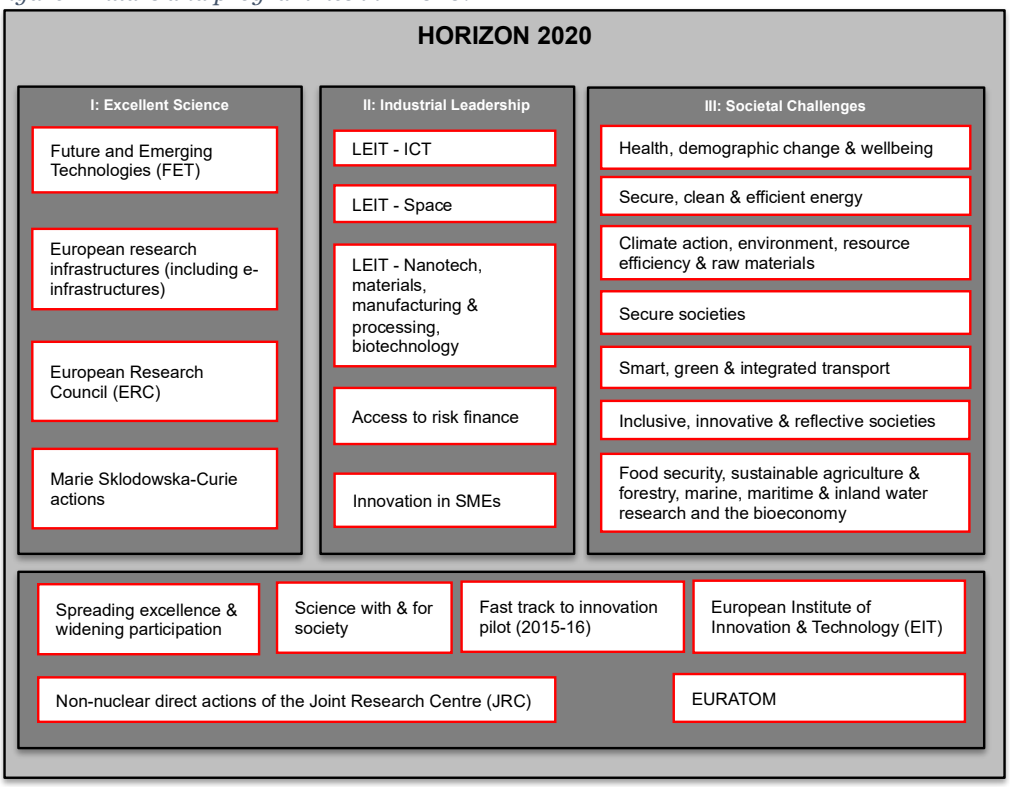
FP7 was structured into five specific sub-programmes: 1) Cooperation – supporting collaborative research in nine thematic priorities; 2) Ideas – introducing the ERC; 3) People – supporting training and career development of researchers; 4) Capacities – supporting key aspects of European research and innovation capacities; and 5) Non-nuclear actions of the JRC, see Figure 1. In the second half of

3 E. Arnold et al., "Understanding the Long Term Impact of the Framework Programme", European Commission, DG Research, 2011.

FP7, there was much more targeted attempts to merge R&I policy agendas leading to a conclusion that this effort requires also concerted complementary policies, such as demand side policy.

H2020 (2014–2020) marks a change in European policy-making due to its comprehensive and integrating approach to R&I, reflecting the developments in the ERA 2020 and the Europe 2020 strategies. The acknowledgement of a need for balance between "supply push" and "demand pull" in innovation policy, and the backing of projects that could cut across the phases of research, testing, procurement and deployment of innovations, is a core concept. Figure 2 shows the overall structure of H2020, with its three "pillars" of Excellent Science, Industrial Leadership and Societal Challenges corresponding to its academic, industrial and political constituencies.

Figure 2 Pillars and programmes in H2020.



Source: Technopolis.

Despite the new structure, most previous themes remain present in H2020. Growth of the ERC and the addition of the Future Emerging Technologies (FET) programme meant that science-orientated activities increased from about 25% to 31% of the budget between FP7 and H2020. Industrial leadership accounts for 21% of the H2020 budget, though many industry-relevant themes have been continued within the new Societal Challenges pillar, which has the largest slice of the budget (39%).

A major objective of H2020 is to support bridging the innovation gap in Europe by making better use of its innovation instruments. The H2020 policy toolbox covers almost the whole spectrum of public policy measures in the field of R&I. H2020 employs both supply- and demand-side instruments in its support to innovation. Demand-side actions are intended to complement the technology push of the R&I initiatives. They include pre-standardisation or pre-commercial procurement of innovative solutions (i.e. the co-funding of Pre-commercial procurement (PCP) and Public procurement of innovative solutions (PPI) actions), standardisation and other user-centred measures to help accelerate the deployment and diffusion of innovative products and services into the market (such as the Innovation Inducement Prizes).

In addition to the two major funding instruments, Research and Innovation Actions (RIA) and Innovation Actions (IA), and the SME instrument (a new bottom-up innovation instrument), H2020 provided new financial instruments operating on the demand side and also developed a range of "linkage instruments" such as forward-looking activities and foresight (including embedded foresight in, for example, joint programming or innovation partnerships), cross-sectoral networks and brokerage activities, innovation observatories and policy learning networks. These "linkage" instruments support cross-cutting networks to respond to societal challenges, e.g. encouraging collaboration between different disciplines and sectors and supporting links between established and emerging networks.

The organisational structure of H2020 around the challenge areas is geared towards facilitating and fostering these "interlinkages", i.e. multi-disciplinary and multi-sectoral collaboration. Addressing societal challenges, while simultaneously enhancing industrial competitiveness and supporting excellent basic research, is at the core of H2020. The H2020 programme is structured around three main pillars (Excellent Science, Industrial Leadership and Societal Challenges) and holds dedicated budget lines also for the programmes "Spreading excellence and widening participation" and "Science with and for society", the European Institute of Innovation and Technology (EIT), the pilot project "Fast track to innovation" and the non-nuclear direct actions of the Joint Research Centre (JRC), see Figure 2.

H2020 increasingly aims to foster links between R&I, public and private actors and among European, national and regional R&I systems. There is an increasing number of network and partnering initiatives at European level, which can be grouped into two categories.

- *Innovation-related initiatives* bringing together R&I actors, i.e. the European Technology Platforms (ETPs), the Contractual Public-Private Partnerships (cPPPs) and Joint Technology Initiatives (JTI), and the European Innovation Partnerships (EIP)
- *Public-Public Partnerships*, i.e. initiatives coordinating national policy makers such as the Joint Programming Initiatives (JPIs), Article 185 actions and ERA-NETs

The major change that occurred with H2020 is the increased emphasis on the creation of coherence and synergy among these initiatives, as well as between the initiatives and H2020. Another development was the strengthening of the initiatives' alignment with Europe's higher-level policies, in particular Europe 2020. The Strategic Research and Innovation Agendas (SRIAs) established by ETPs, JPIs and EIPs are now considered key elements of the external advice and societal engagement needed for the implementation of the FP. H2020 also (co)funds the R&I activities that implement these SRIAs, upon condition of a clear commitment by the participants in the PPPs and the JPIs. This encourages alignment of the H2020 work programme with needs in the stakeholder communities but also tends to align some private and public national funding towards the Europe 2020 objectives.

2.2 Previous evaluations of Norwegian FP participation

This section discusses past Norwegian experience with the FPs. It does not attempt to consider the current situation, since that is analysed in detail later in this report. Rather, it explores the process of learning to be successful.

The FPs involve a substantial reorientation of Norway's international research relationships. Before World War II, Norway's main cultural and scientific links were with Germany. That relationship ended abruptly on 9 April 1940. During and after the war, links were built with the UK and the USA, which were the dominant international scientific partners in the post-War period – despite the continuous cooperation, both informal and formal, with the other Nordic countries. Participating in the FPs therefore represented a reorientation and a reconnection with continental Europe that required building up new networks.

2.2.1 FP2–4

Norway initially participated in certain of the Specific Programmes in the FPs on a self-funding basis under a framework agreement on science & technology cooperation between Norway and the EU. From

1994, with the signature of the EEA Agreement, Norway became a full participant in the FPs. NIFU's report "A Sky full of Stars" reviewed Norwegian experience with Specific Programmes of the FPs up to 1996–1997, i.e. the period of the framework agreement and the first couple of years of FP4, which started in 1994.[4] RCN set up the EU-Forskningsinfo advisory function in 1992, based on an existing Danish model. In this period, RCN awarded "*posisjoneringsmidler*" to universities to help them establish networks and relationships in the FPs.

In FP2–3, the largest group of Norwegian participants was the research institutes, followed by the universities, whereas industry was barely represented. In FP2, Norway was involved in about 2 percent of FP projects, but by the start of 1996 this had increased to some 6 percent. Industry started to be more involved by the start of FP4, with almost one third of Norwegian project participations in 1996–1997 being from companies. About 23 percent of participations were by universities, but the leading group remained the institutes (38%). For the whole period covered by the report, Norway was most strongly represented in themes that reflected national priorities and strengths, notably marine and maritime, transport, energy and parts of electronics.[5] The UK was Norway's biggest partner in the FPs, followed by Germany, France, Italy, the Netherlands and Sweden. To a considerable extent this list simply reflects the fact that large countries have more potential partners than small ones. However, the ranking and presence of the UK, the Netherlands and Sweden suggest that links to these countries were stronger than would be suggested simply by their size.

NIFU's survey of participants in 1996 showed that the three most important reasons researchers gave for participating in FP4 were access to funding, networks and knowledge in other countries. Success in getting into the FP networks required experience. All participants had previously conducted research using national funding, but FP projects were usually more interdisciplinary than their national work. Almost all (86%) Norwegian coordinators had managed international research collaborations before. Success was cumulative: one FP project tended to lead to another. Norwegian project leaders in FP3 felt well positioned to participate in FP4, based on the experience and networks they had accumulated.

One result of this was that 65 percent of Norwegian participants said they had been contacted by others and invited to join a consortium. Still, 45 percent said they had heard of the consortium through EU-Forskningsinfo or RCN. Just under 50 percent themselves approached other partners, while only 9 percent thought it was hard to find partners. Norwegian participants' most frequently used information sources were foreign colleagues with FP experience and EU-Forskninsinfo. Despite growing experience in the Norwegian community, the type of advice sought was often rather basic, focusing on formal and administrative requirements, reflecting the limited extent of their familiarity with the FPs.

The institutes formed a special category among Norwegian FP participants, reflecting their experience in contract research markets. They valued the "quality label" that FP participation gave them. They put more time into FP proposals than the universities, but they struggled to meet the co-funding requirements of the FP at the time, since they had very little core funding compared with institutes in most other European countries.

While Norway formally had no role in FP design, in practice it emerged that Norwegians could nonetheless exert influence at the programme level by conscientiously participating in programme committees and expert groups, and NIFU recommended that people should make an effort to do so.

2.2.2 FP5

FP5 distinguished itself, among other things, by a greater focus on societal problems and thus a greater role for social science than its predecessors. However, the overlaps between Norwegian and FP thematic priorities remained limited. Norway accounted for 2 percent of all project participations and was present in 7 percent of all projects. The NIFU, STEP and Technopolis report indicated that the financial return – in the sense of the proportion of Norway's financial contribution to the FP that returns to Norway in

4 I. Hagen, A. Kaloudis, H. Olsen, H. Simonsen, E. Sjønnesen and R. Søgnen, "En himmel full av stjerner: EUs rammeprogram for forskning og utvikling. En evaluering av norsk deltagelse i utvalgte særprogrammer", NIFU, 1997.

5 The programmes involved were MAST, TSER, ACTS, JOULE and TRANSPORT.

the form of FP project funding – was about 90 percent, but pointed out that the costs of administration (10%) and the commitment to the JRC (5%) together meant that only 85 percent of the FP budget was contestable, so a 90 percent return was more than would be needed to "bring back" the addressable part of Norway's subscription to the FPs.[6]

As before, the institutes were the biggest beneficiaries of FP5, though their share of participations fell from 43 percent in the first three years of FP3 to 37 percent in FP5. While the number of SMEs participating rose in response to the SME increased focus in FP5, large Norwegian companies reduced their participation compared with FP4. Compared with its notional financial contribution to each programme, Norway was in FP5 over-represented in ENVIRO and ENERGY and under-represented in IST and GROWTH.

The responses to survey questions about participants' use of support mechanisms at the stage of applying to the FP suggest considerable learning since FP3. Participants were now able to find their way using Commission sources and appeared to supplement this in some cases with advice from other knowledgeable people – presumably about "softer" questions than those which can be answered using official information sources. At this point, only 12% found EU-Forskningsinfo useful.

2.2.3 FP6 and FP7

The most recent evaluation covers FP6 and the first two years of FP7 (2007–2008).[7] In FP6, Norway contributed €365m (€336m, if adjusted for administration costs and the JRC), obtaining a return of €284m (78%). The average contribution was €223k per project, compared with an EU average of €250k. Norway had 1.8 percent of all participations and was involved in 8.4 percent of the projects. That compared with 6.6 percent of the projects in FP5, but FP6 was organised into fewer, bigger projects than its predecessors. Norway coordinated 149 (18%) of the 834 projects in which it was involved.

Another effect of the larger projects was an apparent increase in the size of project networks. Thus, Norwegian participants had links to 5,933 project partners in FP5, but 23,557 in FP6. Norway had the largest number of project links with the UK (13%), Germany (12%), France (11%), Italy (8.5%) and the Netherlands (7%). The tendency for some projects to be extensions of previous FP work continued, with 16 percent of the projects with Norwegian involvement being such extensions.

The Norwegian success rate was 25 percent – well above the overall rate of 18 percent. However, much of this difference was probably the result of the large number of participations by SMEs. Norwegian participation was above the level needed for a *juste retour* in the FOOD, SUSTainable DEVelopment, CITIZEN and SME programmes. Norway was also prominent in the ERA-NETs and the programme of Support for the Development of Coherent Policies.

In the first two years of FP7, the average contribution to Norwegian participants rose to €302k. Norway's overall success rate was 22 percent, compared with an overall level of 18 percent for the FP as a whole. As in earlier FPs, Norway's main focus was on collaborative R&I projects, with little participation in the Marie Curie programme for researcher mobility. In the first two years of FP7, Norway's participation in ICT, NMP, ENERGY, TRANSPORT and SECURITY was high, continuing earlier foci but with the addition of SECURITY, which was a new topic in FP7.

Table 1 summarises the pattern of Norwegian participation in FP5, FP6 and the start of FP7. It continues the earlier pattern of dominance by the institutes, with the shares of the universities and the institutes being roughly similar in terms of contribution, but with the number of industrial participations being somewhat greater than the number of university participations. This is largely an effect of Norway's success in SME programmes. Large companies participate little in the FP, with only Telenor and Statoil generally having a significant presence.

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6 "Evaluation of Norway's Participation in the EU's 5th Framework Programme", NIFU, STEP and Technopolis, 2004.

7 H. Godø, L. Langfeldt, A. Kaloudis et al, "In Need of a Better Framework for Success: An evaluation of the Norwegian participation in the EU 6th Framework Programme (2003–2006) and the first part of the EU 7th Framework Programme (2007–2008)", NIFU, 2009.

Table 1 EU contributions to Norwegian participants and numbers of Norwegian participations, FP5-7.

	HEIs		Industry		Other		Institutes		Total	
Contribution €m										
FP5	63	25%	73	29%	9	4%	103	42%	248	100%
FP6	80	28%	72	25%	24	8%	108	38%	284	100%
FP7 (2007–2008)	43	26%	44	26%	10	6%	71	42%	168	100%
Participations										
FP5	376	24%	503	32%	111	7%	581	37%	1,571	100%
FP6	316	25%	403	32%	143	11%	412	32%	1,274	100%
FP7 (2007–2008)	130	23%	175	31%	69	12%	184	33%	558	100%

Source: "In Need of a Better Framework for Success".[8]

NIFU's evaluation report did not devote much attention to the measures to support national participation in the FP. The researcher survey did, however, ask about strengths and weaknesses in the proposal process, giving an indirect view of the degree to which support was needed. It painted a picture of a community that had largely got to terms with the FPs, which was able to find partners, connect the FP work with its own R&I agendas and bring appropriate people to the task. There were clearly some institutions that were not up to speed on proposal management or administration, but the majority coped with these issues. Organisations in the HE sector were rated more poorly than others on these dimensions.

2.2.4 Trends across the period

Norwegian participation in the FPs has involved enthusiastic contribution to the development and articulation of the FPs and related policy, both by the Norwegian authorities and through the contributions of the wider research policy community within FP6 and FP7. As a non-Member country it has the right to be a speaking, but non-voting member of programme committees and the like. As a small country, Norway would never expect to have a major influence on the design and content of the FPs. However, despite its formal position as an Associated State, it is clear that Norwegian policymakers and participants in practice are very involved in the various committees and groups that influence the FP and related policies of the EU. A strong (if qualitative) impression from Norway's role in these *fora* is of a Norway striving to be "the best kid in the class" in terms of participation. A more objective indicator is Norway's high participation in the ERA-NET programmes in recent FPs, since these are formal policy learning *fora*. It is, however, difficult for a small country to maintain such an effort, given the limited number people who can be committed to it and the resources of RCN, for example, have sometimes been stretched by the effort.[9] It is difficult to produce clear evidence that this investment has been worthwhile, but it appears to be viewed positively both in Oslo and in Brussels.

The FPs have realigned at least some of Norway's international links. Over time, the FP partnership pattern appears increasingly to reflect the relative size of the other countries participating, suggesting that Norway is increasingly well-integrated into EU R&D communities. The growing size of the researcher networks into which the FPs integrate Norway point in the same direction. However, there is a persistent problem of low Norwegian researcher mobility identified more widely by RCN many years ago, and still reflected in Norway's low participation in the Marie Curie programme.

The institutes continue to account for a large share of Norwegian participation, in line with their significant role in the research system and the economy. Given their role as intermediary institutions, this is probably positive because it provides an internationally embedded set of somewhat applied

8 Ibid.

9 E. Arnold and B. Mahieu, "A Good Council? Evaluation of the Research Council of Norway", MER, 2012.

research capabilities to industry and government. Business participation really only started with FP4 and has been dominated by SMEs. For the SME sector that is probably a benefit. In any small, open economy it is important for firms to be well-linked internationally. However, the weakness of large-firm participation is evident, and it is to some extent driven by the structure of Norwegian industry. Strengthening large-company participation depends more upon raising the R&D intensity of Norwegian industry than on support measures to participation. It is a truism that it is very hard to build capacity in a competitive environment such as the FPs. It follows that this has to be a matter for domestic policy measures.

The thematic focus of Norway's strengths in the FPs has changed somewhat over time. Specifically Norwegian issues such as marine and maritime are now less at the forefront. However, Norway has been consistently strong in transport, energy and environment. Participation in ICT and ICT applications-related areas has been lower than might be expected given their importance in both Norway and the global economy, perhaps reflecting limited national research funding in these areas. While it is of minor economic importance in the context of the FPs, Norway's strengths in social science and R&D policy are reflected in activities in FP6 and FP7.

Norway's high success rates are consistent with the evidence about how researchers see the support system. In the early days, that system helped with basic information about the FPs, but it is clear that the community quickly learned how to find – or often to be invited to be – partners. Most institutions have internalised the more tacit knowledge and the networking skills needed to succeed. While there appear to be laggards among the institutions, in general there seems to be little need for support of a basic kind. There may be more scope for improving researchers' ability to deal with intra-research issues, but that can only be tackled by the institutions themselves. However, the SME sector is one where there is a constant supply of newcomers who need to learn and the fewest internal resources, so it is the most likely to be the one in persistent need of external support.

2.3 Research and innovation landscapes

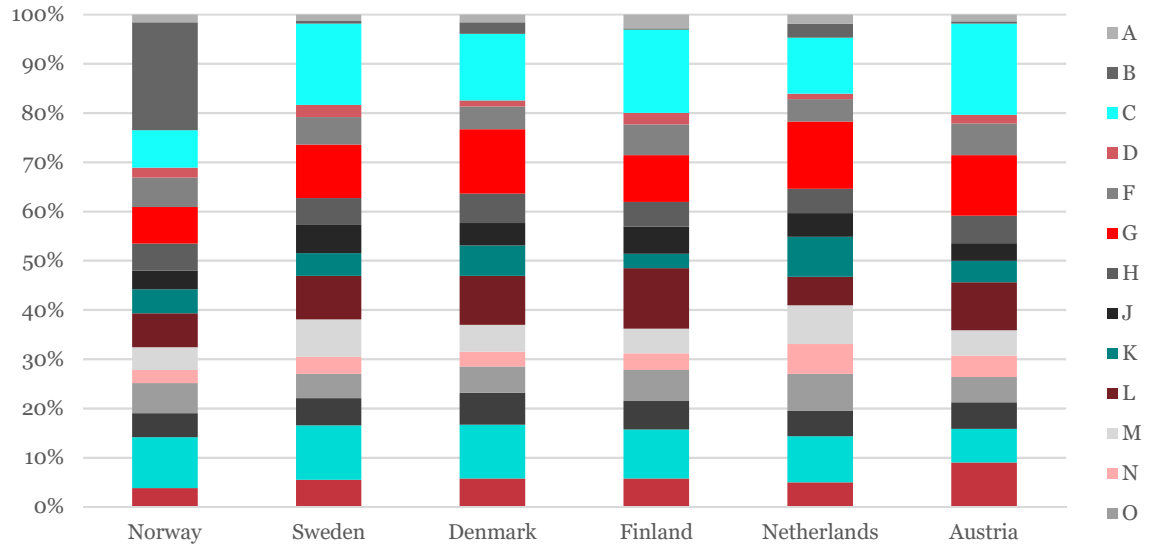
This section aims to paint an overall picture of the R&I landscapes of Norway and its five comparator countries, and to highlight important differences between countries. The main rationale for presenting such data is to assist in understanding and interpreting results subsequent presented, for which reason this section does not include more than basic analyses. (As far as data availability allows, Chapters 3–5 will present equivalent data for the respective topic areas.)

2.3.1 Financial dimensions

Figure 4 shows the gross value added (GVA) of Norway and its comparator countries broken down onto main industry sectors or ISIC categories, cf. Table 2. For the purposes of this study, there are two main differences between Norway and its comparator countries. On the one hand, Mining and quarrying (B) accounts for as much as 22 percent on Norway's GVA, thus making it far more important than in all comparator countries. The dominance of this ISIC category is mainly explained by the subcategory Mining and quarrying of energy producing materials (i.e. oil and gas), which accounts for 91 percent of category B. On the other hand, Manufacturing (C) accounts for a mere 8 percent of Norway's GVA, which is significantly less than in the other countries.

Figure 4 illustrates long-term trends in research intensity (the share of Gross Domestic Expenditure on Research and Development (GERD) in Gross Domestic Product (GDP)) for Norway and its comparator countries.

Figure 3 GVA by main ISIC categories in 2014.



Source: OECD.Stat.

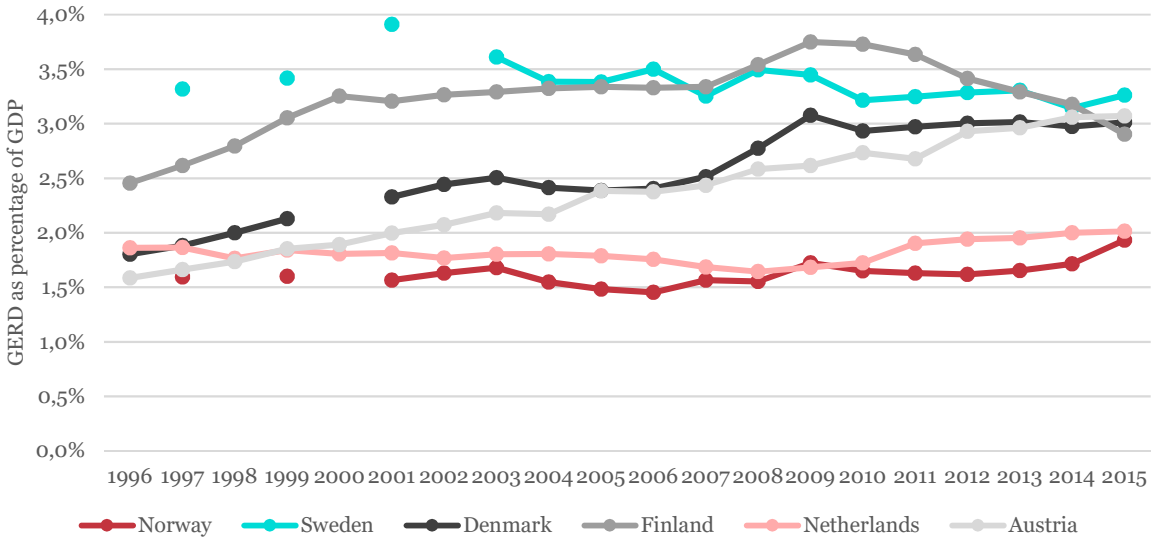
Norway's research intensity has been relatively stable over these two decades, but in all years except one it has had the lowest research intensity of the six countries, despite an increase in recent years. The Netherlands' research intensity has also been relatively stable and at a level similar to Norway's. In 2015, the other four countries had around 50 percent higher research intensity than Norway (and the Netherlands), but their long-term trends have differed significantly. While Austria and Denmark have gradually increased their research intensities dramatically, Sweden and Finland have seen gradual increases revert into decreases over the years, in large part due to outsourcing of R&D by, and/or general misfortunes of, dominating multinationals. Norway's relatively low research intensity may in part be explained by oil-and-gas–dominated GDP (cf. Figure 3) and the fact that the oil and gas industry does not engage in R&D in proportion to its contribution to GDP, but it is nevertheless clear that its research intensity hardly has increased at all over the last two decades (and the same applies to the Netherlands).

Table 2 ISIC categories in Figure 3.

ISIC category	Description
A	Agriculture, forestry and fishing
B	Mining and quarrying
C	Manufacturing
D	Electricity, gas, steam and air conditioning supply
F	Construction
G	Wholesale and retail trade, repair of motor vehicles and motorcycles
H	Transportation and storage
J	Information and communication
K	Financial and insurance activities
L	Real estate activities
M	Professional, scientific and technical activities
N	Administrative and support service activities
O	Public administration and defence; compulsory social security
P	Education
Q	Human health and social work activities

Source: OECD.Stat.

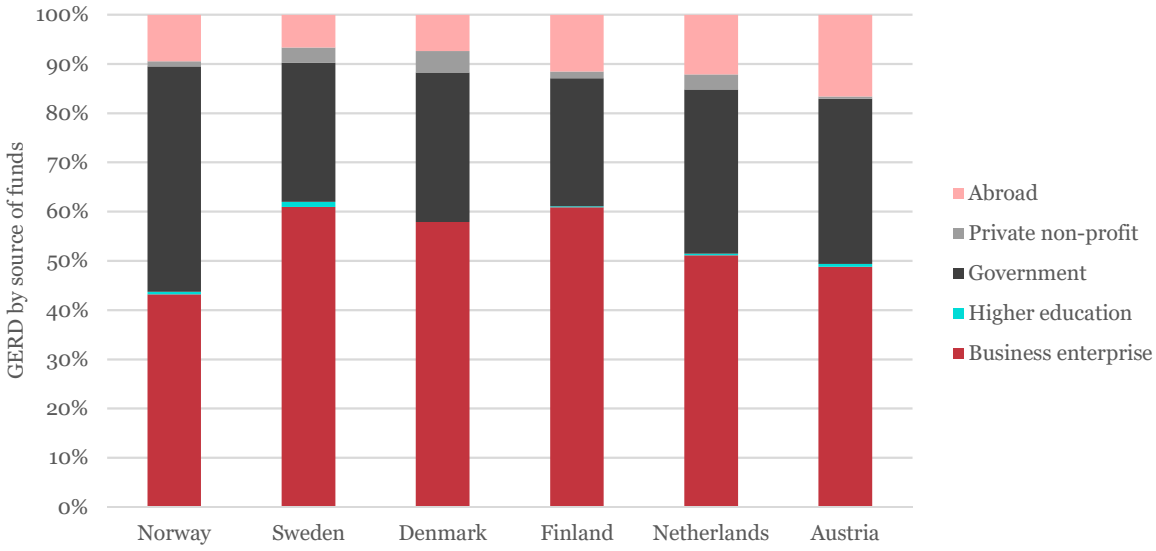
Figure 4 GERD as percentage of GDP.



Source: UIS.

In all countries but Norway and Austria, the majority of research and development (R&D) is funded by industry (business enterprise), see Figure 5. Swedish and Finnish industries invest the most relatively speaking (61%), whereas Norwegian industry accounts for a mere 43 percent, which is in part of course explained by the country's industry structure (cf. Figure 3). In Norway, the government funds almost half of all R&D (46%), whereas the proportion is significantly lower in Finland (26%), Sweden (28%) and Denmark (30%). Netherlands and Austria lie in-between in this respect.

Figure 5 GERD by source of funds in 2013.

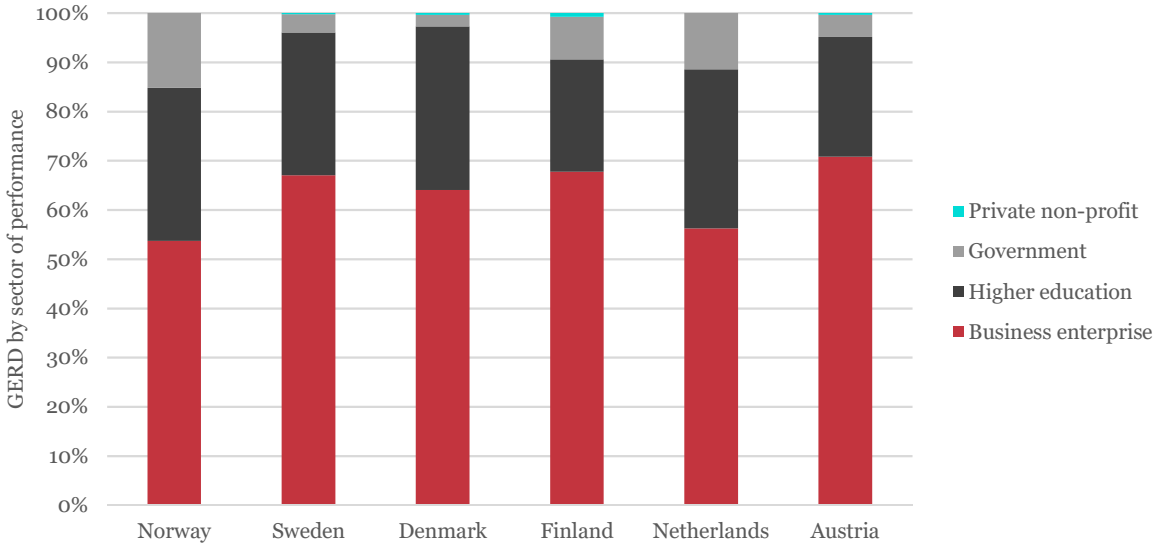


Source: UIS.

Figure 6 shows GERD by sector of performance, illustrating that in all six countries most R&D is conducted by industry. Austria has the highest proportion (71%), followed by Finland, Sweden and Denmark at almost as high a level, whereas Norway has the lowest proportion (54%), with the Netherlands at about the same level. (Again, this is in part explained by Norway's industry structure). When it comes to the proportion of R&D that is performed by higher education institutions (HEIs),

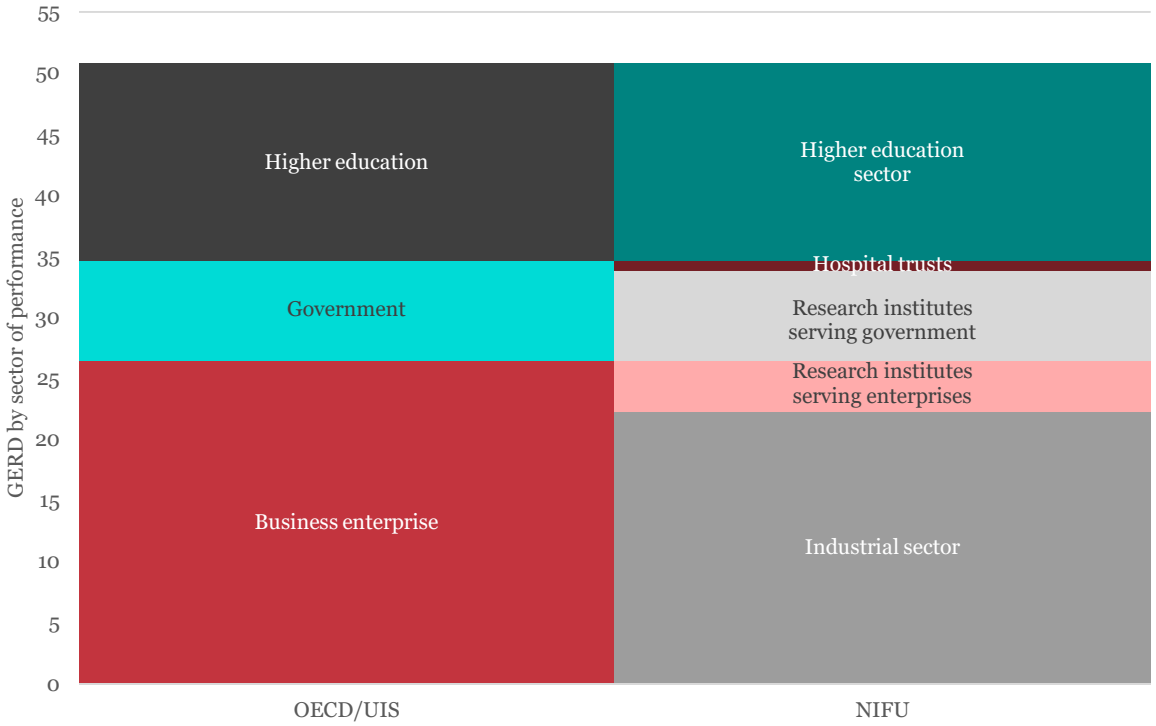
Denmark is on top (33%), followed by the Netherlands, Norway and Sweden at similar levels, whereas Austria and Finland have markedly smaller proportions.

Figure 6 GERD by sector of performance in 2015.



Source: UIS.

Figure 7 GERD by sector of performance in 2013 in million NOK.



Source: OECD.Stat/UIS and NIFU.

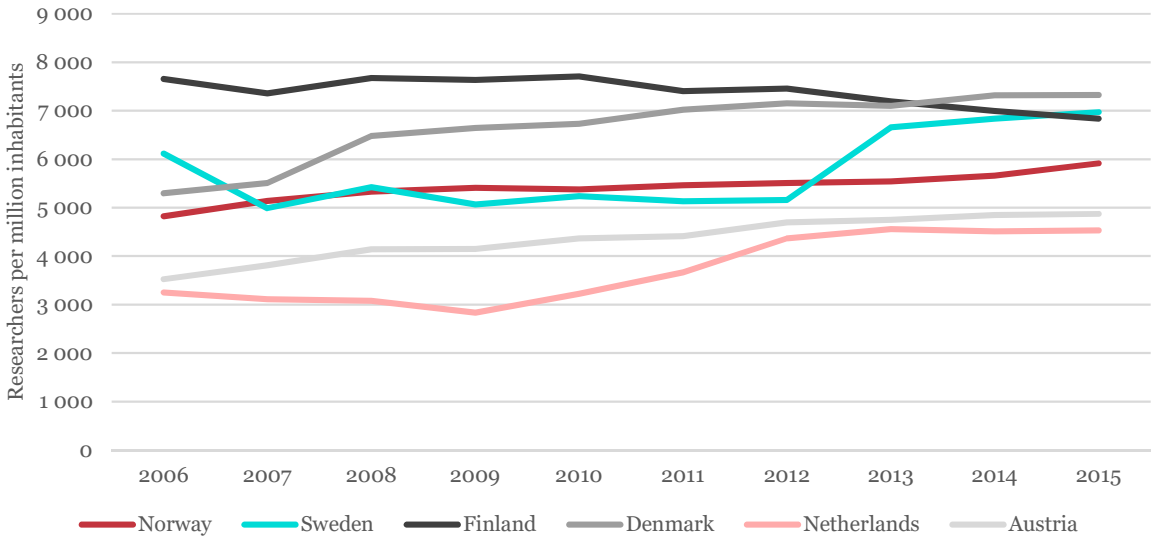
Compared to the other countries Norway has a large institute sector, which accounts for 23 percent of GERD (to be compared to 31% for HEIs). In NIFU's national statistics, research institutes are reported separately, whereas in OECD/UIS statistics they are classified as government or industry depending on whether their main clients are public or private, see Figure 7. Obviously, around two-thirds of the

institutes are deemed to have the majority of their client in the public sector, and a third in the private sector (accounting for 15% of industry GERD in OECD/UIS statistics).[10] The figure also illustrates that hospital trusts[11] are counted as government. The large institute sector thus in part explains Norway's large share of government in statistics (cf. Figure 6).

2.3.2 Human resources

Figure 8 shows the number of researchers per million inhabitants in Norway and in its comparator countries. Norway is in the middle with almost 5,700 researchers per million inhabitants, significantly below its nearest neighbours at around 7,000 researchers per million inhabitants, but comfortably above Austria and the Netherlands at around 4,600 researchers per million inhabitants. All countries but Finland have seen an increase over the last decade.

Figure 8 Researchers (full-time equivalents, FTE) per million inhabitants.[12]



Source: EuroStat.

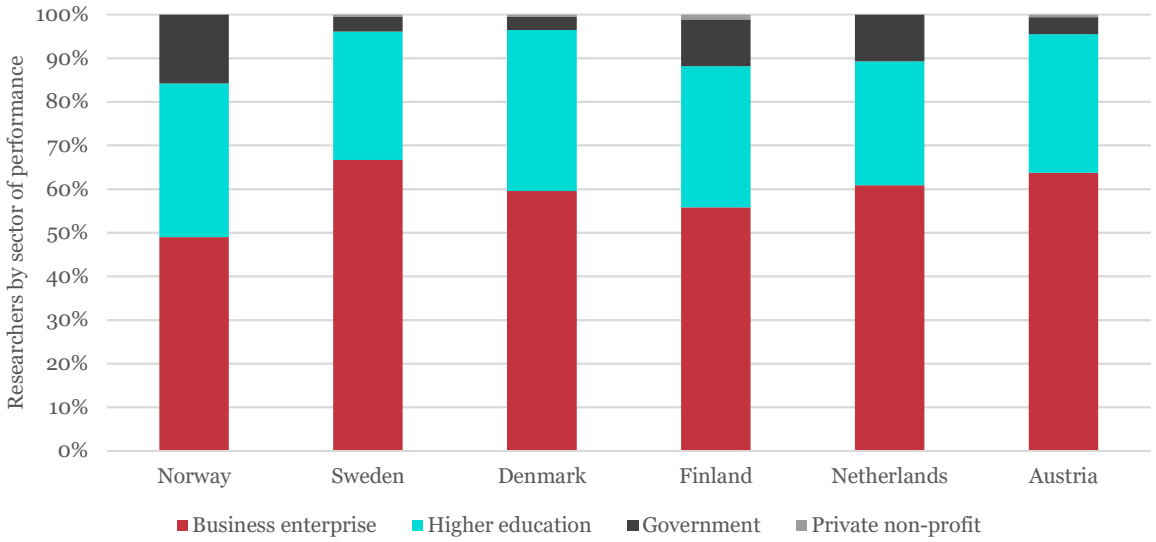
Figure 9 illustrates that Norway has the highest proportion of researchers in government, the second highest proportion in HEIs (after Denmark) and the lowest proportion in industry. As discussed above, the low proportion in industry is in part explained by Norway's industry structure, and the high proportion in government by a large part of Norway's large institute sector being classified as government (cf. Figure 7).

[10] The institutes serving government include all the environmental, all but one of the social science, all but two of the primary industry institutes, and three of the technical-industrial ones, as well as 36 "other institutions". The institutes serving enterprises thus comprise the remaining technical-industrial, primary industry and social science institutes, as well as seven "other institutions". Source: NIFU.

[11] Norway has four state regional health authorities (*regionale helseforetak*) that together own a number of hospital trusts (*helseforetak*) and specialised health care services (*spesialisthelsetjenester*). It is mostly individual hospitals, in general university hospitals, that participate in the FPs, and for the purposes of this report we refer to all participants from this sector as hospital trusts.

[12] The increase in number of researchers in Sweden in 2013 is partly due to an increase in the number of researchers in the HE sector, but also due to a reclassification resulting in technical experts being included in the researchers' category Source: *The Swedish Research Barometer 2016*, Swedish Research Council; e-mail exchange with Statistics Sweden 13 April 2017.

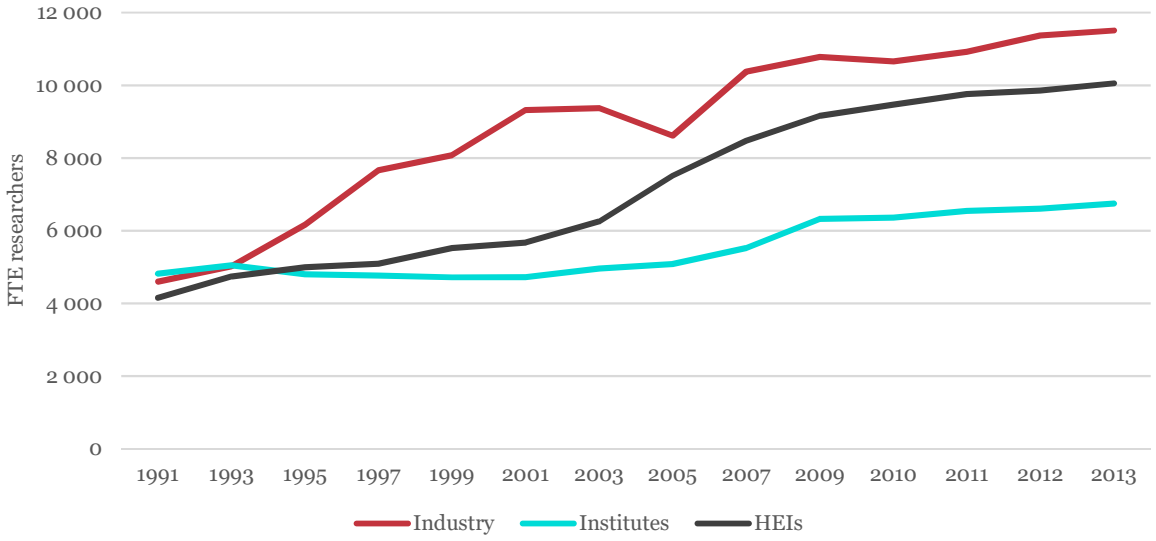
Figure 9 Researchers (FTEs) by sector of performance 2014.



Source: UIS.

Figure 10 shows that the number of full-time equivalent (FTE) researchers in Norway has increased in all three sectors between 1991 and 2013, most in industry (150%) and in the HE sector (142%), and much less in research institutes (40%).

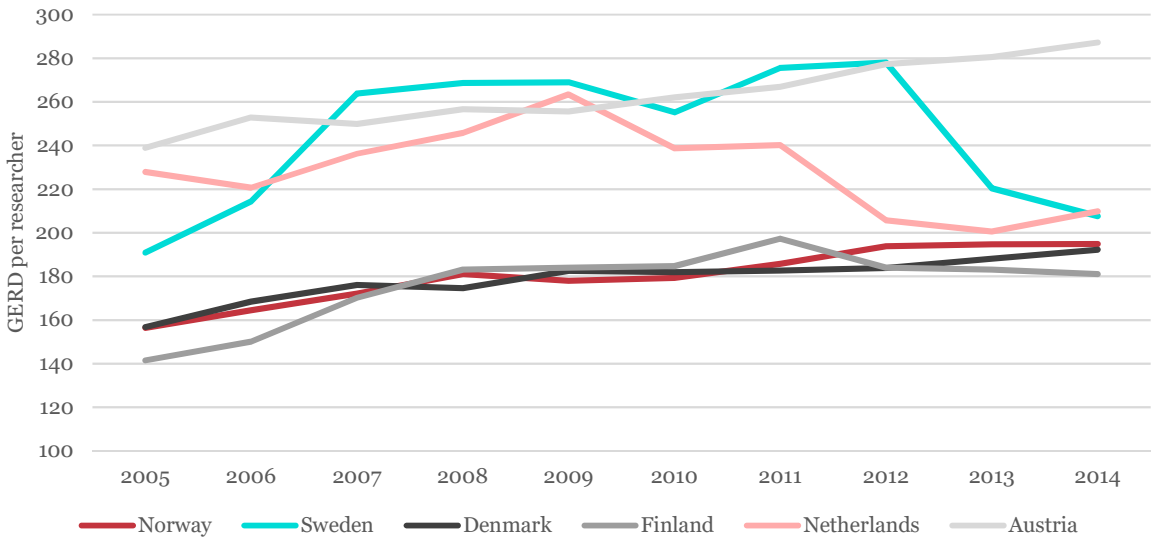
Figure 10 Researchers (FTEs) by sector of performance in Norway.



Source: NIFU.

In simple terms, Figure 11 shows how much resources each researcher has at his/her disposal (adjusted for purchasing power parity (PPP) US$). With the notable exception of Austria, GERD per researcher did not seem to vary greatly between the countries in 2014, although the developments for the Netherlands and Sweden make conclusions on trends difficult (the trends over the last few years appear to correlate with the increase in researchers; cf. Figure 8).

Figure 11 GERD per researcher, FTE (in thousand current PPP$).



Source: UIS.

2.3.3 Quality

There are no direct and uncontroversial indicators for quality in R&D, so we must resort to different proxies. We have chosen to study bibliometric indicators as a measure of quality of scientific research (mainly conducted by HEIs, health trusts and research institutes), intellectual property (IP) indicators as a measure of degree of innovation (mainly in industry), and success rates in FP proposals as a measure of quality of proposals (almost two thirds submitted by HEIs and research institutes and one third by industry). In this section, we present some indicators for the first two categories, whereas success rates in FP proposals are presented in Section 2.4.2.

Table 3 presents key bibliometric indicators based on analyses of data from Web of Science bibliometric database. In terms of number of publications per capita, Denmark is by far the scientifically most productive among the six countries, with Norway in third place (in all subject areas). However, Norway's productivity growth in number of articles (not per capita) has been second highest among these countries in both decades studied.

Table 3 Number of scientific publications, publications per capita and percentage of world production in 2015, and relative growth in number of publications 1995–2005 and 2005–2015.

	Number of publications	Publications per 1,000 inhabitants	Percentage of world production	Growth in publications 1995–2005	Growth in publications 2005–2015
Norway	12,887	2.53	0.61%	5.0%	9.4%
Sweden	27,034	2.81	1.29%	3.0%	5.7%
Denmark	18,322	3.26	0.87%	4.1%	9.9%
Finland	13,215	2.43	0.63%	4.3%	5.7%
Netherlands	39,950	2.37	1.90%	4.0%	6.5%
Austria	15,533	1.83	0.74%	6.6%	7.2%

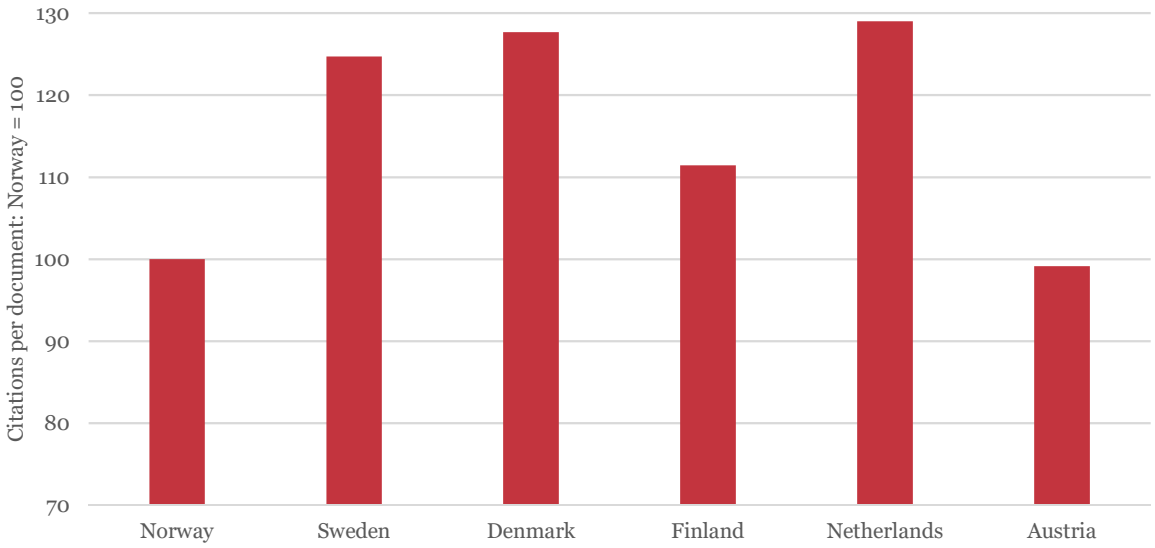
Source: Indikatorrapporten.[13]

Figure 12 shows the average number of citations per scientific publication (in all subject areas) between 1996 and 2015 normalised for Norway, based on the Scopus bibliometric database. Dutch, Danish and

[13] "Det norske forsknings- og innovasjonssystemet – statistikk og indikatorer", RCN, 2016.

Swedish publications are most highly cited, whereas Austrian and Norwegian publications are the least cited.

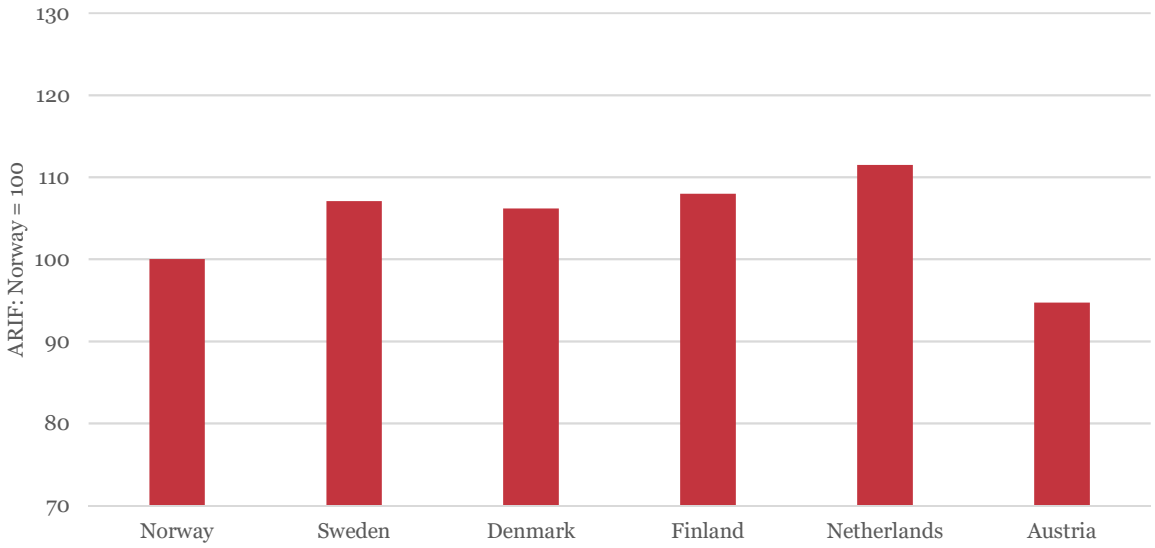
Figure 12 Number of citations per publication 1996–2015.



Source: SCImago Journal & Country Rank.

Figure 13 presents data on Average of Relative Impact Factor (ARIF), again based on Scopus data and normalised for Norway. ARIF is a field-normalised measure of the scientific impact of publications produced by a country, which may serve as a proxy for the "quality" of the research performed by a country. This figure paints a similar picture to the previous figure, with Dutch publications on top and Norwegian ones second to last. The differences between these two figures are mainly due to the analyses concerning different time periods, Figure 12 1996–2015 and Figure 13 2000–2011.

Figure 13 Average of Relative Impact Factor 2000–2011.

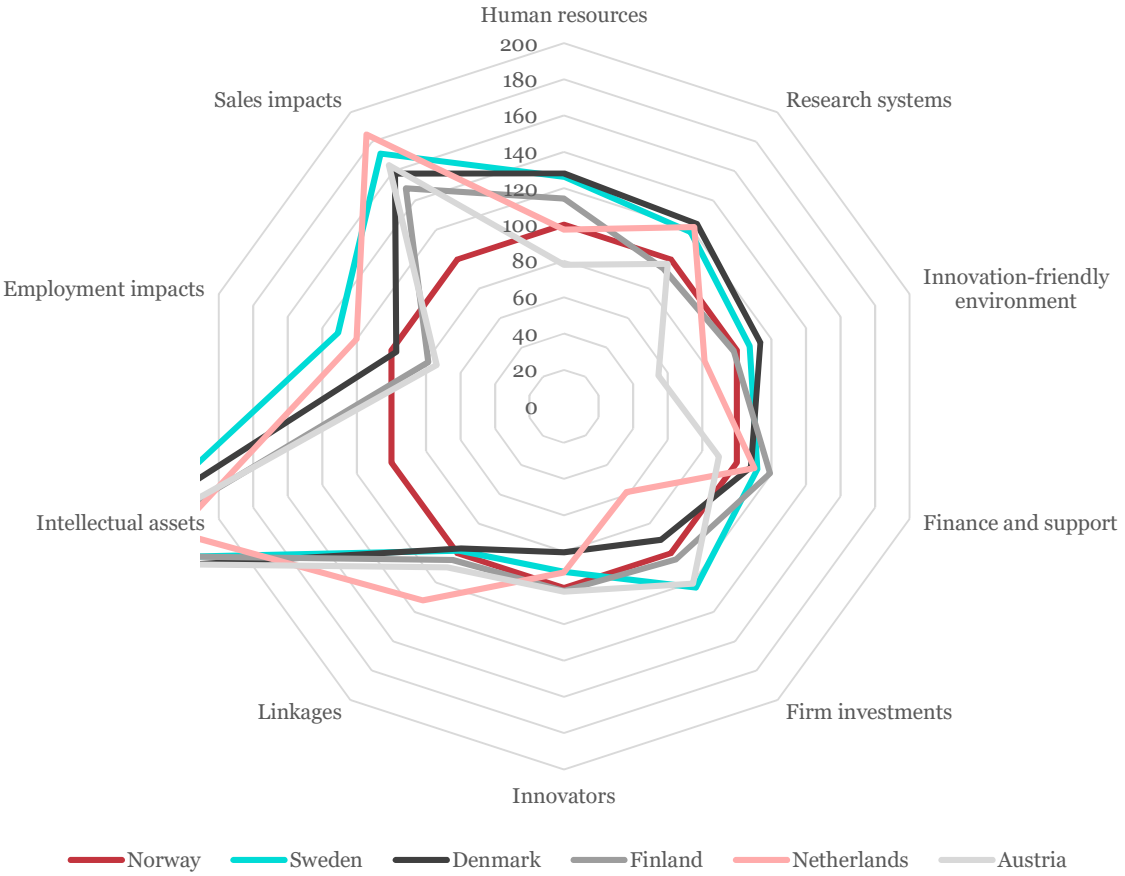


Source: Country and regional scientific production profiles.[14]

[14] "Country and regional scientific production profiles", European Commission, 2013.

The European Innovation Scoreboard (EIS) provides a comparative analysis of the innovation performance of 36 European countries, and assesses relative strengths and weaknesses of national innovation systems. Figure 14 shows the six countries' relative performance in EIS' main indicator categories, normalised for Norway. While Norway obviously compares reasonably well in several categories (the higher the score, the better), EIS' summary innovation index concludes that Sweden, Denmark, Finland and the Netherlands are "Innovation leaders" (ranked as second to fifth, respectively, after leader Switzerland), whereas Austria and Norway are "Strong innovators" (ranked as ninth and twelfth). The indicator category where Norway does worst, intellectual assets, mainly refers to patent and trademark filings, which we investigate in the following three figures.

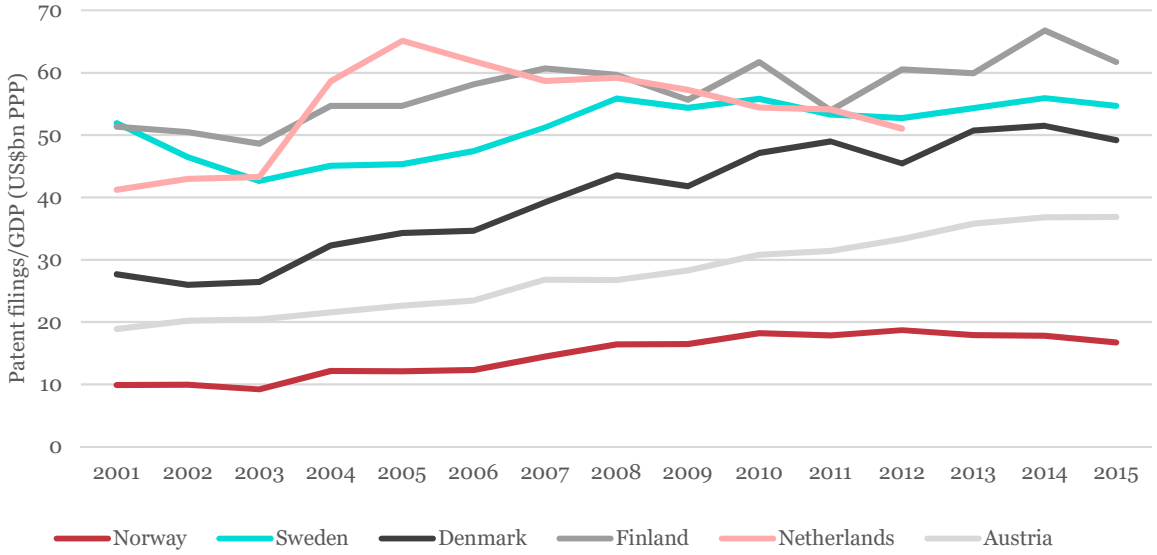
Figure 14 Innovation performance by main innovation indicators. Norway = 100.



Source: European Innovation Scoreboard 2017.

Figure 15 shows patent filings normalised with GDP, indicating that Norwegian organisations – heavily dominated by companies – are far less likely to patent than organisations in all the other countries. However, Norway has seen the same (relative) increase as Austria and Denmark, whereas the other countries have stagnated or declined.

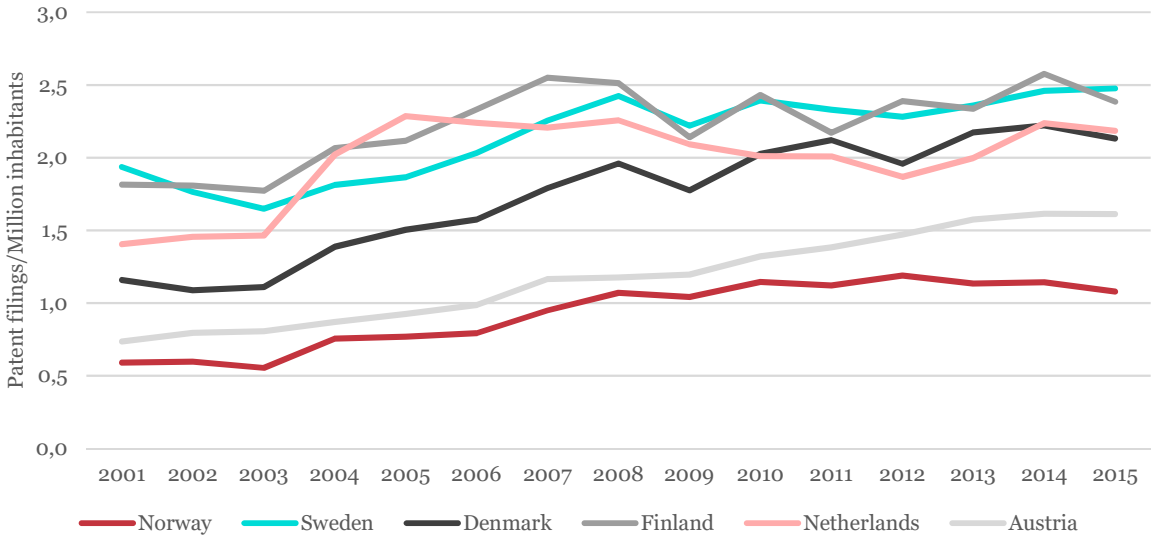
Figure 15 Number of patent filings normalised with GDP.



Source: WIPO Statistics Database.

One may argue that Norway's oil-and-gas–dominated GDP distorts the comparison. However, normalising by population instead of GDP does not alter the picture significantly, see Figure 16; it is obvious that Norwegian organisations are considerably less likely to apply for patents than their counterparts in the other countries.

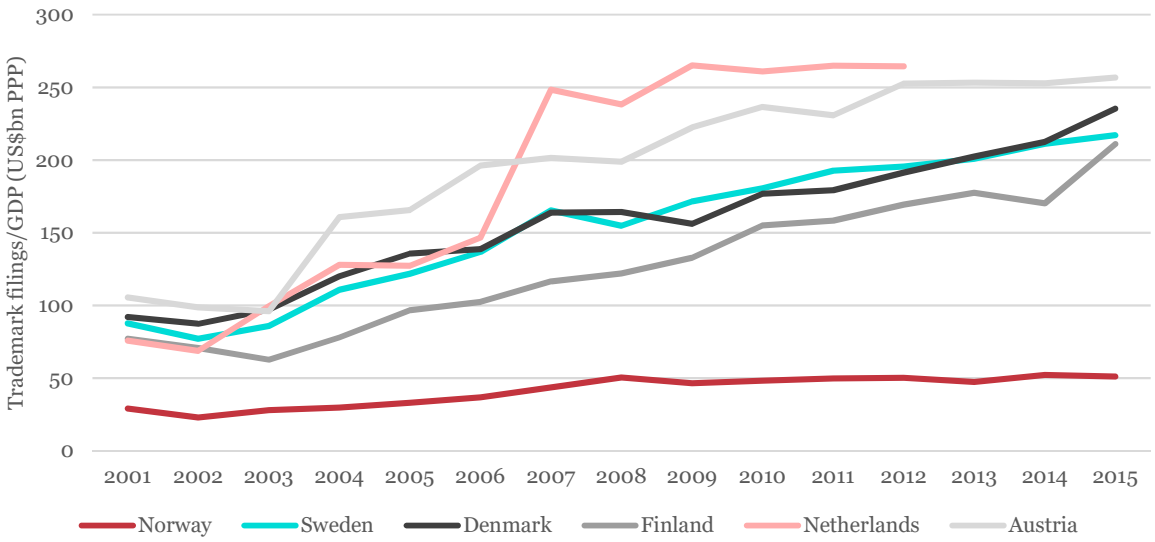
Figure 16 Number of patent filings normalised with million inhabitants.



Source: WIPO Statistics Database and Eurostat.

Figure 17, which shows trademark filings normalised with GDP, also illustrates that Norwegian organisations lag far behind, and the development has stagnated since 2008. In contrast, the other countries, bar the Netherlands, have continuously increased their performance in this respect. (Just as for patent filings, normalising by population only marginally alters the picture (not shown).)

Figure 17 Number of trademark filings normalised with GDP.



Source: WIPO Statistics Database.

2.4 Overall participation patterns in FP7 and H2020

This section presents a selection of overarching analyses of the participation of Norway and its comparator countries in FP7 and H2020. The analyses presented in this section cover FP7 and H2020 overall, and we focus specifically on health, ICT and industry in Chapters 3–5, respectively. The analyses are based on the European Commission's eCorda databases of proposals and projects covering the entirety of FP7 and the first three years of H2020 (data extracted 28 February 2017). Some H2020 proposals that are not currently showing as successful may therefore in fact be awarded grants in the future, and success rates and funding may consequently increase slightly as a result. In the first subsection, we analyse participation in proposals, and in the second we look at proposal success rates and participation in projects. More detailed results of the FP participation analyses (including the data used to draw the figures in this section in table form) are presented in Appendix D, wherein section D.3 provides a high-level summary of Norway's participation in FP7 and H2020.

2.4.1 Participation in proposals

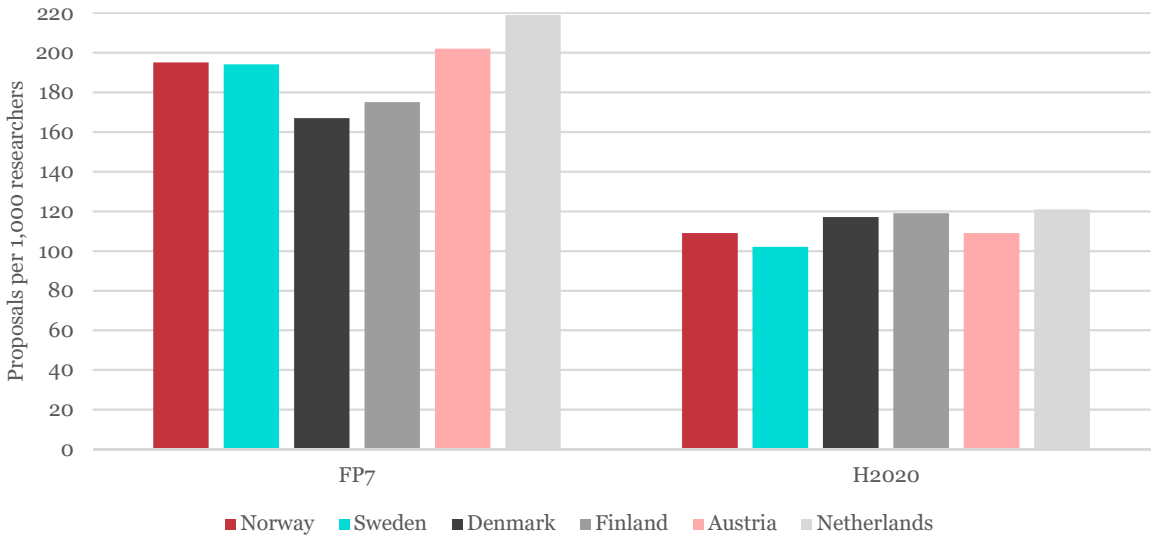
The results of our analysis reported below show that Norwegian actors participate less in proposals in H2020 than their peers in most comparator countries, but they more often take up the role of coordinator. The rate of proposals for which Norwegian actors join forces with each other is similar to the rate in the comparator countries. Participation in H2020 proposals is highly concentrated in Norway and participation of research institutes is higher than in any comparator country. In terms of programmes, the focus for participation in proposals is so far especially on the Governance for the advancement of Responsible Research and Innovation programme (Science with & for society pillar), the Food Societal Challenge, the Biotechnology programme (in the Industrial leadership pillar), and the Research Infrastructures programme (Excellent science pillar). Participation in JTI/JU/PPP proposals is lower than in any comparator country.

By February 2017, Norwegian actors had contributed to 4,410 H2020 proposals, which equates to 3.8 percent of all proposals submitted to the programme during this period. This is slightly lower than the proportion of all FP7 proposals involving Norway (4.5%).

However, to meaningfully benchmark Norway with its comparator countries, we need to weight participation data with some size-related metric. We have elected to use the number of FTE researchers and GDP for such weighting, fully aware that it might be argued that other choices would have been more appropriate in specific cases, such as for close-to-market projects. We have nevertheless opted for

consistency throughout this report. Figure 18 shows that (when normalised) Norway performed better than its Nordic neighbours in FP7, but less well than Austria and the Netherlands. However, so far in H2020 Norway only outperforms Sweden and (marginally) Austria.

Figure 18 Number of FP7 and H2020 proposals involving Norway and its comparator countries normalised with the number of researchers in each country.



Source: Technopolis analysis of eCorda and UIS data.

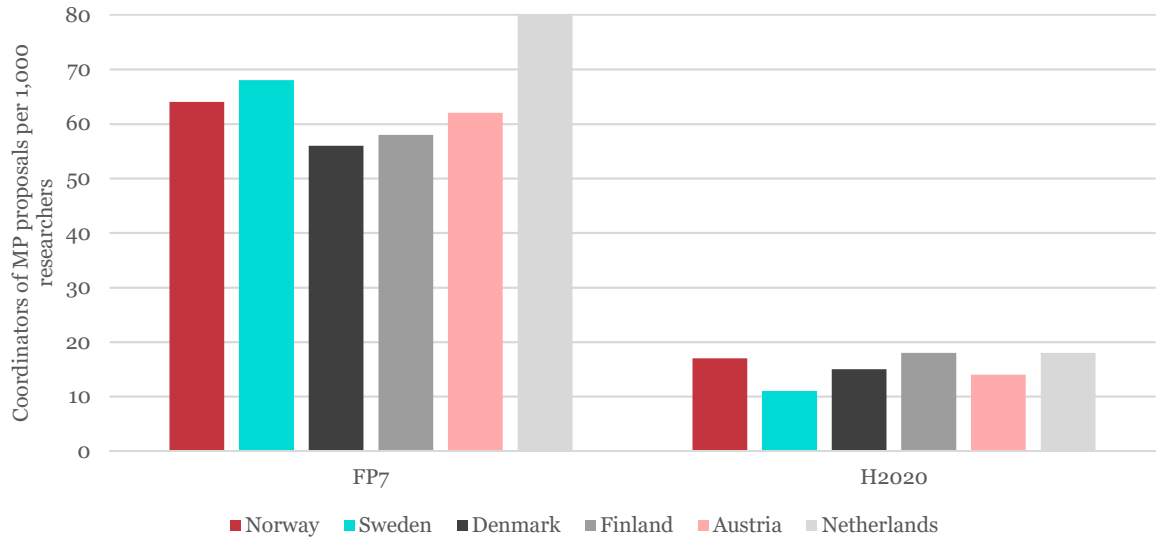
In 41 percent of the H2020 proposals involving Norway, a Norwegian actor has held the role of coordinator. This is a higher rate than in FP7, where just 33 percent of Norwegian proposals were led by a Norwegian coordinator. However, many FP proposals (66 percent in H2020) involve just one participant, who is therefore by default also the coordinator. This is particularly the case in some areas of the programme (e.g. large numbers of ERC, MSCA and SME instrument proposals involve just one participant).[15] These single-participant proposals can therefore give a misleading picture of true proposal coordination rates. We therefore elect to focus on coordinators of multi-partner proposals (i.e. excluding proposals with only one partner).

Norway has participated in 3,267 such multi-partner H2020 proposals, of which 21 percent had a Norwegian coordinator. This is a slightly higher proportion than in FP7 (20%). Figure 19 illustrates that in FP7 Norway performed better than Denmark, Finland and Austria in terms of number of domestically coordinated multi-partner proposals per thousand researchers, but less well than Sweden and the Netherlands. So far in H2020, Norway outperforms Sweden, Austria and Denmark in this respect, but is beaten by Finland and the Netherlands.

On average, H2020 proposals involving Norway included 1.3 Norwegian actors each. During FP7, a similar number of Norwegian actors (1.4) were involved in each Norwegian proposal. These numbers are almost the same in the comparator countries. Norwegian proposals to H2020 also included (on average) 7.9 actors from other countries (i.e. beyond Norway). These partners came from 137 different countries, but with over half (52%) located in Germany, the UK, Spain, Italy, France, the Netherlands and Belgium. Other countries that account for an unusually high proportion of Norwegian partners (unusual compared with their overall levels of participation) include Denmark, Sweden, Finland, Iceland, China and Canada.

[15] Single-partner proposals account for 17,950 (94%) of the 19,165 proposals submitted to the H2020 ERC programme; 22,397 (73%) of the 30,800 proposals submitted to the H2020 MSCA programme; and 28,393 (90%) of the 31,377 SME instrument proposals submitted.

Figure 19 Number of FP7 and H2020 multi-partner (MP) proposals with domestic coordinator for Norway and its comparator countries normalised with the number of researchers in each country.



Source: Technopolis analysis of eCorda and UIS data.

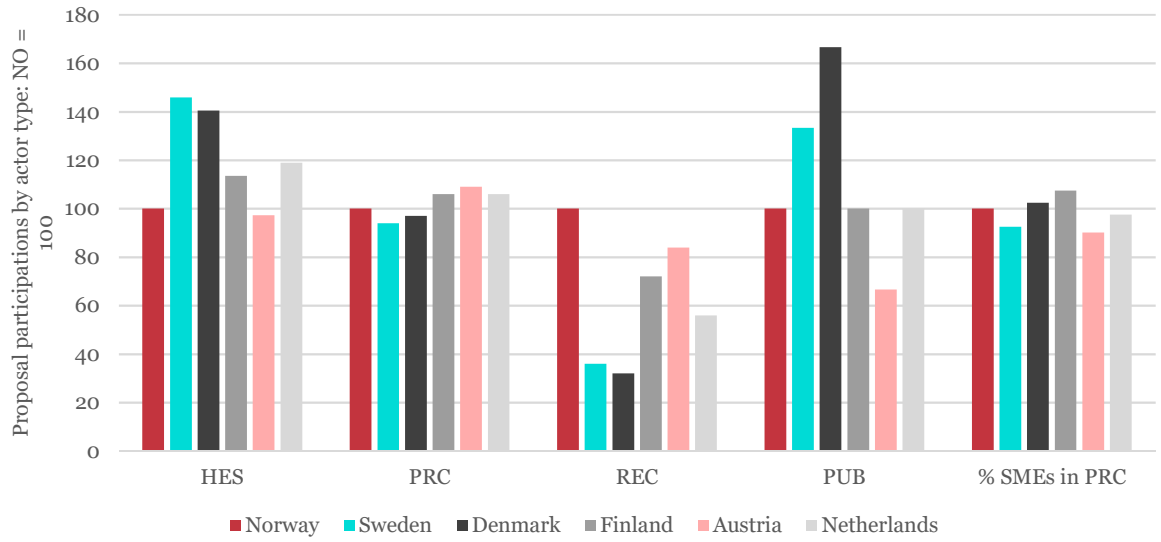
Because of multiple Norwegian participations in some proposals, the total number of Norwegian participations in H2020 proposals (5,797) is a third higher than the number of unique proposals in which Norway is involved (4,410). It is thus possible to analyse the number of individual participations in a manner equivalent to that presented above; such analyses are reported on in Appendix D.3.

So far, 1,179 unique Norwegian organisations ("participants") have participated in H2020 proposals, meaning that each of these actors on average participated in 3.7 proposals. This is a substantially higher rate of proposal participation than the average for H2020 as a whole, where each organisation (on average) participates in just 1.5 proposals each. However, the average of 3.7 proposals per Norwegian organisation masks a concentration of activity among a small number of organisations. More than one-third (38%) of Norwegian proposal participations are accounted for by just seven organisations, who have participated in more than a hundred proposals each. These most active participants are the universities of Oslo (UiO), Bergen (UiB) and Tromsø (UiT), Oslo University Hospital (OUS), the Norwegian University of Life Sciences (NMBU), Norwegian University of Science and Technology (NTNU) and the SINTEF institute group.

Analysing proposals with Norwegian participants using the stakeholder categories available in eCorda[16], we find that HEIs (HES) account for 37 percent of Norwegian proposals to H2020, companies (PRC) for 33 percent, and research organisations for a further 25 percent. (The eCorda stakeholder categories do not correlate so well with the preferred Norwegian classifications. We return to this issue with more detailed analyses in subsequent chapters.) Figure 20 compares the relative distribution of proposers by main eCorda stakeholder categories between Norway and the other countries (in each case the data is normalised, with Norway=100). The figure reveals that Norwegian HEIs (HES) are less active relatively speaking than their counterparts in all comparator countries but Austria. When it comes to companies (PRC), the differences between the countries are rather small, as is the variation in the share of these companies that are SMEs. The most important difference between Norway and the other countries is the high proportion of research organisations (REC), which is no doubt due to the country's large institute sector (cf. Section 2.3.1). It may finally be noted that public organisations (PUB) are considerably more active in Sweden and Denmark than in Norway.

16 HES (Higher or Secondary Education Organisation), PRC (Private for Profit Organisation (excluding education)), REC (Research Organisation), PUB (Public Body (excluding research and education)) and OTH (Other).

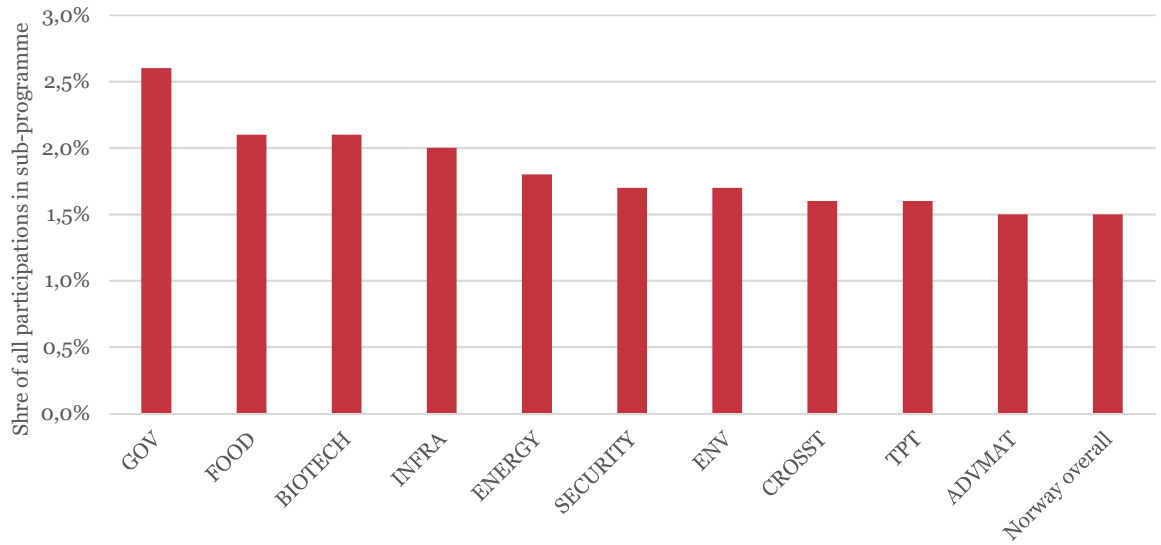
Figure 20 Number of H2020 proposal participation by eCorda stakeholder category involving Norway and its comparator countries normalised for Norway.



Source: Technopolis analysis of eCorda data.

Norway accounts for 1.5 percent of all participations in H2020 proposals, and by studying Norwegian participation at the sub-programme level, we reveal where Norwegian participants have been more active than in H2020 as a whole. Figure 21 shows the ten H2020 sub-programmes where Norwegian actors have been (relatively) more active (i.e. where Norway accounts for more than 1.5% of all participations in each sub-programme). Obviously, Norwegian actors have been (relatively) less active in the other sub-programmes, including the Health (1.4%) and ICT (1.3%) sub-programmes.

Figure 21 Share of Norwegian H2020 proposal participations by sub-programme as share of total participations.[17]



Source: Technopolis analysis of eCorda data.

In FP7, Norway accounted for 1.3 percent of participations in JTI proposals, which is below the rates seen in all comparator countries, and also slightly lower than the country's rate of participation in FP7

[17] Sub-programme abbreviations are explained in Appendix D.2.

overall (1.5%). In H2020, Norway thus far accounts for 1.7 percent of participations in JTI proposals, which again is below the rates seen in all five comparator countries, but slightly higher than in FP7 and also greater than Norway's overall rate of proposal participation in H2020 (1.5%).

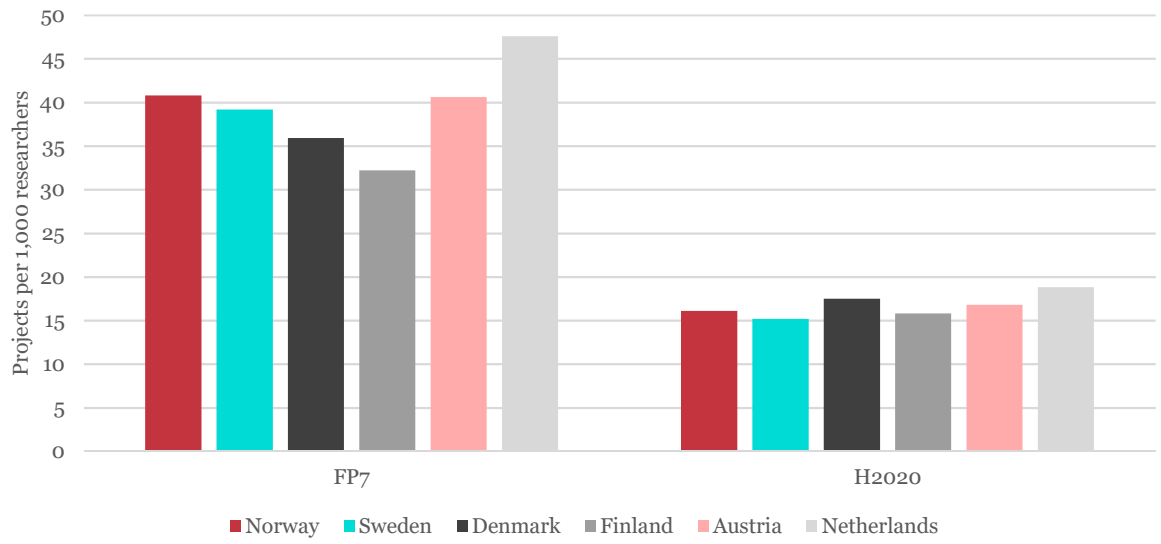
2.4.2 Success rates and participation in projects

In H2020, the success rate of proposals involving Norwegian actors is above the H2020 average, but below the average in close to all comparator countries, and worse than in FP7. Combined with the lower rate in proposal participations, Norwegian actors therefore participate in fewer projects than their peers in the comparator countries. However, proposals coordinated by Norwegian actors reach higher success rates than in most comparator countries.

Especially hospital trusts, but also HEIs and industry (SMEs), have low success rates for their participations in proposals. Partnering with Norwegian research institutes can increase the chances of success for Norwegian companies. The most successful participations in proposals are in the Industrial leadership programmes Biotechnology, NMP and ICT, the Inclusive and reflective societies Societal Challenge, and two programmes in the Science with and for society pillar (Integrate society and S&T careers for young people). Except for the programmes in the Excellent Science pillar, the funding distribution reflects the focus of the proposal participations. Norway is especially successful in its participation to proposals for the JTI/JU/PPPs.

By February 2017, 650 H2020 grants had been awarded to all types of projects involving Norwegian participants (both single- and multi-partner projects), which represents 4.8 percent of all H2020 projects. This is below the 5.9 percent share of all projects in FP7. In FP7, Norway had more projects per thousand researchers than all comparator countries bar the Netherlands, whereas Norway so far in H2020 only outperforms Sweden and Finland in this respect, see Figure 22.

Figure 22 Number of FP7 and H2020 projects involving Norway and its comparator countries normalised with the number of researchers in each country.

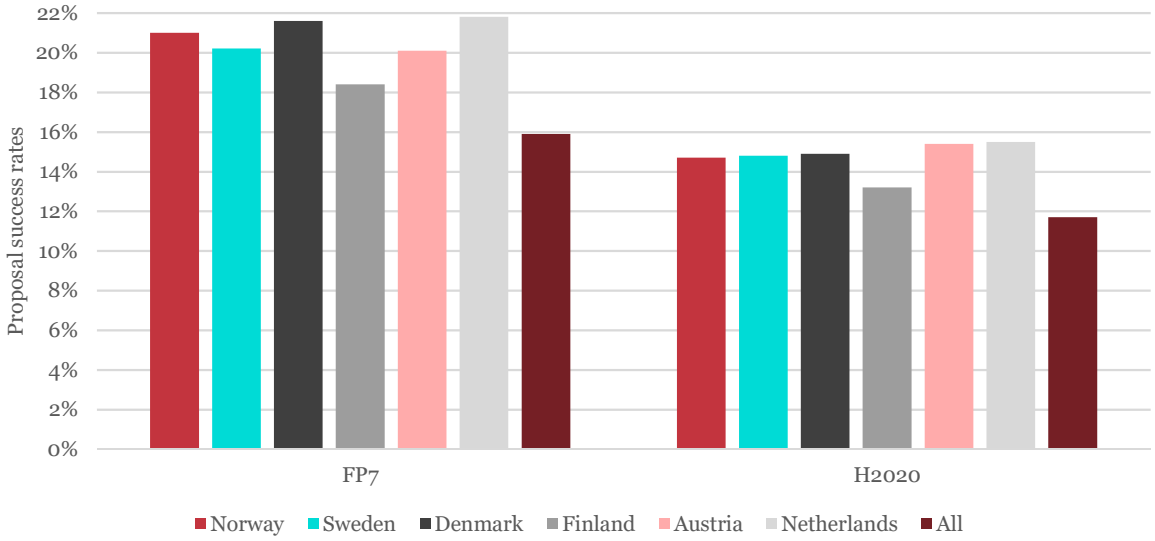


Source: Technopolis analysis of eCorda and UIS data.

The 650 H2020 projects involving Norway came from 4,410 proposals, which equates to a proposal success rate of 14.7 percent. This is substantially higher than the overall success rate of H2020 proposals (11.7%), but (marginally) below the rates achieved in all comparator countries except for Finland, see Figure 23. The figure reveals that Norwegian success rates were much higher (21.0%) in FP7, but this partly reflects higher success rates seen in FP7 overall (15.9%). However, Norway's FP7 success rate was also above that of Sweden, Finland and Austria, and only somewhat below that of Denmark and the Netherlands. As such, Norway's performance relative to comparator countries (in terms of proposal

success rates) has apparently tended to worsen in the first period of H2020 compared with the whole of FP7.

Figure 23 FP7 and H2020 proposal success rates for Norway and its comparator countries.



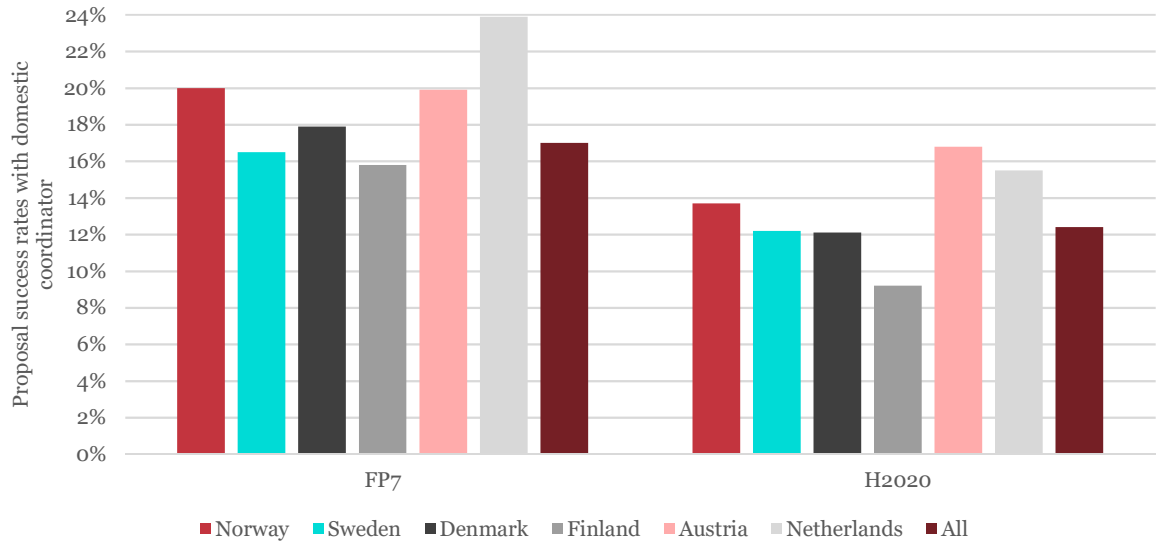
Source: Technopolis analysis of eCorda data.

If we look only at those proposals/projects with multiple participants that were coordinated by domestic coordinators, the success rates for Norway are above the overall rates for both H2020 and FP7. Figure 24 illustrates that in FP7 Norway had a coordinator success rate (for multi-partner proposals) higher than all comparator countries except for the Netherlands. So far in H2020, Norway still outperforms all its Nordic neighbours, but Austria and the Netherlands do even better in this respect.

Comparing across different organisation types, H2020 success rates for Norwegian proposals are so far the highest among public bodies (40.6%), much higher than in most comparator countries. This is heavily influenced by RCN's own activities. The majority of successful proposal participations by public bodies are accounted for by RCN (48 of 78), whose success rate in H2020 is very high (91%). Three-quarters of these RCN proposals relate to its involvement in ERA-NETs. Norwegian research organisations also perform well by comparison. Participants from HEIs and industry as a whole, as well as SMEs, achieve success rates below those of all comparator countries except for Finland. The participation success rate for hospital trusts (a category that does not exist in eCorda) is 8.9 percent, which is lower than for any other organisation type.

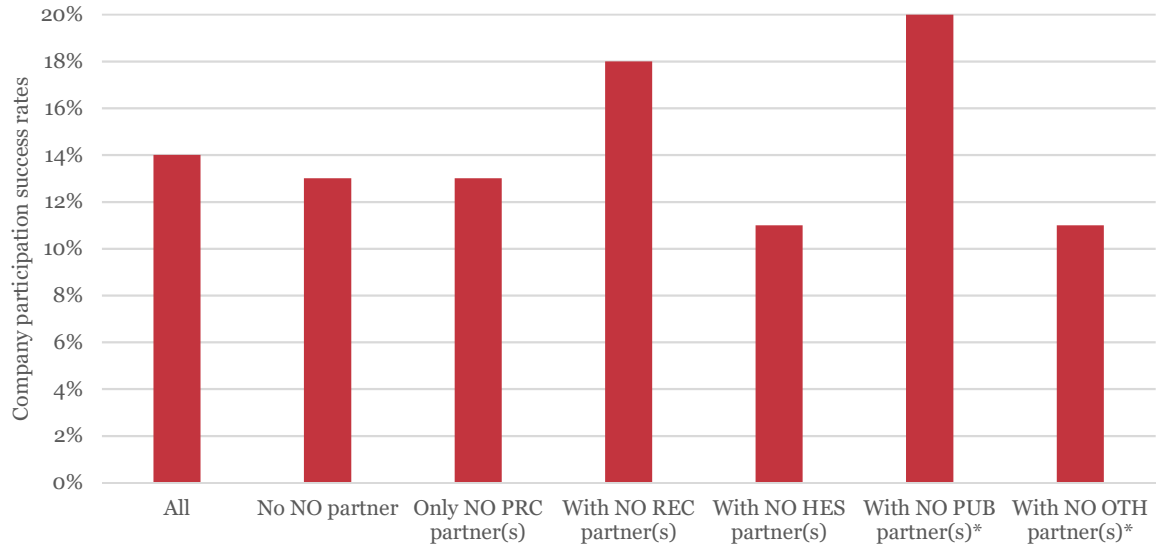
We have examined the success rates of Norwegian companies engaged in H2020 proposals in more depth, see Figure 25. The overall success rate for Norwegian company (PRC) participations is 14 percent. The rate is slightly lower (13%) for those with no other Norwegian partner and those whose only Norwegian partner is another company (or more than one). The rate is even lower (11%) where the company has partnered with at least one HEI (HES) or another type of actor (OTH) from Norway. By comparison, the success rates of Norwegian companies in a consortium with at least one Norwegian research organisation (REC) is 18 percent and with a public body (PUB) it is 20 percent. This suggests that partnering with Norwegian REC organisations (possibly also with PUB organisations, though the numbers here are small) can increase the chances of success for Norwegian companies. (In Chapter 5, we investigate how Norwegian companies have fared in the SME sub-programmes, where the new H2020 SME instrument has made single-partner projects considerably more common than in FP7.)

Figure 24 FP7 and H2020 success rates for multi-partner (MP) proposals with domestic coordinator for Norway and its comparator countries.



Source: Technopolis analysis of eCorda data.

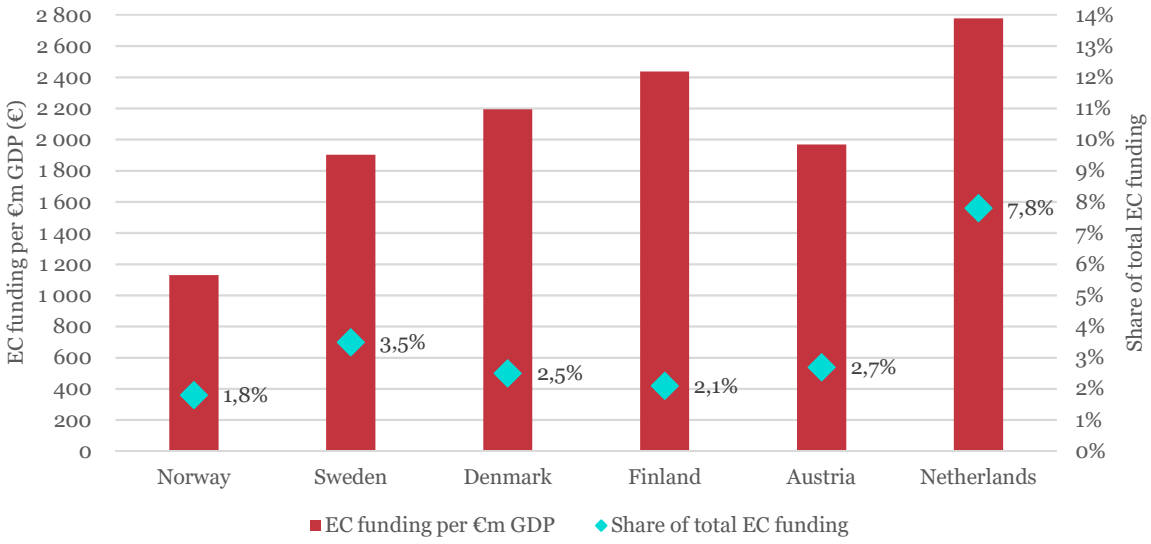
Figure 25 H2020 success rates for company participations. Asterisks indicate small numbers.



Source: Technopolis analysis of eCorda data.

H2020 funding to all Norwegian participations in projects so far totals €425m, which equates to 1.8 percent of total H2020 funding to date (slightly below the country's 2% return target). This is below the proportion realised by all comparator countries, see diamonds in Figure 26. When we normalise contributions by national GDP (illustrated by the columns in the figure), we see that Norway compares quite unfavourably with its comparator countries, which of course in part is explained by its oil-and-gas–dominated GDP (cf. Section 2.3). However, the average H2020 funding to each Norwegian participation (€481k) is relatively high; only the Netherlands receives higher average funding. Because financial information is missing or incorrect for 6 percent of all proposal participations and for 2 percent of all project participations, we have not looked in detail at H2020 funding received as a proportion of that requested. However, based on the data available, we find that Norway thus far has been awarded around 14 percent of the funding requested in proposals.

Figure 26 H2020 funding relative to GDP (columns, left axis) and to total H2020 competitive funding disbursed (diamonds, right axis).



Source: Technopolis analysis of eCorda and Eurostat data.

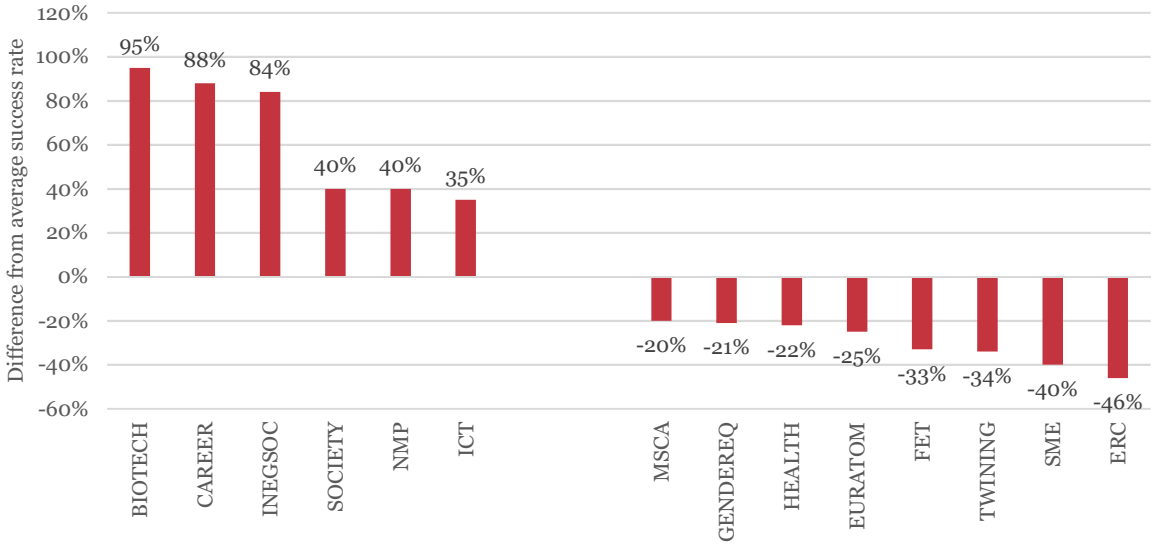
Norwegian success rates across the main programme areas of H2020 broadly follow the patterns for H2020 overall. In 14 sub-programmes Norway has achieved higher success rates than the national average, and in ten sub-programmes lower rates. Figure 27 shows the sub-programmes where the differences from the average in both respects so far is the greatest, and we note that in the ICT sub-programme Norway has a comparatively high success rate, and in the Health sub-programme a comparatively low rate. The SME sub-programme in this figure, as well as in subsequent figures and tables, includes both the "SME Instrument" and "Enhancing SME innovation capacity by providing better innovation support" (INNOSUP).

Overall, 37 percent of Norwegian proposal participations to H2020 JTIs were successful, which is a higher success rate than for most of the comparator countries. In FP7, 42 percent of Norwegian proposal participations to JTIs were successful, which was a higher success rate than for any comparator countries.

From a funding perspective, there are 14 sub-programmes in H2020 where H2020 funding to Norwegian participants accounts for at least 2 percent of the total funding so far disbursed. In particular, there are five sub-programmes where Norway has received 3 percent or more of the H2020 funding awarded to date. These are SME (8.4%), FOOD (5.2%), BIOTECH (4.3%), CAREER (Make scientific and technological careers attractive for young people: 3.6%) and GOV (Develop the governance for the advancement of responsible research and innovation: 3.4%).

In nine sub-programmes, H2020 funding to Norway accounts for less than 2 percent of all funding to each of these areas of H2020. These include Health (1.1%) and ICT (1.6%), and notably also the main parts of Excellent science, namely ERC (1.0%), FET (1.0%) and MSCA (1.3%).

Figure 27 Greatest differences in participation success rates from Norwegian average by H2020 by sub-programme.[18]



Source: Technopolis analysis of eCorda data.

[18] Sub-programme abbreviations are explained in Appendix D.2.

3 Participation in health-related research and innovation

In this chapter we set out by identifying the areas in health research that are considered most relevant for this study. We then use statistics to illustrate that – relative to the comparator countries – Norwegian investment in health R&D has increased substantially over the past ten years; there has been a corresponding strong growth in the number of researchers in HEIs, but also in research institutes and hospital trusts; and proxies for quality in research are comparable to the group of comparator countries across all health research areas.

Our analyses of eCorda data reveal that Norway has a low proposal activity in health-related R&I, compared to other countries. This fact combined with the very low success rates (lower than overall average for health) result in low participation in health projects. Norway has shown a preference for multi-partner proposals but, whether led by Norwegian actors or by partners in other countries, the success rates are below average of the comparator countries. This indicates a low level of integration in competitive international networks. In addition, Norwegian health researchers make very little use of the funding opportunities offered by single-partner projects, such as the MSCA and ERC sub-programmes. EC contributions to Norwegian participations in health-related H2020 projects so far equates to 1.1 percent of all funding in health, below the proportion realised by all comparator countries.

Focusing on multi-partner proposal participations in H2020, our analyses show that Norwegian HEIs (mostly UiO and UiB) have taken leading position, followed by hospital trusts (OUS), research institutes (SINTEF) and industry (mostly SMEs). However, the success rates have dropped significantly for all stakeholder categories compared to FP7.

The main subject areas of relevance to Norway include Personalised medicine (PerMed), with over half of the overall available funding in H2020, as well as Clinical research and Health ICT with about 20% each of the available funding. Analysing participation in multi-partner proposals by subject areas, we find that Norwegian activity in health research is lower than in most comparator countries. This is despite the fact that Norwegian proposal activity in H2020 has increased considerably in Health ICT and PerMed compared to FP7. However, Norway has had particularly low success rates in Health ICT, while PerMed compares better and Clinical research appears to be the most successful area relatively speaking, albeit at low proposal volumes. Again, success rates have dropped significantly in Health ICT and PerMed compared to FP7.

Going into more detail, we find that in the Health ICT area, universities, university colleges, hospital trusts and SMEs have substantially increased activities in H2020 compared to FP7, while the TI institutes have been less active. However, as noted above success rates have dropped dramatically for all stakeholder categories, possibly indicating that actors have found it difficult to adjust to the more application-oriented focus of H2020. The only exception is proposals coordinated by Norwegian universities, which have achieved a relatively high success rate (20%). In the area of PerMed, there is a rise in participation among all stakeholder types in H2020, albeit with a lower success rate than in FP7. Interestingly, in this area Norwegian universities have joined competitive consortia (rather than coordinated proposals) and have thus achieved a rather high success rate (16%). Clinical research is an area where overall success rates in H2020 have increased (compared to FP7) when analysing IMI-funded projects, but proposal activity has decreased. In addition, Norway has participated in JPIs relating to health through 39 projects in Ambient Assisted Living, Neurodegenerative Diseases and Antimicrobial resistance.

Taken together, there is an opportunity for Norwegian actors to increase participation and success rates in health-related R&I in H2020, particularly since bibliometric data suggest a high-quality research base. However, stakeholders may need to be incentivised to participate in more ERC or MSCA projects, or to join forces with successful national universities to compete in core Health Societal Challenge calls.

3.1 Mapping methodology used for all three topic areas

Our approach to the analysis of Norwegian participation by area is based on the understanding that R&I related to a specific area is in FP7 and H2020 funded not only in the core programme for an area (where there is one). While there are indeed sub-programmes dedicated to each of the three topic areas, pockets of relevant calls for funding and projects can be found also in other sub-programmes. We therefore must also capture the relevant R&I activities funded outside the dedicated "main" programmes.

In addition, a longitudinal analysis of FP participation must also deal with the changes in programme structure, in this case the restructuring of the R&I funded in H2020 around societal challenges rather than scientific or technological themes as in FP7. In H2020, this implies, among other things, a fostering of interdisciplinary R&I in the Societal Challenges programmes, as well as the involvement of value chains for the development of challenge-relevant applications. In other words, R&I funded through FP7 and H2020 in programmes that carry the same name, such as Health and ICT, does not necessarily have the same characteristics in terms of nature of the R&I conducted, its scientific focus, and the type of participants involved.

To capture as much as possible of the Norwegian participation in the FPs, we mapped all R&I funded in the two FPs against the three topic areas of this study. We identified for each topic area a set of "subject areas" that would allow linking the FP participation patterns to the Norwegian R&I policy objectives and to the national R&I capabilities. The consistent use of these subject areas for the mapping of R&I funded through FP7 and H2020 facilitated our analysis of the participation patterns over time. However, a different methodology had to be used for the ERC and MSCA programmes since these are not structured along thematic action lines. The text-mining methodology used is straightforward to implement for higher-level categories (in our case health and ICT), but it becomes prohibitively time-consuming when going for more detailed levels. For this reason, participation in the ERC and MSCA programmes is only categorised in terms of high-level categories, and not at the lower levels done for other programmes.

3.2 Introduction

For the health topic area, we identified four subject areas, namely Clinical research, ICT for health & health informatics (abbreviated Health ICT), Neurosciences, and Personalised medicine, genomics and basic health research[19] (abbreviated PerMed), see Table 4.[20] FP actions in non-identifiable fields of health R&I were categorised as Health NEC (not elsewhere classified). Our categorisation into subject areas was informed by three documents on Norwegian health R&I and policy priorities:

- The 2011 RCN evaluation on biology, medicine and health research in Norway[21]
- The 2015 national Health&Care21 strategy[22]
- The 2016 Norwegian Strategy for personalised medicine in healthcare[23]

The 2011 evaluation distinguished between physiology-related disciplines, molecular biology, clinical medicine, public health, psychology and psychiatry, and bioinformatics. Neuroscience was indicated as an area of specific strength in the Norwegian research community. While the Health&Care21 strategy emphasises the need for an evidence-informed health and care system, the 2016 strategy sets out the longer-term strategy in health research and emphasises the importance of biomedicine.

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19 The characteristics of health research funded under FP7 and H2020 did not allow us to make a more fine-grained distinction between projects focusing on personalised medicine and genomics on the one hand and basic health research on the other.

20 We are aware of the HRCS Research Activity Code groups or Health (disease) categorisations using tags with defined percentages of HRCS codes. This approach is complex, though, and would have gone beyond the scope and budget of this study.

21 "Evaluation of Biology, Medicine and Health Research in Norway (2011), Report of the Principal Evaluation Committee", RCN, 2011.

22 "HelseOmsorg21 – Nasjonal forsknings- og innovasjonsstrategi for helse og omsorg", 2014.

23 "Nasjonal strategi for persontilpasset medisin i helsetjenesten 2017-2021", Helsedirektoratet, 2016.

Table 4 Categorisation of health-related research in the FPs.

Area	Description
Clinical research	• Discovery and development of therapeutic interventions and testing in model systems and preclinical settings & Testing and evaluation of therapeutic interventions in clinical, community or applied settings • This category reflects the HRCS "Treatment development and treatment evaluation" category
Health ICT	• *Health informatics:* Research into individual care needs and management of disease, conditions or ill health & Research into the provision and delivery of health and social care services, health policy and studies of research design, measurements and methodologies • *ICT for Health:* Actions focusing on active ageing and self-management of health, as well as health care provision and integrated care
Neuroscience	• Identification of determinants that are involved in the cause, risk or development of disease, conditions and ill health & Dementias, transmissible spongiform encephalopathies, Parkinson's disease, neurodegenerative diseases, Alzheimer's disease, epilepsy, multiple sclerosis and studies of the normal brain and nervous system • This category reflects the HRCS "Aetiology/neurological health" category
PerMed	• *Personalised Medicine & Genomics:* Discovery, development and evaluation of diagnostic, prognostic and predictive markers and technologies; Identification and characterisation of endogenous factors known or suspected to be involved in the cause, risk or development of disease, conditions or ill health including genes and gene products, molecular, cellular and physiological structures and functions; Biological factors linked to ethnicity, age, gender, pregnancy and body weight; bioinformatics and structural studies; Development and characterisation of models, etc. – This category reflects the HRCS "Detection, Screening and Diagnosis" and "Aetiology (Biological and endogenous factors)" categories • *Basic Health Research:* Research that underpins investigations into the cause, development, detection, treatment and management of diseases, conditions and ill health – This category reflects the HRCS "Underpinning research" category

We continue this chapter with a brief overview of the national context relevant to health R&I, thus covering the same three dimensions as the overall background in Section 2.3 Research and innovation landscapes – to the extent possible given the structure and resolution of national statistics and other available reference sources. The health-specific information in the following background section should be interpreted in light of the overall background in Section 2.3.

We have similarly identified subject areas for ICT and industry, as well as charted the respective national contexts, and will commence the two subsequent chapters by introducing these.

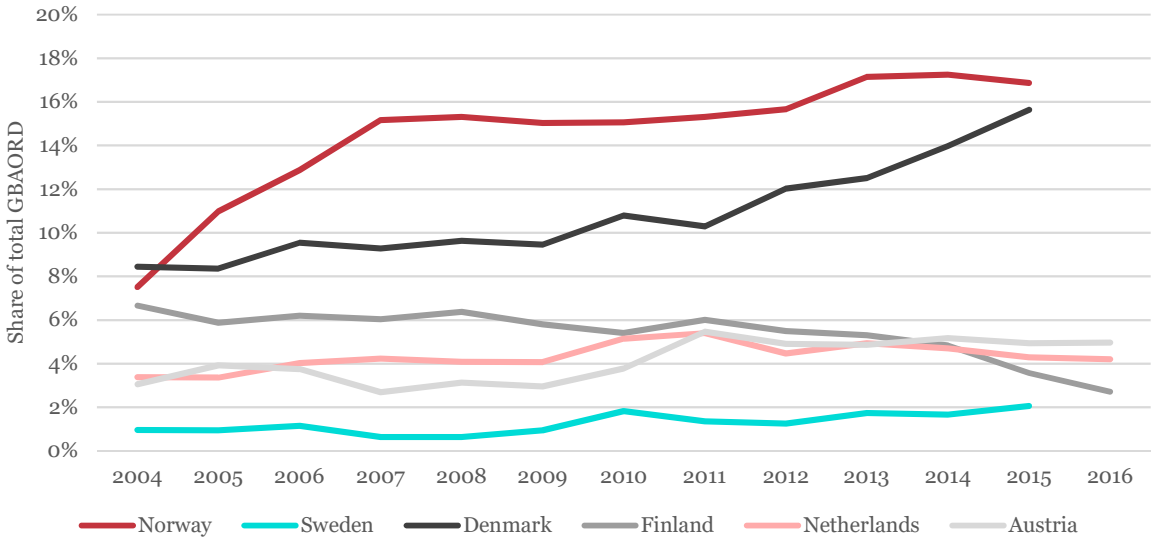
3.3 Background

3.3.1 Financial dimensions

Figure 28 shows the share of Government Budget Appropriations or Outlays on R&D (GBAORD) that goes to health-related R&D. Among the comparator countries, the Norwegian government's massive (relative) investments in health-related R&D are only matched by the Danish government's, whereas health-related R&D is obviously prioritised much lower by the governments in the four other countries, at least as far as public funding goes.

Figure 29 further illustrates the Norwegian government's prioritisation on health-related R&D. Absolute investments have increased from €118m in 2004 to €539m in 2015 (a 357% increase), corresponding to an increase from 8 to 17 percent of total GBAORD. (NIFU's national statistics reveal that the share was essentially flat between 2000 and 2004 when the increase shown in the figure commenced.)

Figure 28 GBAORD in health as share of total GBAORD in Norway and its comparator countries.



Source: Eurostat.

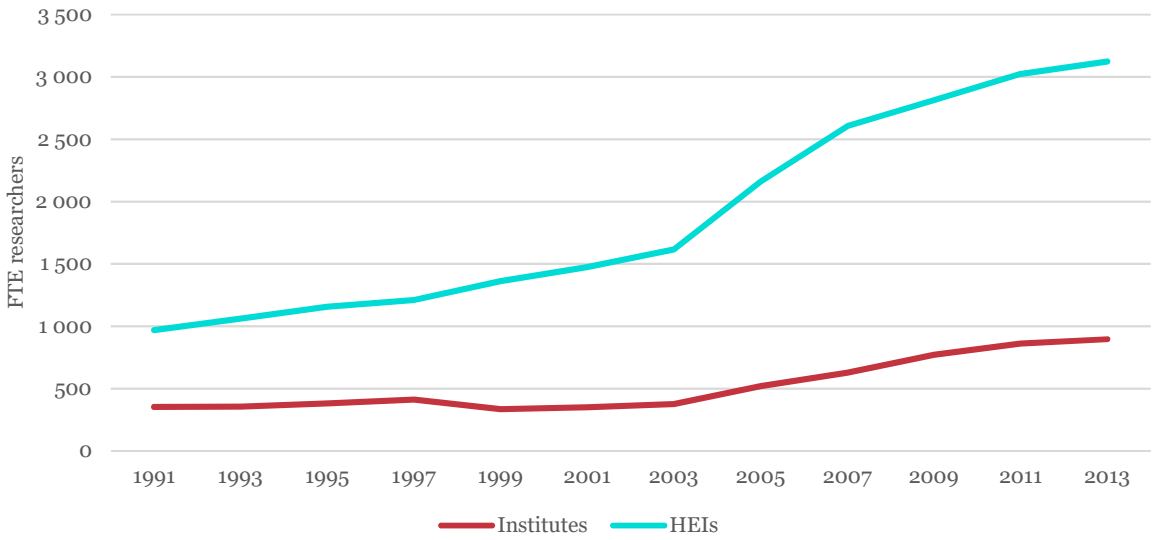
Figure 29 Norwegian GBAORD in health in million euro (columns, left axis) and as share of total GBAORD (line, right axis).

Source: Eurostat.

3.3.2 Human resources

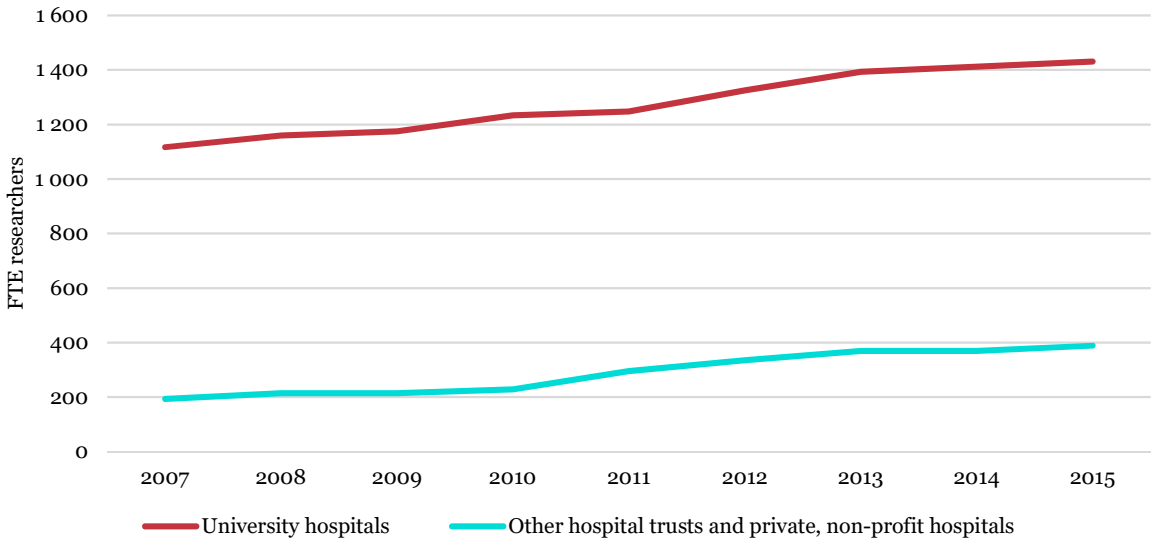
Figure 30 shows that there has been strong growth in the number of researchers in medical and health sciences in Norway since 1991, particularly in HEIs but also in research institutes. The growth since 2003 appears to correspond to the rapid increase in GBAORD starting in 2004 shown in the previous figure. Figure 31 shows a gradual increase also in number of researchers in hospital trusts (note that the time scales of the two figures are quite different).

Figure 30 FTE researchers in medical and health sciences in Norway.



Source: NIFU's R&D statistics bank.

Figure 31 FTE researchers in hospital trusts in Norway.



Source: NIFU's R&D statistics bank.

3.3.3 Quality in research

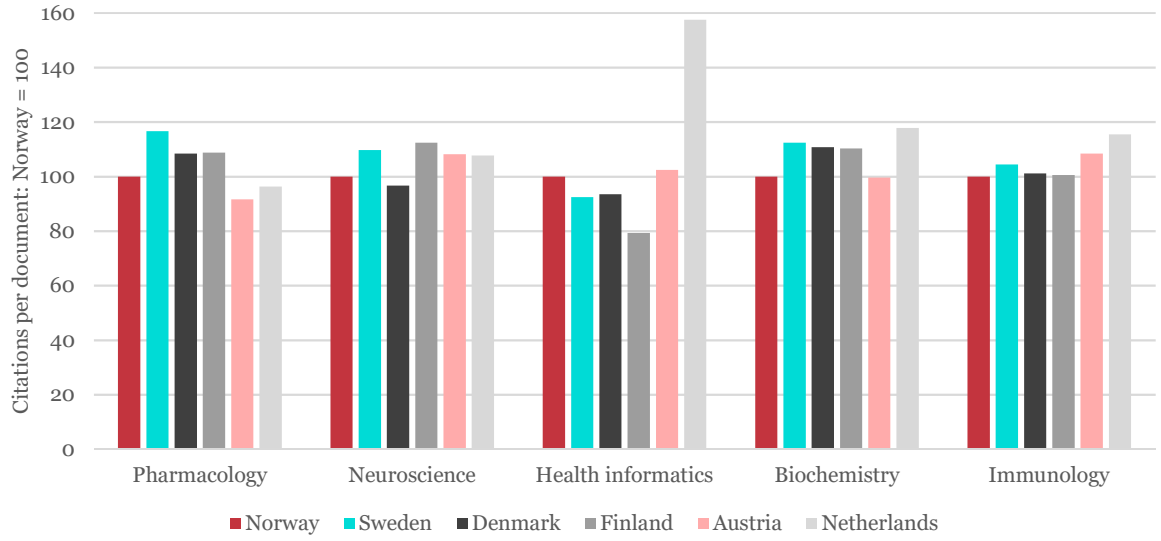
We use the bibliometric indicator of citations per document to gain a view on the competitiveness of Norwegian health research relative to the comparator countries. Table 5 lists the scientific fields that we identified for each of the health subject areas; the breadth of the research covered in the PerMed subject area led us to consider two scientific fields. However, the description of the health subject areas in Table 4 shows that also for the other subject areas there is no single scientific field that fully represents the research conducted in that area. Consequently, the bibliometric data in Figure 32 should be considered only as proxy indications for the Norwegian research strengths in the subject areas defined.

Table 5 Matching of health subject areas to SCImago scientific fields.

Health subject area	Scientific field
Clinical research	Pharmacology, toxicology and pharmaceutics (abbreviated Pharmacology)
Neuroscience	Neuroscience
Health ICT	Health informatics
PerMed	Biochemistry, genetics and molecular biology (abbreviated Biochemistry)
	Immunology and microbiology (abbreviated Immunology)

Figure 32, which shows the average number of citations per scientific publication in health between 1996 and 2015 normalised for Norway, suggests a level of research strength comparable to the group of comparator countries. The exception is Health informatics where Norway seems to be more competitive, but in a couple of additional fields Norwegian research performance also appears reasonable, namely in Pharmacology and Immunology. Linking these fields to the subject areas, one would expect Norwegian researchers to have a good potential for FP participation in the areas of Health ICT, PerMed and, to an extent, Clinical research.

Figure 32 Number of citations per publication in health 1996–2015 in Norway and its comparator countries.

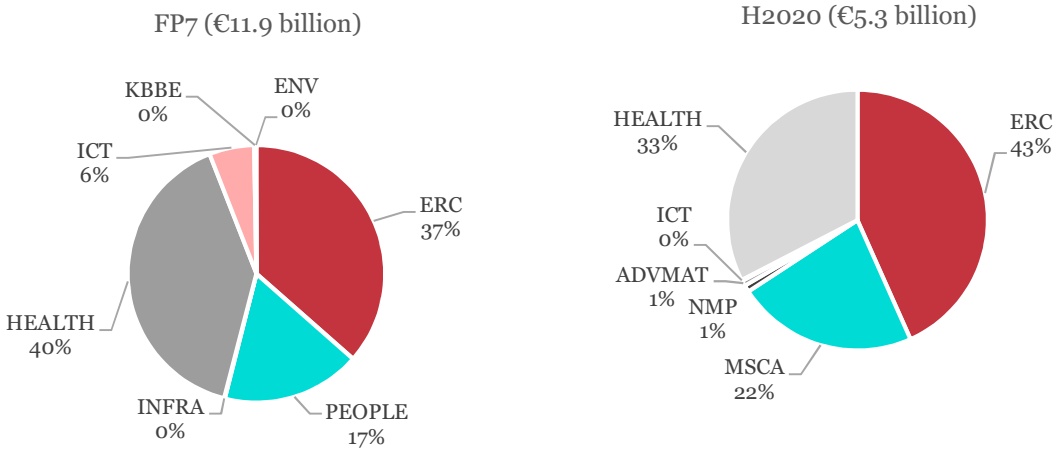


Source: SCImago Journal & Country Rank.

3.3.4 EU funding of health R&I in FP7 and H2020

Figure 33 shows the distribution of funding for health R&I in the sub-programmes of FP7 and H2020. The figure illustrates two major trends. On the one hand, a substantial increase in the proportion of the budget in H2020 allocated to (largely single-partner) ERC grants and, on the other hand, concentration of the collaborative R&I projects dealing with various aspects of health and healthcare (e.g. ICT for health) in the H2020 "core" health programme, i.e. the Health Societal Challenge.

Figure 33 Distribution of health R&I funding over sub-programmes in FP7 (left) and H2020 (right).[24]



Source: Technopolis analysis of eCorda data.

3.4 Participation patterns in FP7 and H2020 – a comparative analysis

In H2020, Norway participates in fewer health proposals than all comparator countries in H2020; combined with the lower-than-average success rates (versus the comparator countries, as well as the FP average), Norwegian actors also participate in fewer projects. They make very little use of the funding opportunities offered by the ERC and MSCA sub-programmes, and reach below-average success rates for these proposals. They also less frequently take the lead in multi-partner proposals than their peers in the comparator countries and when they do, success rates are only modest.

HEIs are the most active in health proposals, and together with the hospital trusts, they increased their proposal activity in H2020. Success rates have decreased significantly, though, beyond the overall trend in the FP. These low success rates are shared by all stakeholder categories, including universities. The particularly active university colleges have so far been poorly rewarded for their efforts; SMEs and TI institutes have seen a devastating drop in success rate.

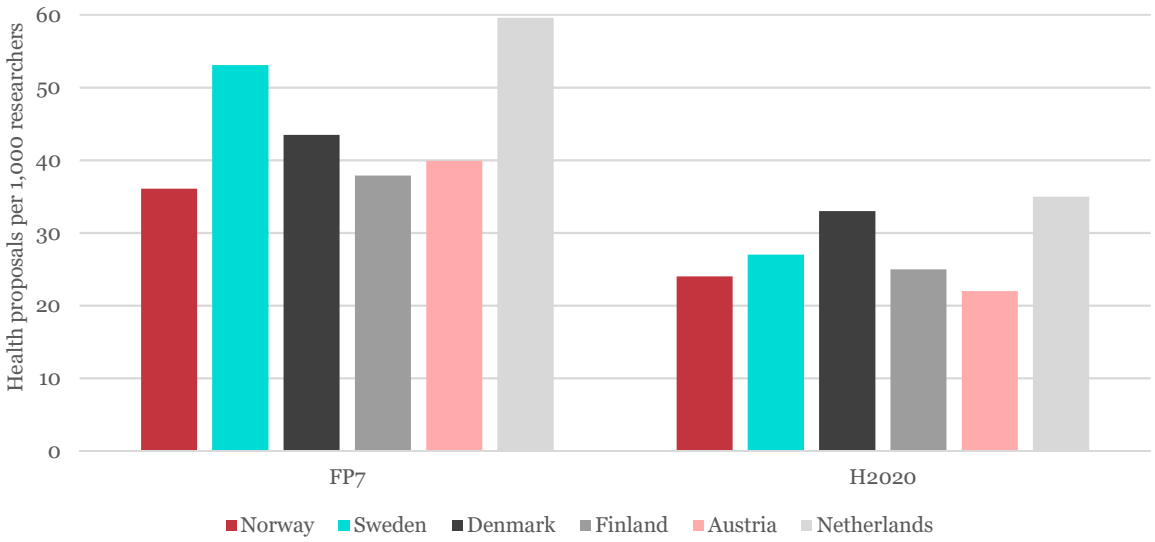
3.4.1 Participation overall

Figure 34 illustrates that Norway had fewer health proposals in FP7 than all comparator countries when normalising with the number of researchers in each country.[25] So far in H2020 (eCorda data extracted 28 February 2017), Norwegian actors have submitted fewer health proposals than in all comparator countries except Austria. Throughout this chapter, health proposals (and later health projects) refer to all health-related proposals in FP7 and H2020 identified using the mapping methodology explained in Section 3.1, regardless of sub-programme.

[24] Sub-programme abbreviations are explained in Appendix D.2.

[25] For lack of data on researchers in the three topic areas, normalisations by number of researchers have been made using the overall number of researchers per country. This is not ideal, but it is consistent between countries.

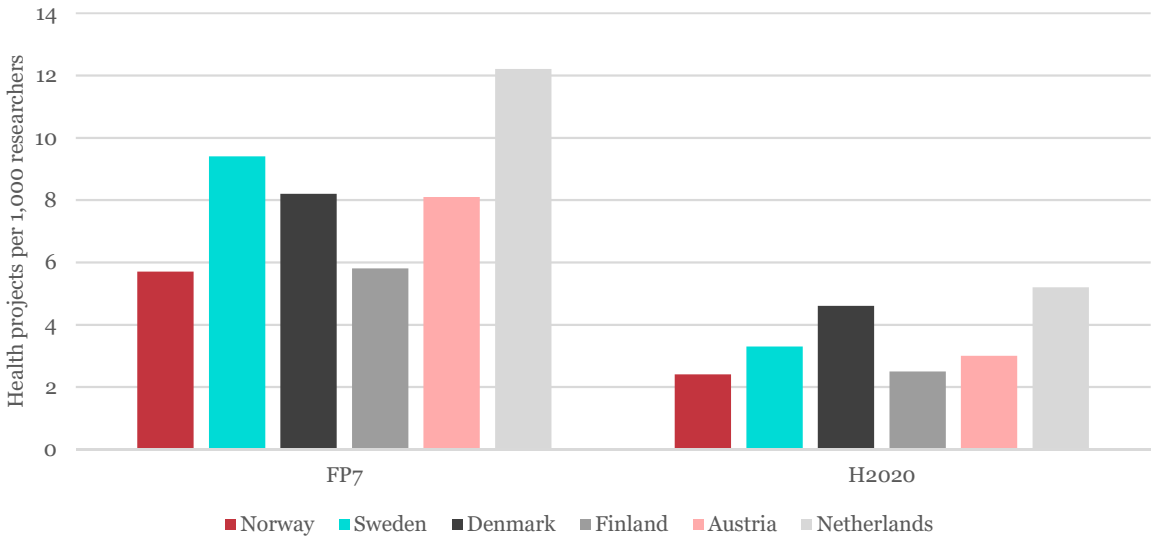
Figure 34 Number of FP7 and H2020 health proposals involving Norway and its comparator countries normalised with the number of researchers in each country.



Source: Technopolis analysis of eCorda and UIS data.

By February 2017, 97 H2020 grants had been awarded to health projects involving Norway, which represents 2.2 percent of all grants to health R&I in H2020. When normalising with the number of researchers per country, we find that both in FP7 and H2020 Norway has been involved in fewer health projects than all comparator countries, see Figure 35. (The pattern is the same when considering the total number of participations, i.e. taking account of the involvement of more than one organisation in the country per proposal (see Appendix D.4.)) We remind the reader that since the eCorda proposal database for H2020 includes proposals that have not yet been evaluated, the number of H2020 projects is likely a slight underestimate, but since this applies to all countries and on average to the same extent, comparisons between countries should be fair.

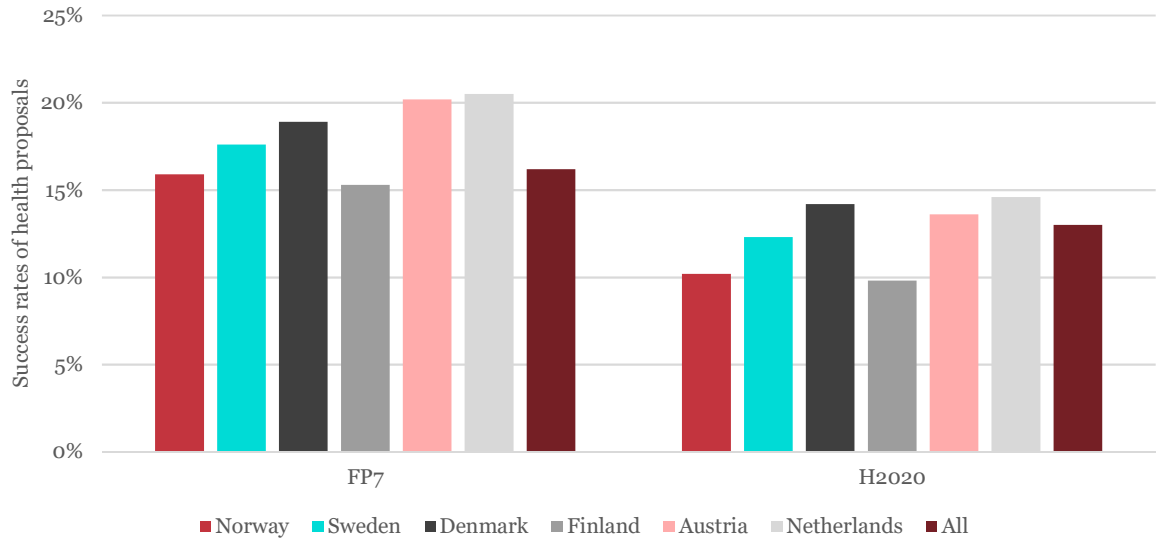
Figure 35 Number of FP7 and H2020 health projects involving Norway and its comparator countries normalised with the number of researchers in each country.



Source: Technopolis analysis of eCorda and UIS data.

The combination of low levels participation in proposals and low success rates, see Figure 36, lie at the origin of these very modest results. The figure shows that in both FP7 and H2020 health proposals involving Norwegian actors have had lower success rates than proposals involving actors from all comparator countries bar Finland. (For the same reason as mentioned above, the H2020 success rates are slight underestimates, but this applies to all countries.) Most strikingly, Norwegian actors have had lower success rates than the overall averages for health, particularly in H2020. This contrasts with Norway's high overall success rates in both FP7 and H2020 (cf. Figure 23).

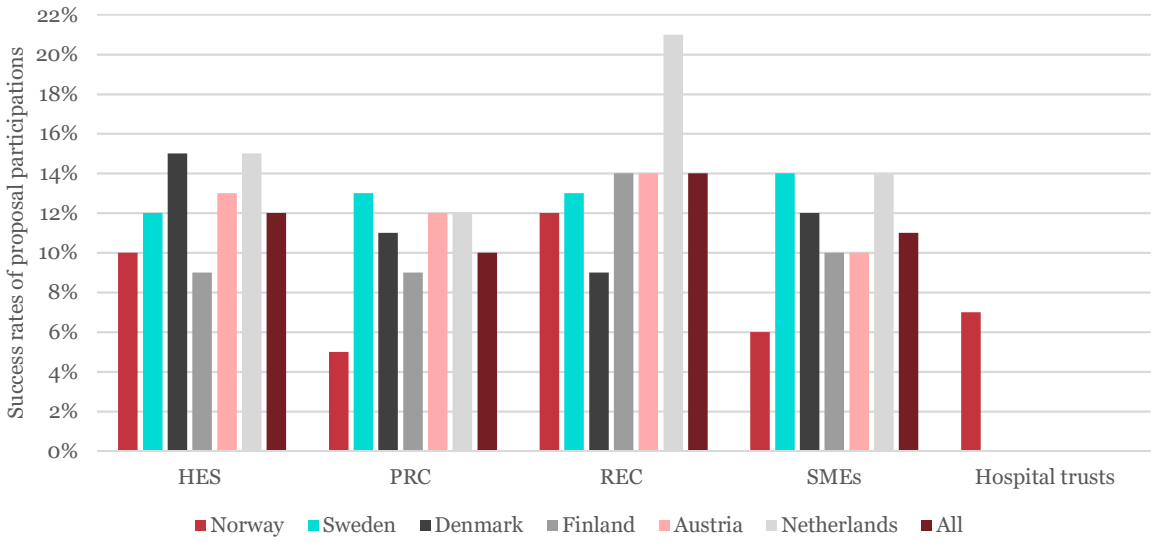
Figure 36 Success rates of FP7 and H2020 health proposals involving Norway and its comparator countries.



Source: Technopolis analysis of eCorda data.

The modest Norwegian success rates in H2020 are shared by all stakeholder categories. Data at eCorda organisational level shows that in H2020, all Norwegian actors have reached success rates for their proposal participation that are below those of almost all comparator countries, see Figure 37. (Note that we now consider number of participations, not proposals. There are, on average, 1.2 Norwegian participants per Norwegian health proposal.) Especially the private sector (PRC) has underperformed in this respect. (Note that the SME category shown is a subset of PRC, and that hospital trusts – a stakeholder type unique to Norway – similarly also appear in other eCorda categories.) We investigate the participation patterns among stakeholder categories in more detail in Section 3.4.5.

Figure 37 Success rates of H2020 health proposal participations involving Norway and its comparator countries by eCorda organisation type.[26]



Source: Technopolis analysis of eCorda data.

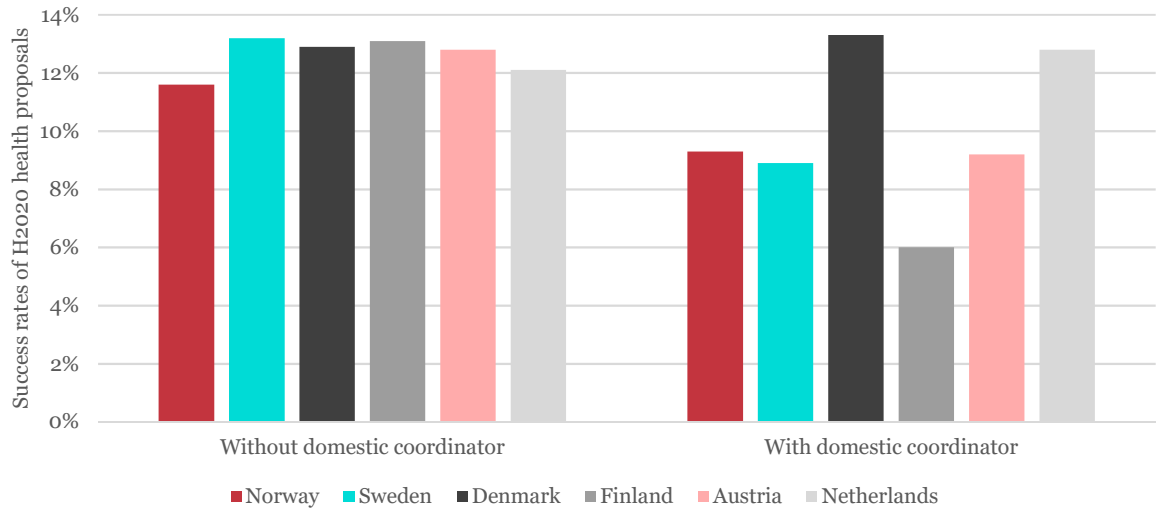
3.4.2 Participation in multi-partner proposals

When investigating the areas of strengths and weaknesses that may influence trends in FP participation levels, it is important to make a distinction between multi-partner projects and single-partner projects, such as most ERC, MSCA and SME instrument projects. In the case of multi-partner projects, factors that influence the potential for participation go beyond research competitiveness and the quality of proposals, and include the degree of inclusion in international networks and especially, the quality of these networks and the prestige and competitiveness of the collaboration partners.

In H2020, Norwegian health actors show a higher preference for multi-partner proposals than their peers in all comparator countries but Austria (in FP7 also Denmark). Both in FP7 and H2020, around 60 percent of Norwegian health proposals have been multi-partner. However, in H2020 Norwegian health actors have less frequently taken the lead in multi-partner proposals than their peers in all comparator countries bar Austria (and bar Denmark in FP7) (see Appendix D for details). In the case of multi-partner H2020 health proposals led by partners in other countries, H2020 proposals in which Norway has been involved have had a somewhat lower success rate than those of the comparator countries, see left set of columns in Figure 38. The success rate for multi-partner proposals coordinated by Norwegian actors (two-thirds of which are HEIs) is below the average for proposals coordinated by actors in the comparator countries as a group (10%), although the difference between countries is obviously large (right set of columns in the figure).

[26] HES = HEIs, PRC = private companies, REC = research organisations.

Figure 38 Success rates of H2020 health multi-partner (MP) proposals involving Norway and its comparator countries, without and with domestic coordinator.



Source: Technopolis analysis of eCorda data.

3.4.3 Participation in ERC and MSCA proposals

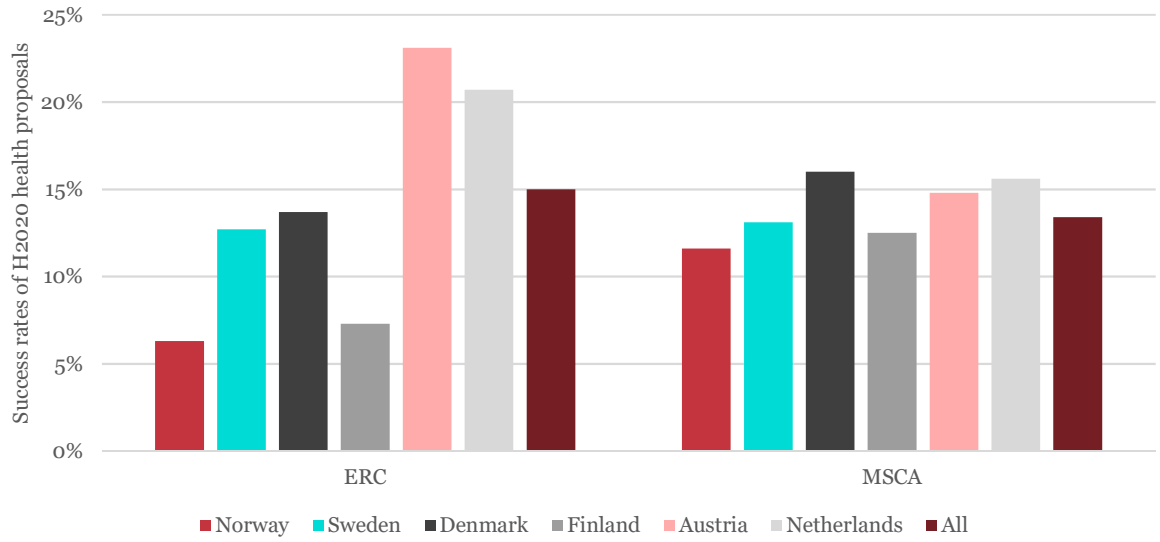
Norwegian health researchers make very little use of the funding opportunities offered by the MSCA and ERC sub-programmes. In H2020, Norwegians have accounted for only 1 percent of the total number of health-related ERC proposals, a rate that is far below all comparator countries. The proportion of health-related MSCA proposals from Norwegian researchers was at 3 percent also far below all other countries except Finland. (See Appendix D for details.) Figure 39 shows that the success rate of the ERC proposals submitted by Norwegian researchers is well below all comparator countries but Finland, and also well below the overall average. The success rate of the MSCA proposals submitted by Norwegian researchers compare better, but is below those of all comparator countries and the overall average. While the Norwegian success rate for ERC proposals remains the same in H2020 as in FP7 (6.3%), it has dropped dramatically for MSCA proposals (from 16.8% to 11.6% in H2020). By comparison, the ERC success rates have increased for all comparator countries (notably so for all countries but Finland) and overall, whereas the MSCA success rates have dropped for all countries and overall, but the relative drop is the largest for Norway.

3.4.4 EC contributions

The participation pattern described above inevitably has had its consequences for the EC contributions to Norway. So far in H2020, EC contributions to Norwegian participations in health projects total €56m, which equates to 1.1 percent of all H2020 funding in health. This is below the proportion realised by all comparator countries.

Norway's stronger reliance on coordination by others, combined with lower success rates for Norwegian-coordinated proposals, implies that overall Norwegian actors assume less important roles in EU health R&I than actors in the comparator countries. This is further indicated by the average H2020 funding per participation eventually realised (€518k), which is below the average funding requested per participation (€676k). This is also lower than for all comparator countries and lower than the overall average.

Figure 39 Success rates of H2020 health ERC and MSCA proposals involving Norway and its comparator countries.



Source: Technopolis analysis of eCorda data.

3.4.5 Norwegian participation by stakeholder category

Experience tells us that the eCorda classifications of participating organisations is not always correct and, more importantly, often does not reflect the stakeholder categories in the national landscape in an adequate manner. For this study, we have therefore quality reviewed the eCorda classifications, and have classified participants as shown in Table 6.

Table 6 Norwegian stakeholder categories and types used for detailed analyses.

Stakeholder category	**Stakeholder type**	
Health sector	Hospital trust	
HEI	University college	University
Industry	Large company	SME
Non-profit	Civil society associations	Health associations
	Industry associations	
Public sector	Agency/authority (e.g. Norwegian Coastal Administration)	Public administration (city and county councils etc.)
	R&I funding organisations (e.g. RCN)	
Research institutes	Environmental institutes (abbreviated Environmental)	Primary institutes (abbreviated Primary)
	Social sciences institutes (abbreviated SS institutes)	Technical-industrial institutes (abbreviated TI institutes)
	Other institutes (e.g. Norwegian Meteorological Institute (MET), Simula Research Laboratory (SIMULA), Norwegian Institute of Public Health (NIPH))	

In this and the following sections of this chapter, we focus on multi-partner projects only, which constitute the core of our analysis for reasons mentioned above. ERC and MSCA projects were analysed

in a preceding section, and the analysis of participation in H2020 Innovation in SMEs projects is included in Chapter 5. Moreover, by necessity we focus on participations (and not proposals or projects), since there is on average 1.3 Norwegian participations in each Norwegian multi-partner H2020 proposal. Reflecting a general pattern in FP participation (in Norway and in many other countries), the data over time shows a strong core of organisations participating in health-related collaborative R&I. In both FP7 and H2020, ten organisations have accounted for nearly 60 percent of proposal participations, see Table 7.

Table 7 List of key Norwegian health participants in FP7 and H2020 by number of proposals (top 10 in each FP).

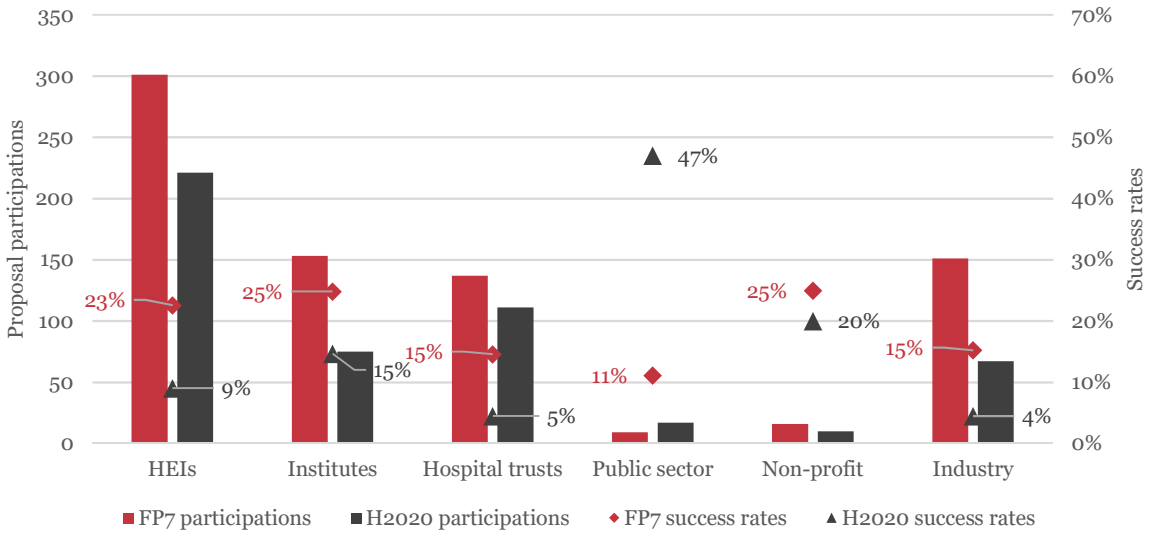
Stakeholder type	Organisation	FP7	H2020
University	University of Oslo/Universitetet i Oslo (UiO)	92	62
Hospital trust	Oslo universitetssykehus/Oslo University Hospital (OUS), including Rikshospitalet	80	55
University	University of Bergen/Universitetet i Bergen (UiB)	78	49
University	Norwegian University of Science and Technology/Norges teknisk-naturvitenskapelige universitet (NTNU)	54	53
TI institute	SINTEF Group	45	21
Other institute	Norwegian Institute of Public Health (NIPH)/Folkehelseinstituttet	26	22
University	University of Tromsø/Universitetet i Tromsø (UiT)	23	18
Hospital trust	University Hospital of North Norway/Universitetssykehuset Nord-Norge HF (UNN)	17	18
SME	Smerud Medical Research International AS	17	10
University	Norwegian University of Life Sciences/Norges miljø- og biovitenskapelige universitet (NMBU)	21	5
Hospital trust	Haukeland University Hospital/Haukeland universitetssjukehus	8	14

In FP7, health proposals involved 176 Norwegian individual organisations, covering all stakeholder types, that accounted for 767 proposal participations. In H2020, the number of organisations involved is so far 135, accounting for 548 proposal participations.

Figure 40 summarises health proposal activity and success rates by main stakeholder categories, illustrating that HEIs have been the most active in both FPs. In FP7, institutes, industry and hospital trusts were approximately equally active, but so far in H2020, institutes and industry have been notably less active than hospital trusts. Considering that H2020 is not quite at mid-term, HEIs and hospital trusts have thus far been more active in H2020 than in FP7 (judging from the absolute numbers of proposals). However, most striking is that the success rates for all main stakeholder categories have decreased significantly (except for the public sector where the small number of proposals seems to wreak havoc on the divisions). While it is true that the success rates have decreased across the board between FP7 and H2020, the Norwegian decreases go beyond the overall trend (the overall success rate in H2020 so far is 10 percent).

Note that while we argued that the fact that the eCorda proposals database also includes H2020 proposals that have not yet been evaluated was not a problem when comparing between countries (all countries should have the same "backlog" of pending proposals), this is not the case when we compare Norwegian performance between FP7 and H2020. It is likely that H2020 success rates will change with time (up or down), but it is unlikely that changes will be dramatic – unless the number of proposals is small. This is a caveat that applies to all analyses at subject area in this report, and it is particularly important to keep in mind in interpreting analyses by both stakeholder type and subject area (when numbers are the smallest).

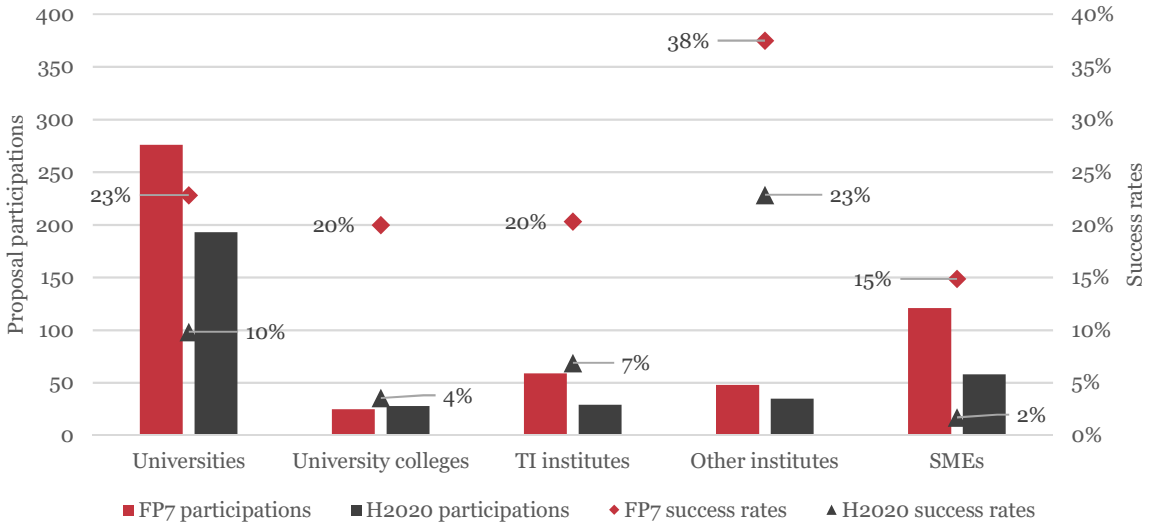
Figure 40 Norwegian health proposal participations (columns, left axis) and success rates (diamonds/triangles, right axis) in FP7 and H2020 by stakeholder category.



Source: Technopolis analysis of eCorda data.

Figure 41 shows data equivalent to the previous figure, but only for the stakeholder types that so far in H2020 have submitted at least 20 proposals. We note that university colleges have been very active in H2020 and have already submitted more proposals in H2020 than in all of FP7, but they have so far been poorly rewarded for their efforts; the drop in success rate is dramatic. In contrast, the TI institutes have been less active relatively speaking, and have also seen their success rate drop dramatically. The (indirectly defined) group of Other institutes have been more active relatively speaking and have done reasonably well, despite the huge decrease in success rate. SMEs have also been less active, and have seen a devastating drop in success rate, similar to the TI institutes' development. (The stakeholder types not included in the figure are large companies (nine H2020 participations, of which two successful), SS institutes (five participations, of which one successful), Environmental institutes (five participations, of which none successful) and Primary institutes (one unsuccessful participation).)

Figure 41 Norwegian health proposal participations (columns, left axis) and success rates (diamonds/triangles, right axis) in FP7 and H2020 by most active stakeholder type.



Source: Technopolis analysis of eCorda data.

3.5 Participation patterns in the subject areas

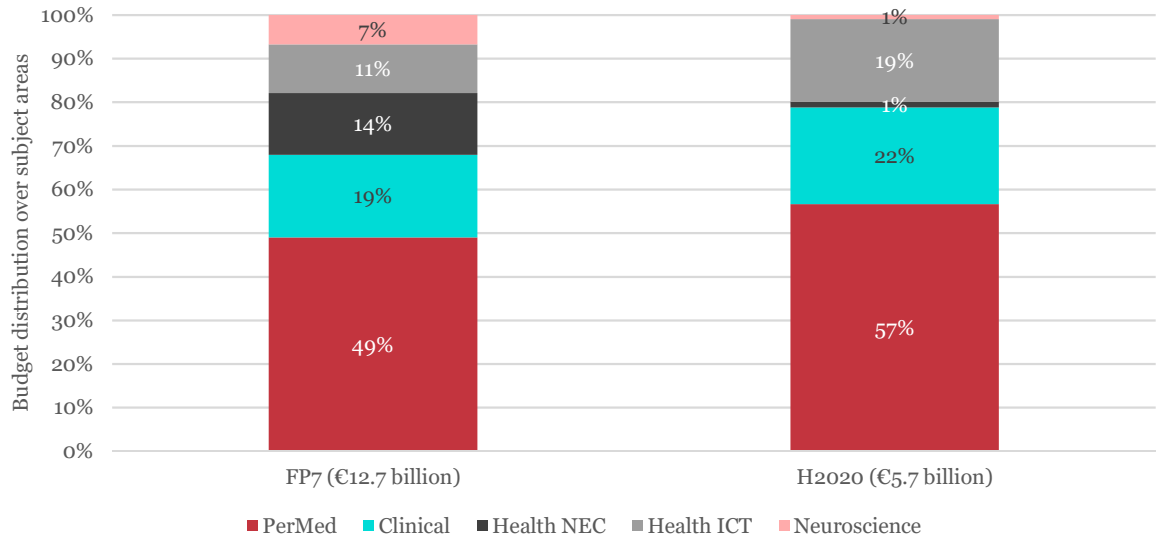
In the following analysis at the subject area level, we continue to focus on multi-partner projects.

The low proposal activity by Norwegian actors, lower than their peers in the comparator countries, is visible in all subject areas, and especially in PerMed. Success rates are comparatively low in all areas, but especially in Health ICT. Detailed data for the Health ICT area show a drastic fall in success rates for universities and TI institutes, and no success at all for any of the other actors (university colleges, Other institutes, hospital trusts and SMEs). In PerMed, the outcome is considerably better than in Health ICT; nevertheless, despite a rise in participations among all stakeholder types, they all experienced massive decreases in success rates. In Clinical research, mainly funded through the IMI, proposal activity seems to be decreasing, but reaches higher success rates than in FP7.

3.5.1 EU funding for health R&I in the subject areas

Figure 42 shows the proportion of the FP budgets for health R&I allocated to the subject areas. It should be noted that the apparent changes in priorities in part may be due to our inability to map 14 percent of the R&I funded in FP7 into the defined subject areas. Nevertheless, the changes shown in the figure are in line with developments in EU priorities and have resulted in a stronger focus on PerMed and Health ICT, as well as on Clinical research, the latter albeit to a smaller extent. As can be seen, funding specifically for the Neuroscience subject area is minimal in H2020.

Figure 42 Budget distribution into health subject areas.

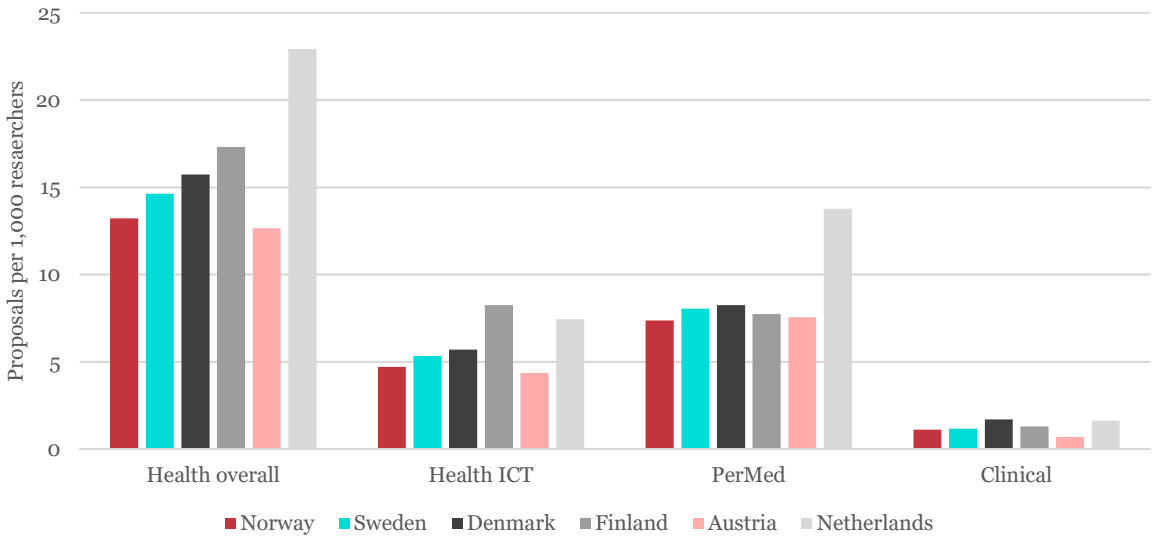


Source: Technopolis analysis of eCorda data.

3.5.2 Proposals and success rates

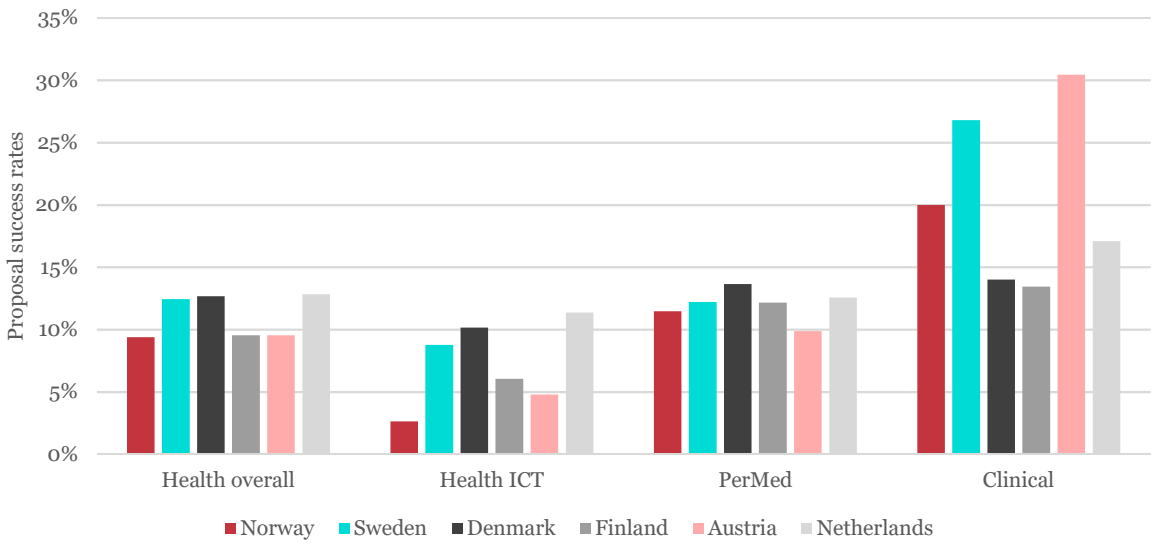
The lower rates of participation in H2020 health proposals in general implies that both overall and in the main health subject areas (except for PerMed), so far in H2020 Norway has been less active in health proposals than all comparator countries but Austria (Figure 43). In PerMed, Norway is the least active country of all. Norway has had a lower success rates especially in Health ICT, see Figure 44. It compares somewhat better in PerMed and much better in Clinical research, but proposal volumes are small in the latter area (cf. Figure 43).

Figure 43 Number of H2020 proposals involving Norway and its comparator countries normalised with the number of researchers in each country by main health subject areas. Excludes ERC and MSCA programmes.



Source: Technopolis analysis of eCorda data.

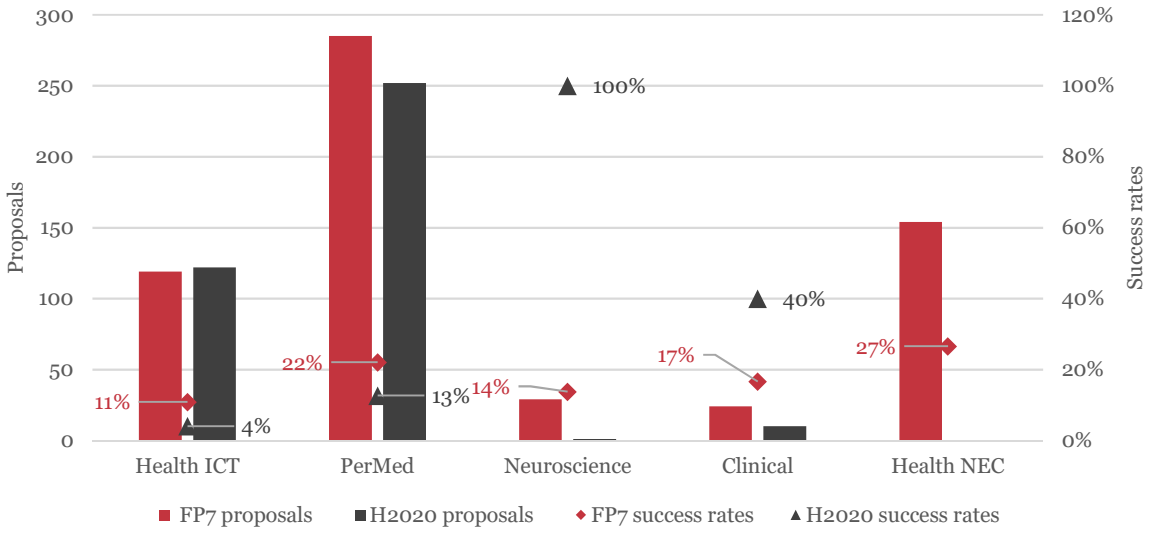
Figure 44 Success rates of H2020 proposals involving Norway and its comparator countries by main health subject areas. Excludes ERC and MSCA programmes.



Source: Technopolis analysis of eCorda data.

Norwegian actors focused their H2020 proposals on Health ICT and PerMed and significantly increased their proposal activity in both areas compared to FP7. Considering that these two areas had higher shares of EC funding in H2020 than in FP7 (cf. Figure 42) and that Norway historically has been comparatively strong in these areas based on bibliometric data (cf. Figure 32), one would expect Norwegian actors to perform well in both subject areas. However, while proposal success rates in FP7 were relatively high for PerMed, those for Health ICT were low, see Figure 45. Success rates have dropped considerably, especially in Health ICT. In contrast, only a few proposals have been submitted in the area of Clinical research so far, with very high success rates (as for the one and only Neuroscience proposal).

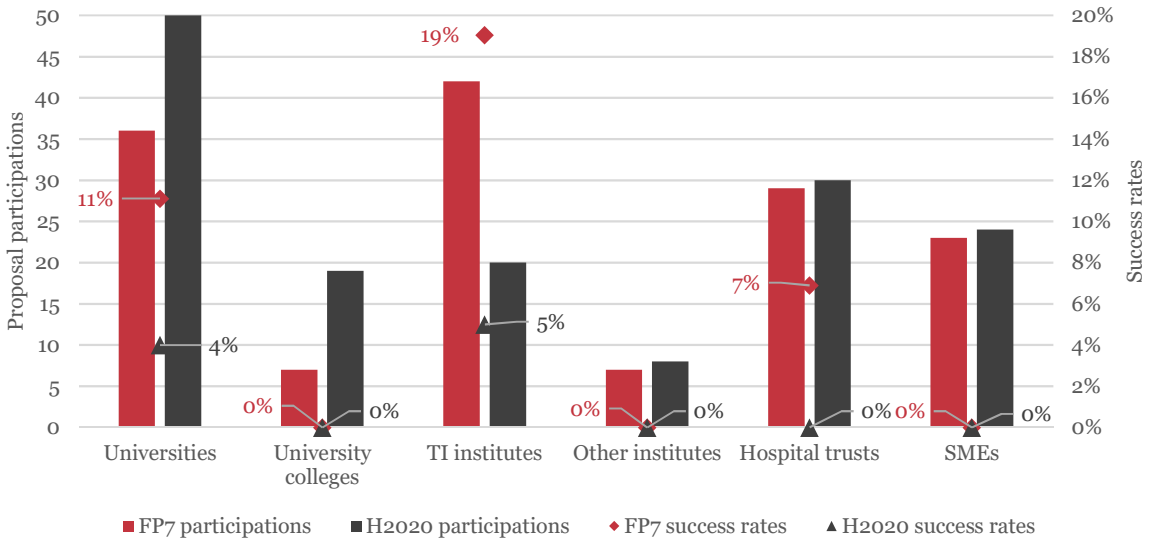
Figure 45 Norwegian multi-partner proposals (columns, left axis) and success rates (diamonds/triangles, right axis) in FP7 and H2020 in health subject areas.



Source: Technopolis analysis of eCorda data.

The lack in continuity in success in the Health ICT and PerMed subject areas is worth investigating, as is the remarkably high rate of success rate in Clinical research. A first point for investigation is the extent to which a change in involvement of different stakeholder categories has played a role. Another factor potentially playing a role are the changes in the nature and specific focus of the R&I funded in these subject areas from FP7 to H2020. Both in FP7 and H2020, the Health programme has been the main funder of health R&I, but the change in FP structure implies a significant change in the focus and nature of the R&I funded. We cover both points in the sections per subject area below.

Figure 46 Norwegian multi-partner proposal participations (columns, left axis) and success rates (diamonds/triangles, right axis) in FP7 and H2020 in the Health ICT area.



Source: Technopolis analysis of eCorda data.

We now again, from necessity, turn to proposal participants in order to analyse health participation per stakeholder category and type. Figure 46 illustrates a huge increase in activity from universities, university colleges, hospital trusts, Other institutes and SMEs, whereas the TI institutes have been less

active; while universities and TI institutes have experienced a dramatic decrease in success rate, the others have had no success at all. In the following sub-sections, we take a closer look at developments.

3.5.2.1 Health ICT

In H2020, Health ICT is funded through the Health Societal Challenge rather than through the main ICT programme, as was the case for 98 percent of the Health ICT research in FP7. This implies a more application-oriented focus for the R&I funded in H2020. In FP7, the R&I was funded in the action lines on information processing and information systems and telecommunication, while in H2020, the focus is on support of active ageing and self-management of health, health care provision and integrated care.

Overall, so far in H2020 there have been 157 Norwegian proposals, compared to 150 proposals in the entire FP7; the overall success rate was 11 percent in FP7 and is so far 4 percent in H2020. Figure 46 shows the number of participations and success rates for Norwegian stakeholder types that have amassed at least five multi-partner Health ICT proposals in H2020. So far in H2020 there has been an increased interest in Health ICT funding, and all stakeholder types but the TI institutes have clearly increased their proposal activities over FP7 (keeping in mind that H2020 is not quite at mid-term yet). Only universities and TI institutes have been successful so far, but with dramatically lower success rates than in FP7. Even more worrying is that university colleges, Other institutes, hospital trusts and SMEs have all had no successful 2020 proposal to date (which for all but the hospital trusts is in line with their dire FP7 experiences). So far in H2020 there has been no Health ICT proposal involving a large Norwegian company.

3.5.2.2 PerMed

Both in FP7 and H2020, R&I in the PerMed subject area was funded predominantly through the Health programme. In FP7 R&I was focused on scientific research and medical biotechnology, while in H2020 it is funded mainly in the "Health, demographic change and well-being", "Understanding health, wellbeing and disease", "Preventing disease" and "Treating and managing disease" topics. A small proportion of the H2020 budget for PerMed R&I (9%) is funded through three other sub-programmes, the Food/Bioeconomy Societal Challenge, as well as NMP and Advanced Materials within LEIT. Norwegian actors have grasped these opportunities, and have participated in successful proposals in the two LEIT programmes, whereas so far only unsuccessful proposals have been submitted in the Food/Bioeconomy programme.

In analogy with the previous figure, Figure 47 summarises the performance of the stakeholder types with at least five multi-partner PerMed proposals in H2020. Similar to the pattern in Health ICT, there is a rise in participations among all stakeholder types, although least so for SMEs, and there have been massive decreases in success rates for all stakeholder types – the outcome is nevertheless clearly considerably better than in Health ICT.

3.5.2.3 Neuroscience

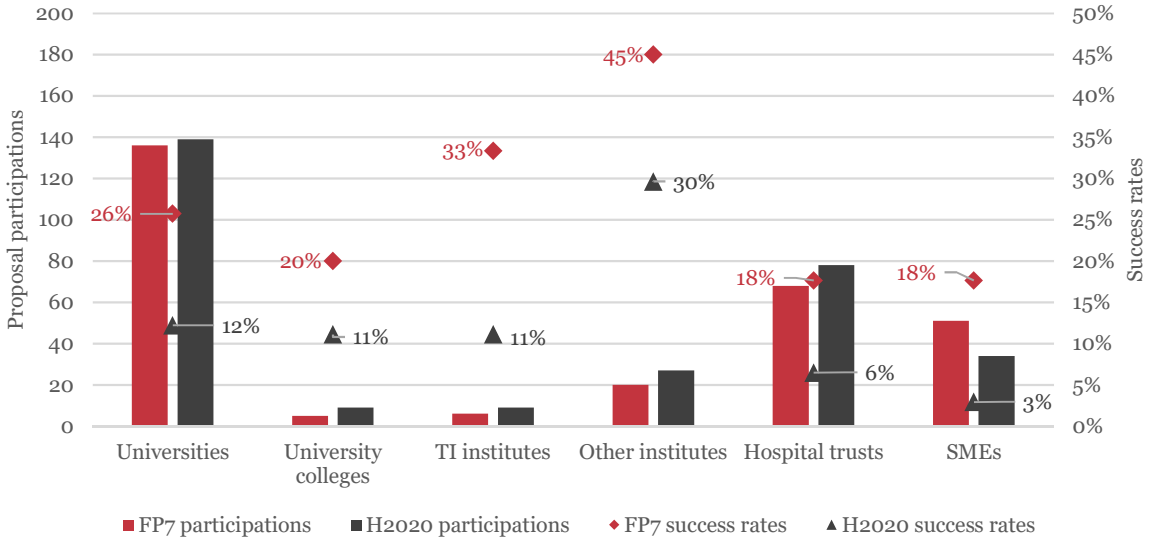
As mentioned in Section 3.5.1, H2020 funding specifically for the Neuroscience area is minimal due to changes in FP policy priorities. While in FP7 the Health programme funded a small set of projects specifically focused on this subject area (e.g. neurodegenerative diseases), in H2020 funding is limited to support for the ERANETs in this subject area, such as "ERANET in the area of brain-related diseases and disorders of the nervous system" (ERA-NEURON) in which RCN participates.

3.5.2.4 Clinical research

Both in FP7 and H2020, funding in the Clinical research subject area has mainly been through the Innovative Medicines Initiative JTI (IMI), focusing on the development of the next generation of vaccines, medicines and treatments, such as new antibiotics. In H2020, IMI accounts for 60 percent of the funding to Clinical research. The remaining 40 percent is divided equally between the SME instruments and more R&I-oriented action lines in the Health Societal Challenge, including an action line for Exploratory Research (accounting for 6% of the total budget). Like for Neuroscience, we note

the approach of shifting support for this R&I area from the EU to the Member (and Associated) States through the co-funding of ERANETs.

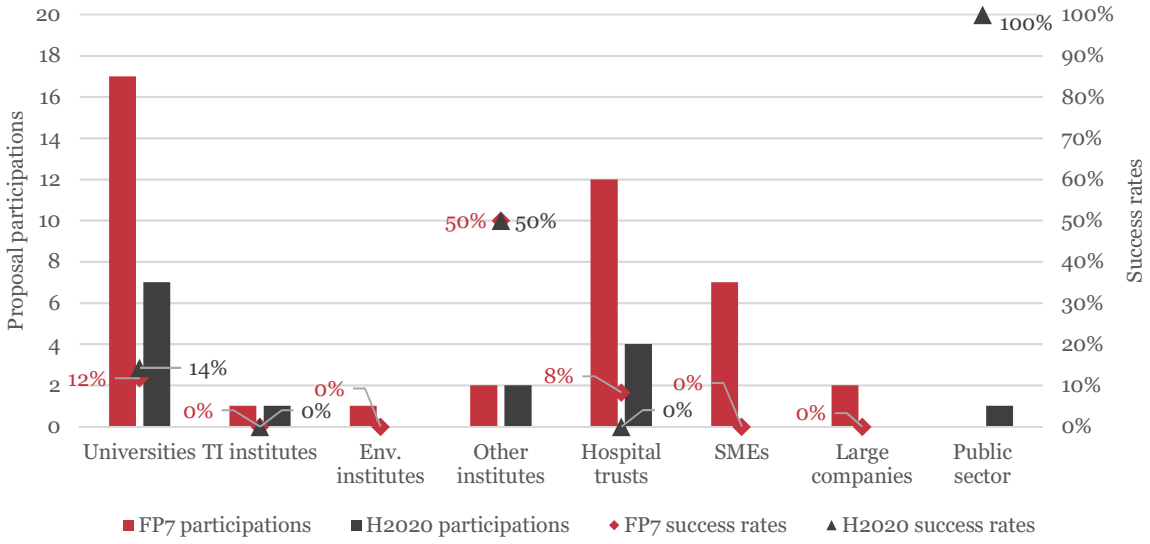
Figure 47 Norwegian multi-partner proposal participations (columns, left axis) and success rates (diamonds/triangles, right axis) in FP7 and H2020 in the PerMed area.



Source: Technopolis analysis of eCorda data.

The IMI activity by stakeholder types is shown in Figure 48. It seems like proposal activity is decreasing in H2020 since so far only 15 Norwegian proposals have been submitted, compared with 42 in FP7. However, the overall Norwegian participation success rate has improved significantly from 10 percent in FP7 to 20 percent in H2020 (four and three funded projects, respectively). Since the total number of proposals is very low, we nevertheless need to be careful in our interpretations. So far, the private sector has not participated in any H2020 proposal in this subject area.

Figure 48 Norwegian multi-partner proposal participations (columns, left axis) and success rates (diamonds/triangles, right axis) in FP7 and H2020 in IMI JTI.



Source: Technopolis analysis of eCorda data.

3.5.3 *Participation in Public-Public Partnerships*

Based on discussions with NCPs, we have identified other health-related programmes with Norwegian participation, beyond that identifiable through eCorda. These are three Joint Programming Initiatives (JPIs) relating to Health. Below we present a brief analysis of the Norwegian participation data for these programmes made available to us by RCN, to complement the main FP/H2020 analyses. The data files received list 39 Norwegian participations in 39 projects that began between 2009 and 2017 (i.e. four–five started each year). Each project lasts between one and five years (three on average). (There is one further participation listed as "under evaluation". However, as we do not hold details of other (unsuccessful) proposals, this has been excluded from the analysis.) The participations are split between the following Joint Programming Initiatives:

- Ambient Assisted Living (AAL) (22 participations)
- Neurodegenerative Diseases (JPND) (11 participations)
- Antimicrobial resistance (AMR) (6 participations)

Budgets for Norwegian participations in these projects range from NOK271k to NOK7.6m, with an average per participation of NOK3.1m. The average budget per participation is the highest in AMR projects (NOK4.1m), while the averages for JPND (NOK3.1m) and AAL (NOK2.8m) projects are lower. There are only 23 separate Norwegian actors listed, meaning that some appear more than once. Those with three or more participations are UiO (6), UNN (3) and Karde AS (3), the latter an SME.

3.6 Potential for increased participation in H2020

The areas with the highest potential for increased participation by Norwegian actors in multi-partner projects in health are Health ICT and PerMed. So far in H2020, Norwegian actors have shown an increased interest in Health ICT, and all stakeholder types but the TI institutes have clearly increased their proposal activities over FP7. However, only universities and TI institutes have submitted successful proposals in Health ICT, reaching much lower success rates than in FP7. We also noted that university colleges, Other institutes, hospital trusts and SMEs have not had any successful H2020 proposal to date.

In the Health ICT area, Norwegian universities are the only actors that currently show the needed competence successfully to coordinate H2020 proposals. In contrast, in the PerMed area very few of the proposals led were successful, including those led by universities. The main issue for a better performance of Norwegian actors in H2020 health R&I appears to be the competitiveness of the consortia they team up with in their proposal activities. This is especially the case in Health ICT, where even for universities the success rates of proposals led by other partners are particularly low.

In Table 8 we summarise H2020 performance in health in more detail. We still focus on multi-partner proposals and limit the analysis to stakeholder types that have had at least 20 participations in H2020. We then separately consider their performance as coordinators and as partners.

Table 8 Norwegian H2020 performance in Health ICT and PerMed by most active stakeholder types.

Subject area	Stakeholder types	Proposal participations	As coordinator		As partner	
			Share of participations	Success rate	Share of participations	Success rate
Health ICT	**Universities**	**50**	**20%**	**20%**	80%	0%
	TI institutes	20	15%	0%	85%	6%
	Hospital trusts	30	0%	–	100%	0%
	SMEs	24	17%	0%	83%	0%
PerMed	**Universities**	**139**	32%	4%	**68%**	**16%**
	Hospital trusts	77	18%	0%	82%	8%
	SMEs	34	32%	0%	68%	4%

Source: Technopolis analysis of eCorda data.

Taking universities as an example, we see that they have so far participated in 50 Health ICT proposals, 20 percent of which (10) have been coordinated by a Norwegian university and these proposals have had a success rate of 20 percent (2 coordinated proposals have been funded). In the remaining 80 percent

of proposals (40) Norwegian universities have been partners, and none of these proposals have been funded. We may thus infer that Norwegian universities are well qualified to coordinate H2020 proposals in the area of Health ICT, since the success rate is above the 16 percent average success rate in health. Given the fact that none of the proposals wherein Norwegian universities have been partners have been funded (the cell is shaded to indicate a below average health success rate), we may further conclude that Norwegian universities have engaged in less competitive proposals and, by extension, in consortia that appear less competitive.

From the table, we may also conclude that the performance of all other stakeholder types in Health ICT is most discouraging. SMEs and TI institutes have coordinated a few proposals (four and three, respectively), but judged specifically by these (admittedly very few) proposals they have not proven qualified as coordinators. Of the remaining 17 proposals involving a TI institute, one has been successful. Thus, in the other 16 proposals involving a TI institute, the 30 where a hospital trust has been a partner and the 20 where an SME has been partner, these Norwegian actors have become involved in uncompetitive consortia. (University colleges have participated in 19 proposals and therefore just barely failed to make it into the table; none of these were coordinated by themselves and none were successful.) This reasoning is of course an oversimplification of very complex processes, and there are no doubt other reasons than partnership and proposal coordinator that may cause a proposal not to be funded. However, in the aggregate we believe that the total absence of success (or the very low success for TI institutes) is a clear indication of these Norwegian actors on average have the wrong international networks.

In Section 3.5.2.2 we determined that participation in the PerMed subject area in several ways resemble that in Health ICT. There has been an overall increase in participation in H2020 combined with massive decreases in success rates for all stakeholder types. Hospital trusts have coordinated close to one in five proposals (14) and SMEs one in three proposals (11), but none of which has been successful, see Table 8. Universities have coordinated a third of a large number of proposals, but have achieved a success rate far below the health average. (So far, one in four proposals involving a large Norwegian company has been successful, which is a doubling of the success rate in FP7. However, recall the small-numbers caveat above; the H2020 25% success is highly likely to change with time.) Based on this outcome, it seems as if Norwegian coordinators are not competitive in PerMed. Hospital trusts and SMEs also seem to have the wrong international networks, whereas universities appear to be part of the right ones.

Given the increased proposal activity from Norwegian actors in both these subject areas, there ought to be opportunity to increase success rates by on the one hand providing would-be coordinators (from SMEs and TI institutes in Health ICT, and all stakeholder types in PerMed) with hands-on support to increase proposal quality and keeping a watchful eye on being critical on consortium composition. On the other hand, would-be partners from all stakeholder types (except universities in PerMed) ought to be made aware of them – on average – having the wrong international networks, and that they might as well refrain from joining consortia that are not obviously of high quality. The dismal partner success rates shown in Table 8 provide a strong message in this respect (to all stakeholder types except universities in PerMed). The large H2020 budget for PerMed and Norway's historically high success rate (in FP7) in this area ought to constitute a good starting point for increasing project participation as long as the failings of the majority of proposals in H2020 so far are addressed. In both subject areas, the universities are key to Norwegian participation, both by virtue of proposal volumes and by decent success rates as coordinators (Health ICT) and partners (PerMed), respectively (as indicated by boldface in the table).

It is also worth noting that in the Clinical research subject area, the number of Norwegian proposals and participations was relatively low, both with respect to comparator countries and to the Health ICT and PerMed areas. Nevertheless, with a relatively high success rate, Clinical research provides almost one fifth of all funded projects for Norway. According to SCImago citation rankings, Norway publishes papers in Clinical research that compare favourably to other comparator countries. The issue seems to lie with the lack of certain actor types that are expected to contribute to proposals in this R&I area, especially in a public-private partnership such as IMI; the Norwegian private sector and in particular SMEs could be better incentivised and nurtured to participate in pan-European Clinical research. Note

also that the majority of projects in Clinical research fall under Industrial leadership/Innovation in SMEs in H2020. The other major actor type, hospital trusts, also show low activity (with only four proposal participations) and so far no funded project in H2020. It is reasonable to assume that the generous funding and limited competition offered by the Regional Health Authorities for Clinical research acts as a disincentive to participation in the international arena.

In addition to the above conclusions for collaborative R&I, there is clearly a major opportunity to increase Norwegian participation in ERC projects by increasing proposal quality to address the very low Norwegian ERC success rate, which is below that of all comparator countries and far below the overall ERC average of 15 percent for health projects. Norwegian researchers' current ERC success rate of 6.3 percent in this area is less than half of their Swedish and Danish peers' success rates, and less than a third of their Dutch and Austrian peers'. Such huge differences in success cannot be explained by Norwegian health researchers being less competitive, particularly since bibliometric data on citations indicate that Norwegian researchers appear to be as competitive as their peers in the comparator countries. In this case, we believe that the low Norwegian success rate is due to researchers not realising what it takes to stand a chance in the competition, meaning that they need to invest much more time and energy to hone their proposals.

4 Participation in ICT-related research and innovation

The analysis methodology used in this chapter as well as the chapter structure are consistent with the one used in Chapter 3. We set out by identifying the areas of ICT research that are considered most relevant for this study. We then use statistics to illustrate that – relative to the comparator countries – Norwegian government R&D investments in transport, telecommunication and other infrastructure (the standard statistics category closest to ICT) are in the average, but declining since 2007; the number of researchers in engineering and technology (again, a proxy for ICT research) has strongly grown in the universities; and proxies for quality in research are average.

Our analyses of eCorda data reveal that Norway has a low proposal activity in FP-funded ICT research and average success rates (but behind most of the comparator countries), both in FP7 and H2020. In contrast to health, Norwegian actors in ICT reach high success rates for the proposals that they coordinate, higher than in close to all comparator countries. Similar to the pattern in health, in the MSCA and especially the ERC sub-programmes, the proposal participations as well as success rates are below average. EC contributions to Norwegian participations in ICT projects so far equates to 1.3 percent of all funding for ICT research under H2020.

Focusing then on the stakeholders involved, our analyses of multi-partner proposals and projects show that in H2020, the high level of proposal activity by SMEs has meant that Norwegian companies have taken over the leading position in ICT proposals from institutes. Large companies continue to enjoy very high success rates in H2020, while SMEs remain moderately competitive overall. The TI institutes, led by the SINTEF Group, have decreased their participation in proposals and experienced a significant drop in their success rates, down to the FP average in H2020. Universities, led by the NTNU and UiO, have reached success rates slightly below the FP average – in H2020 as in FP7.

Analysing participation by area, we find that the Communication technology and infrastructure (COMM) subject area is the only Norwegian area of strength, while the Components and systems (MICRONANO), Technologies for digital content and information management/systems (CONT), and Next-generation computer systems (NEXTGEN) areas show potential for increased participation. These findings align with the results from the bibliometrics analyses when considering the FP participation and success patterns of the universities only. This is understandable, seeing that universities are the main producers of scientific publications.

In the COMM area, the success of the TI institutes and the large companies is key for Norwegian participation; the high potential for continuing growth in this area relates to the increase in (successful) participation by the Other research institutes, exploiting the trend towards more cross-disciplinary research in H2020. SMEs are struggling to keep up their competitiveness, though, and so are universities. The TI institutes and large companies are at the core also of Norwegian participation in the MICRONANO subject area. Success rates are very high, but decreasing compared to FP7 and strongly depending on the competence of the international partner organisations, which illustrates the critical importance of active participation in the JTI ECSEL, the only JTI in the field of ICT. In the CONT area, instead, universities and SMEs are the most frequent proposers, however reaching only moderate success rates. The NEXTGEN area is a niche area where universities have proven highly competitive, mainly thanks to the proposals in the FET HPC and the e-infrastructures action lines. The TI institutes are also quite active, but have seen their success rate plummet compared to FP7. The ROBOTICS area is another niche area for Norwegian actors; it saw an increase in interest especially among SMEs. So far, the private sector (both SMEs and large companies) are the only actors that have reached at least some result from their proposal efforts. The Software and services (SW) area is an area of interest for many stakeholder types in Norway, but there is clearly an issue of lacking competitiveness – for all, but especially for the TI institutes, hospital trusts and university colleges.

4.1 Introduction

The mapping of FP activities in ICT, which followed the same methodology as described for health in Section 3.1, is based on the categorisation of information and communication technologies provided in RCN's 2013 strategy "Veien videre for IKT-satsing i Forskningsrådet".[27] The technological focus of this categorisation matches well with the structure of the FP action lines for ICT, both for FP7 and H2020. Due attention was dedicated also to identify action lines in the Norwegian priority areas of information security, public sector and infrastructure, and health and welfare, defined in the National strategy for ICT R&D 2013–2022[28], as well as action lines related to the digitisation of industry.

Table 9 provides a description of the subject areas that we defined for the ICT R&I funded throughout the two FPs. To allow for a complete mapping, we coded those action lines where ICT R&I was involved but for which the exact technological focus could not be defined with the general coding "ICT". This was the case, for example, with SME instruments funded in the field of ICT.

Table 9 Categorisation of the ICT-related actions in the FPs.

Area	Abbreviation	Description
Communication technology and infrastructure	COMM	Communication technology, networks and infrastructure including the future internet, 5G, smart grids, internet of things (IoT) systems etc.
Technologies for digital content and information management/systems	CONT	This includes application areas such as digital libraries, technology-enhanced learning, e-culture, language technologies and networked media
Components and systems	MICRONANO	Micro-nano systems and technologies, photonics etc.
Next-generation computer systems	NEXTGEN	Distributed systems, e-infrastructures, collaborative environments, advanced and high-performance computing, including cloud computing
Robotics, automation and smart environments	ROBOTICS	Research & application areas related to robotics and artificial intelligence, including robotics for health and care
Software and services	SW	Software and ICT-enabled services in the field of security, health (personalised health systems, physiological human etc.) and government
Other areas of ICT	ICT	

4.2 Background

4.2.1 Financial dimensions

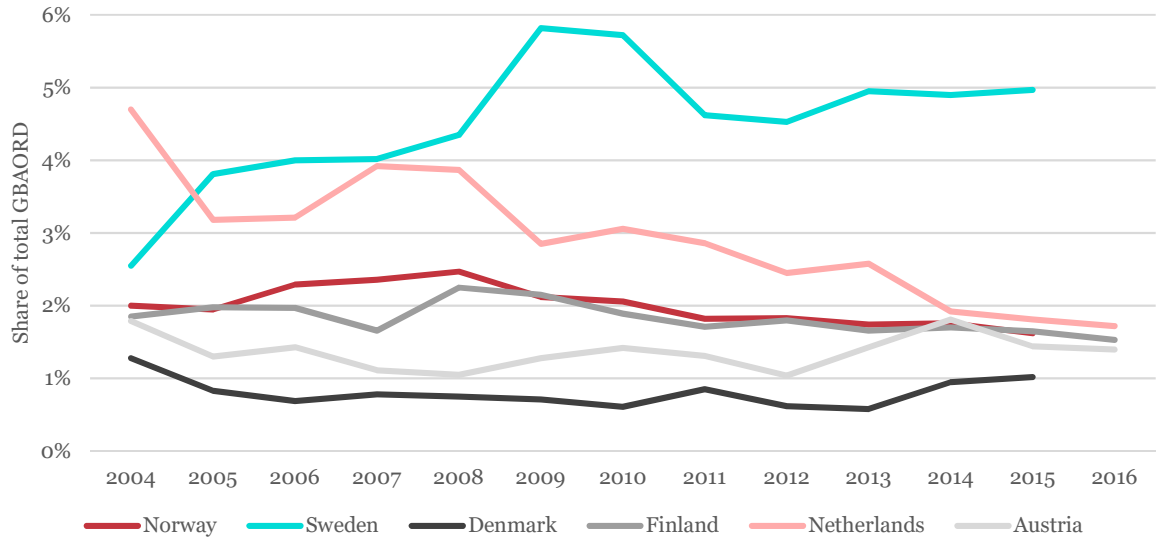
Figure 49 shows the share of GBAORD that goes to R&D in transport, telecommunication and other infrastructure. Transport, telecommunication and other infrastructure is a much broader field than ICT, but this is as close we get with standard statistics categories. The Swedish government obviously invests far more in R&D related to transport, telecommunication and other infrastructure than all the other countries. Moreover, while Swedish investments have increased in the time period shown, all other countres show opposite trends.

Figure 50 illustrates that while the Norwegian government's R&D investments in transport, telecommunication and other infrastructure have decreased in relative terms, there was an increase in absolute terms in the beginning of the period, but investments have levelled off since 2007.

[27] "Veien videre for IKT-satsing i Forskningsrådet", RCN, 2013.

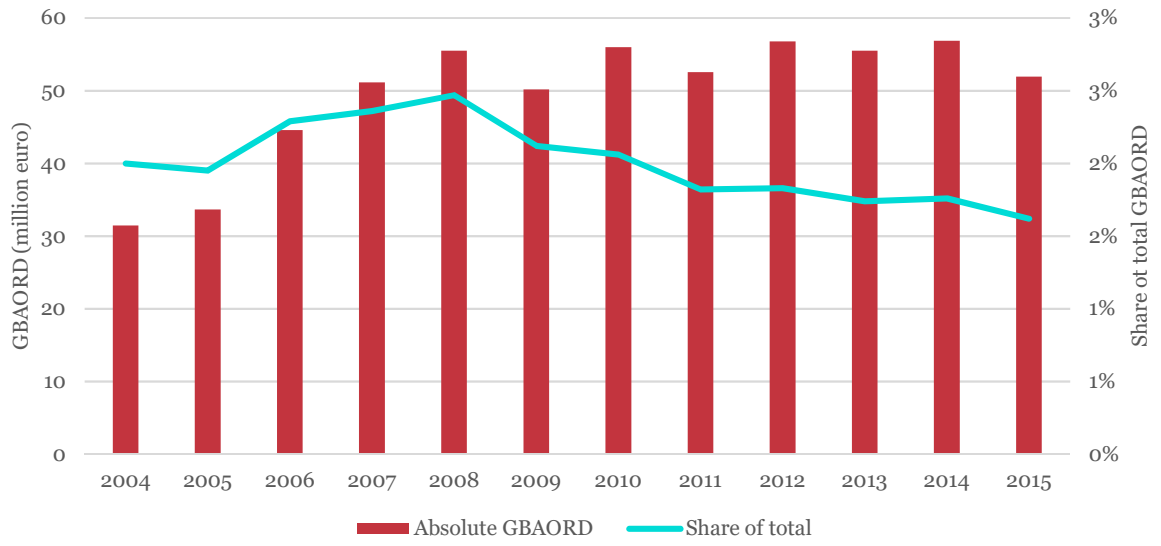
[28] "Strategi 2013–2022. Nasjonal strategi: IKT-forsking og -utvikling", Ministry of Government Administration, Reform and Church Affairs (FAD), 2013.

Figure 49 GBAORD in transport, telecommunication and other infrastructure as share of total GBAORD in Norway and its comparator countries.



Source: Eurostat.

Figure 50 Norwegian GBAORD in transport, telecommunication and other infrastructure in million euro (columns, left axis) and as share of total GBAORD (line, right axis).

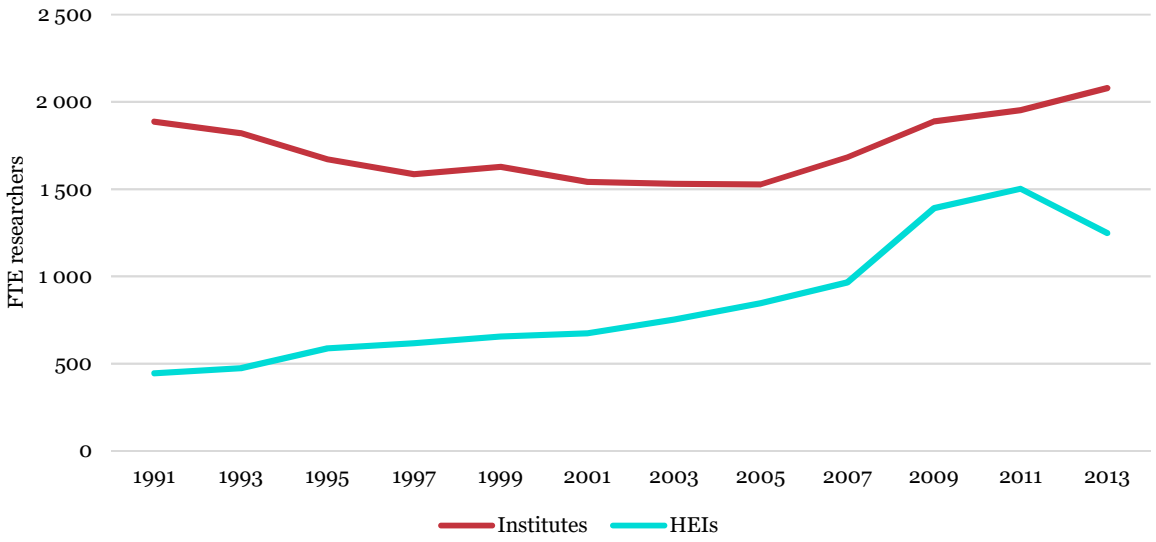


Source: Eurostat.

4.2.2 Human resources

Figure 51 shows that there has been strong growth in the number of HEI researchers in engineering and technology in Norway since 1991, whereas the number of researchers in research institutes first fell and then recovered in the period shown. Once again, engineering and technology is a much broader field than ICT, but this is as close we get with standard statistics categories.

Figure 51 FTE researchers in engineering and technology in Norway.

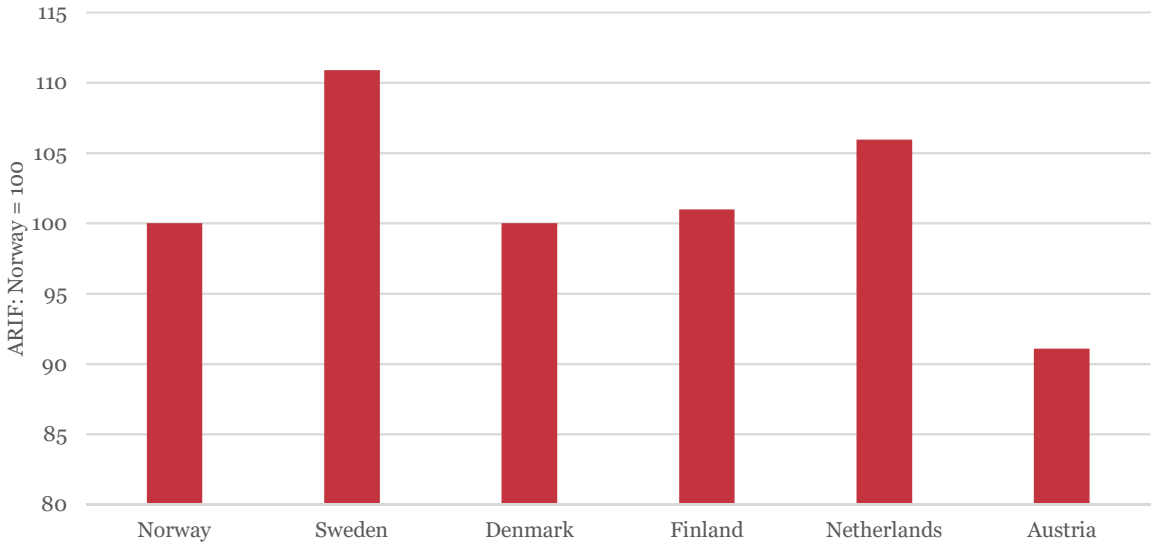


Source: NIFU's R&D statistics bank.

4.2.3 Quality in research

Figure 52 presents the Average of Relative Impact Factor (ARIF) for scientific publications in ICT between 2000 and 2011 normalised for Norway. As explained in Chapter 2, ARIF is a field-normalised measure of the scientific impact of publications that may serve as a proxy for quality. The definition of ICT used in the reference source coincides with the ICT defined in FP7. Swedish and Dutch publications in ICT had the highest impact and Austrian the lowest, with Norwegian, Danish and Finnish publications in the "midfield".

Figure 52 ARIF for publications in ICT 2000–2011 in Norway and its comparator countries.



Source: Country and regional scientific production profiles.[29]

[29] "Country and regional scientific production profiles", European Commission, 2013.

Table 10 lists the scientific fields that we identified as proxy indicators for research strengths in the subject areas we defined for ICT.

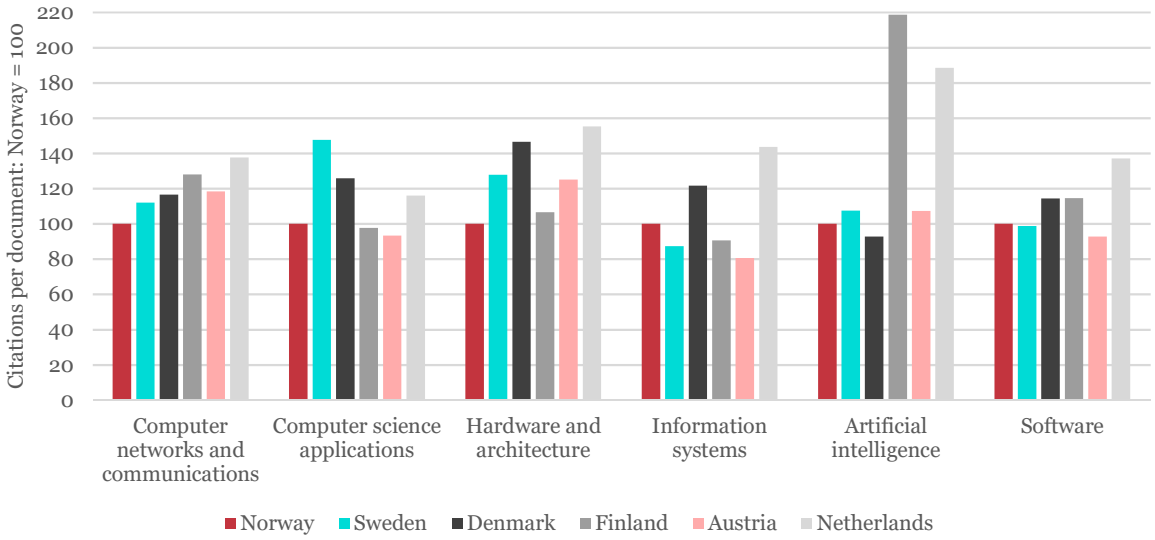
Table 10 Matching of ICT subject areas to scientific fields.

Subject area	Abbreviation	Scientific field
Communication technology and infrastructure	COMM	Computer networks and communications
Technologies for digital content and information management/systems	CONT	Computer science applications
Components and systems	MICRONANO	Hardware and architecture
Next-generation computer systems	NEXTGEN	Information systems
Robotics, automation and smart environments	ROBOTICS	Artificial intelligence
Software and services	SW	Software

Figure 53 shows the average number of citations per scientific publication in ICT between 1996 and 2015 by these scientific fields and normalised for Norway. The figure indicates that relative to the comparator countries, Norwegian publications have a below-average performance (i.e. one of the two lowest performing countries) in the fields of computer networks and communications, hardware and architecture, and artificial intelligence, and an average performance (i.e. ranked the third or fourth best performer) in computer science applications. information systems, and software. Based on these bibliometric data, one would therefore expect:

- A low level of competitiveness in the COMM, MICRONANO and ROBOTICS areas
- A modest level of competitiveness in the CONT, NEXTGEN and SW areas

Figure 53 Number of citations per publication in ICT 1996–2015 in Norway and its comparator countries.



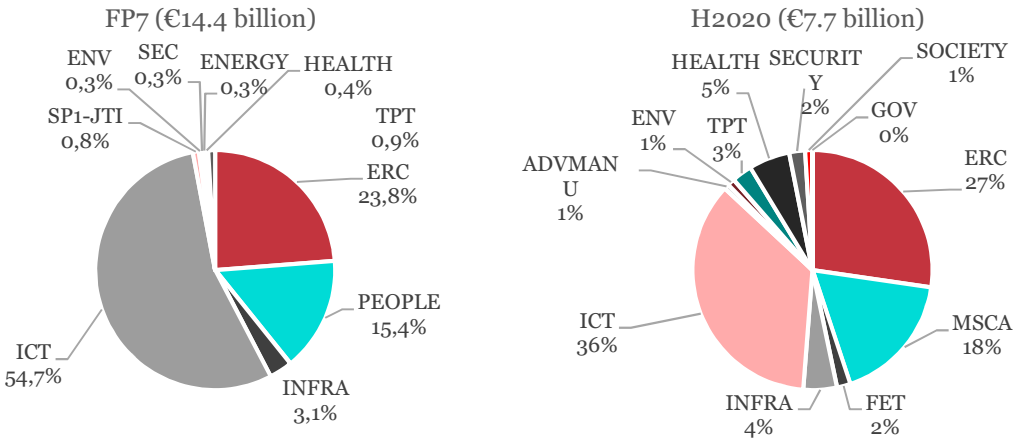
Source: SCImago Journal & Country Rank.

4.2.4 EU funding of ICT R&I in FP7 and H2020

Figure 54 shows the distribution of funding for ICT R&I in the sub-programmes of FP7 and H2020. The figure illustrates that also in ICT the share of funding to ERC and MSCA grants has increased between

FP7 and H2020, although not to the same extent as for health funding. The dedicated LEIT ICT programme in H2020 represents a significantly smaller share of total ICT funding than the ICT programme in FP7. This is in part due to the LEIT ICT programme only containing the "hard" ICT funding (e.g. photonics) and more exploratory research, whereas ICT as enabling technology is obvious by a sizable portion of the ICT funding in H2020 appearing in several of the Societal Challenges.

Figure 54 Distribution of ICT R&I funding over sub-programmes in FP7 (left) and H2020 (right).[30]



Source: Technopolis analysis of eCorda data.

4.3 Participation patterns in FP7 and H2020 – a comparative analysis

Relative to the comparator countries, Norwegian participation in ICT overall is one of low proposal activity and average success rates, both in FP7 and H2020.

In H2020, Norwegian actors have participated in fewer ICT proposals than their peers in the comparator countries, a pattern that was visible already in FP7. Success rates in ICT are in line with the FP averages, but behind most of the comparator countries. Consequently, they also participate in fewer projects. H2020 programmes of relative strength are LEIT ICT and the Energy Societal Challenge. When it comes to the ERC and MSCA sub-programmes, the Norwegian proposal participation pattern is identical to that in health.

The private sector, including SMEs, performs very well in H2020, at a level competitive with the comparator countries; the success rates essentially have remained the same as in FP7. However, institutes have seen their success rates drop considerably in H2020, and they are now below average. HEIs showed a weak performance in FP7, and still do in H2020.

In contrast to health, Norwegian actors in ICT reach high success rates for the proposals that they coordinate, higher than in close to all comparator countries. Especially the institutes show a high level of selectivity before investing efforts, and are sufficiently integrated in high-quality networks to set up competitive consortia. This attitude is far less visible among universities, and not at all among the SMEs when taking up the coordination of multi-partner proposals.

4.3.1 Participation overall

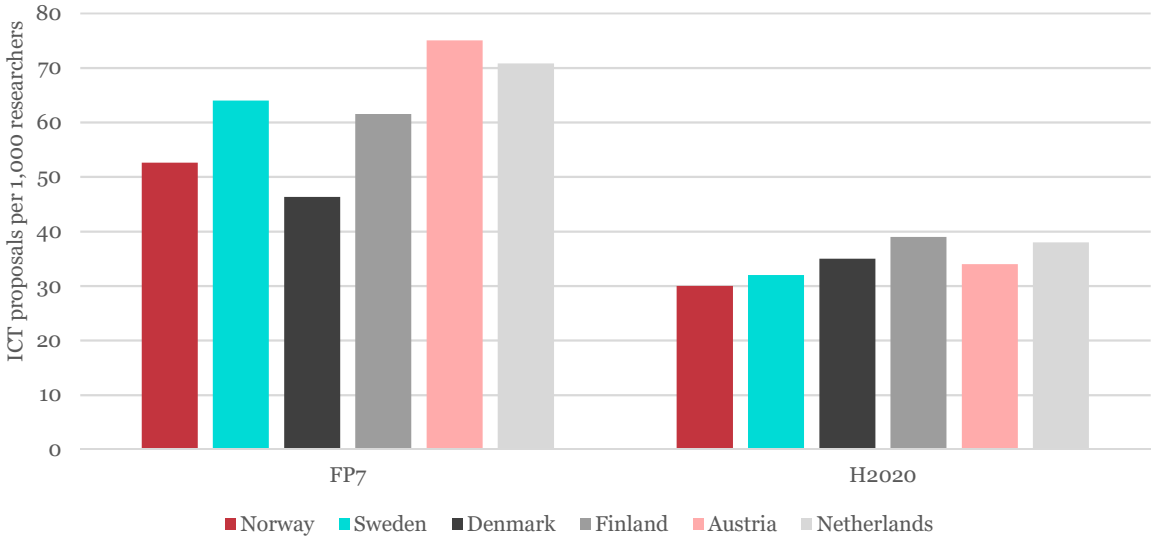
Figure 55 reveals that Norway had fewer ICT proposals in FP7 than all comparator countries except Denmark, when normalising with the number of researchers.[31] By the same measure, Norwegian actors have submitted fewer ICT proposals than all comparator countries so far in H2020 (eCorda data extracted 28 February 2017). Throughout this chapter, ICT proposals (and later ICT projects) refer to

[30] Sub-programme abbreviations are explained in Appendix D.2.

[31] For lack of data on researchers in the three topic areas, normalisations by number of researchers have been made using the overall number of researchers per country. This is not ideal, but it is consistent between countries.

all ICT-related proposals in FP7 and H2020 identified using the mapping methodology explained in Section 3.1, regardless of sub-programme.

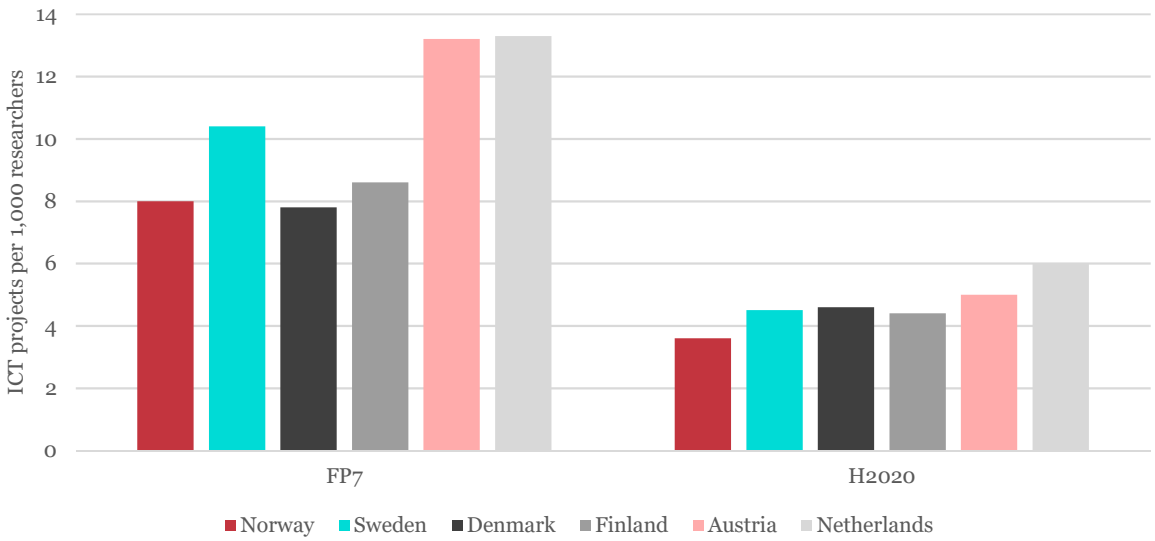
Figure 55 Number of FP7 and H2020 ICT proposals involving Norway and its comparator countries normalised with the number of researchers in each country.



Source: Technopolis analysis of eCorda and UIS data.

By February 2017, 145 H2020 grants had been awarded to ICT projects involving Norway, which represents 3.1 percent of all grants for ICT R&I in H2020. Figure 56 shows that the pattern for ICT *projects* for Norway and its comparator countries is almost identical to that for ICT *proposals* shown in Figure 55, above.

Figure 56 Number of FP7 and H2020 ICT projects involving Norway and its comparator countries normalised with the number of researchers in each country.

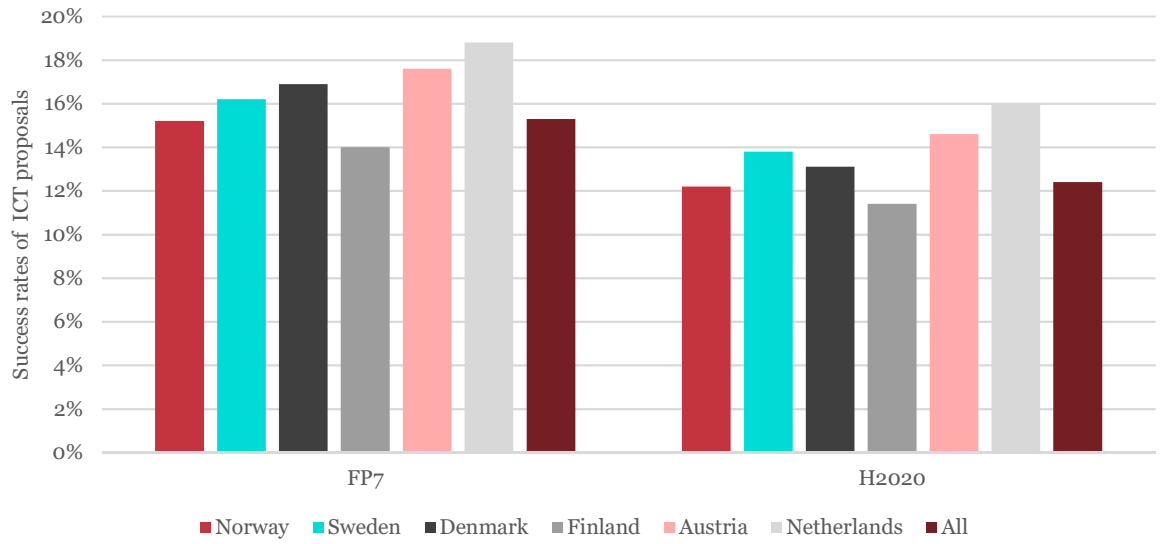


Source: Technopolis analysis of eCorda and UIS data.

Norwegian success rates in ICT are in line with the FP averages in both FP7 and H2020, see Figure 57, thus placing Norway ahead of Finland but behind all other comparator countries. This contrasts with

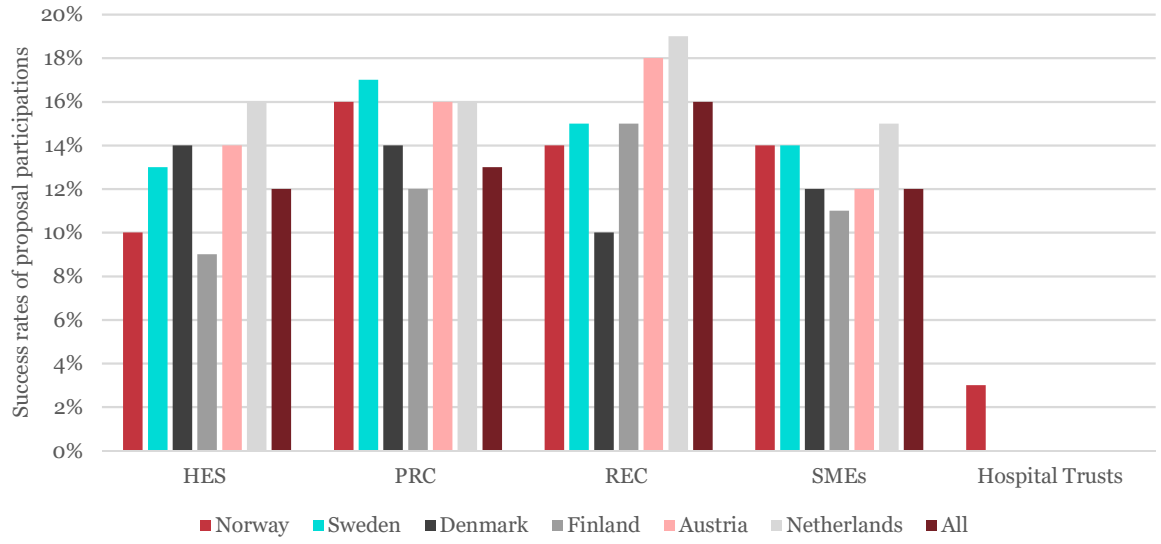
Norway's high overall success rates in both FP7 and H2020 (cf. Figure 23). Taking a closer look at Norwegian H2020 performance by sub-programme, Norway performs very well in LEIT ICT and in the Energy Societal Challenge (in both cases far better than all comparator countries), and does reasonably well in the Environment and Transport Societal Challenges (see Appendix D for details).

Figure 57 Success rates of FP7 and H2020 ICT proposals involving Norway and its comparator countries.



Source: Technopolis analysis of eCorda data.

Figure 58 Success rates of H2020 ICT proposal participations involving Norway and its comparator countries by eCorda organisation type.



Source: Technopolis analysis of eCorda data.

Data at eCorda organisational level shows that in H2020, the private sector (PRC) performs very well, both considerably better than the H2020 average and at a level competitive with the comparator countries, see Figure 58. The same applies to SMEs (which is a subset of PRC). The HEIs (HES) and research organisations (REC) perform below the respective organisational averages and only outperform their counterparts in one comparator country each (Denmark and Finland, respectively). Hospital trusts obviously greatly underperform. (Note that the figure shows number of participations,

not proposals. There are, on average, 1.3 Norwegian participations per ICT proposal.) We investigate the participation patterns among stakeholder categories in more detail in Section 4.3.5.

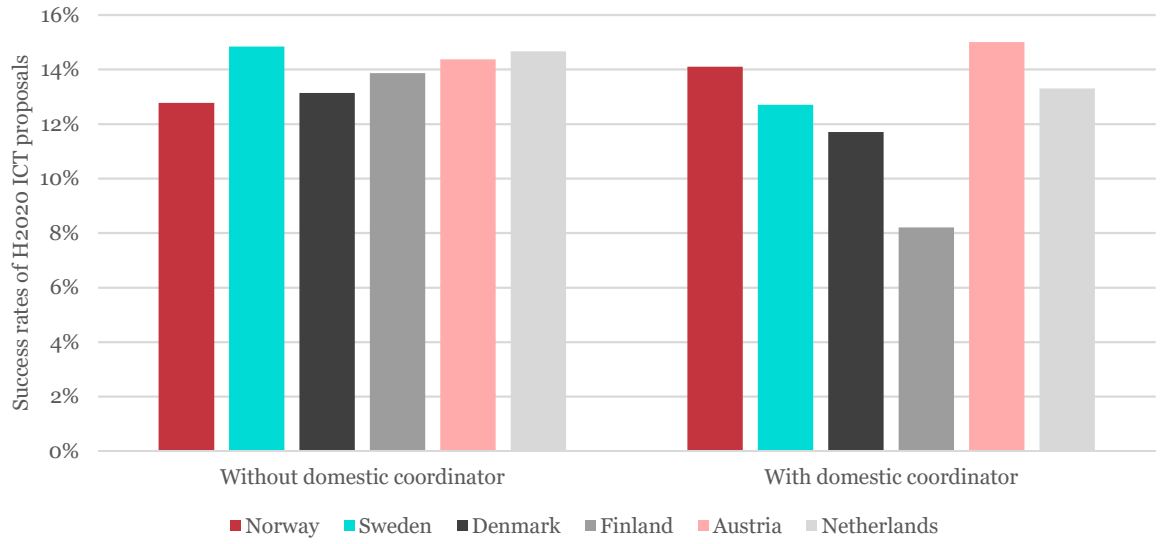
Relative to the comparator countries, Norwegian participation in ICT overall is one of low proposal activity and average success rates, in both FP7 and H2020.

4.3.2 Participation in multi-partner proposals

Also in ICT, Norwegian actors show a higher preference for multi-partner proposals than their peers in all comparator countries, except for Austria. In FP7, 85 percent of Norwegian proposals were multi-partner, in H2020 the share so far is 76 percent. In FP7, Norwegian ICT actors were just about as likely to take the lead in multi-partner proposals as their peers in the comparator countries, but so far in H2020 Danes and Finns are more likely to do so (and Swedes, Austrians and Dutch less likely), see Appendix D for details.

Just as in health, multi-partner H2020 proposals led by partners in other countries have lower success rates for Norwegian actors than for actors in any of the comparator countries, see left set of columns in Figure 59. However, in contrast to health, multi-partner proposals coordinated by Norwegian actors have higher success rates than proposals coordinated by actors in any of the comparator countries, except for Austria (right set of columns in the figure).

Figure 59 Success rates of H2020 ICT multi-partner proposals involving Norway and its comparator countries, without and with domestic coordinator.



Source: Technopolis analysis of eCorda data.

These data suggest a higher level of selectivity among Norwegian actors in ICT R&I before investing efforts in proposal writing as coordinators, as well as a high capacity in self-assessment. More often than their peers, they invest the needed effort only for R&I topics where they are highly competent, and they are sufficiently integrated in high-quality networks to set up competitive consortia. There are significant differences among the stakeholder types, though. The pattern above is especially true for the institutes, where one in six ICT proposals that they coordinated received funding (10 out of 60). It is less so for the HEIs where (only) about one in ten is funded (5 out of 46, i.e. 1 out of 7 for the university colleges and 4 out of 39 for the universities), and it is not at all the case for the industry sector where none of the 23 coordinated proposals was successful (18 by SMEs and 5 by large companies).

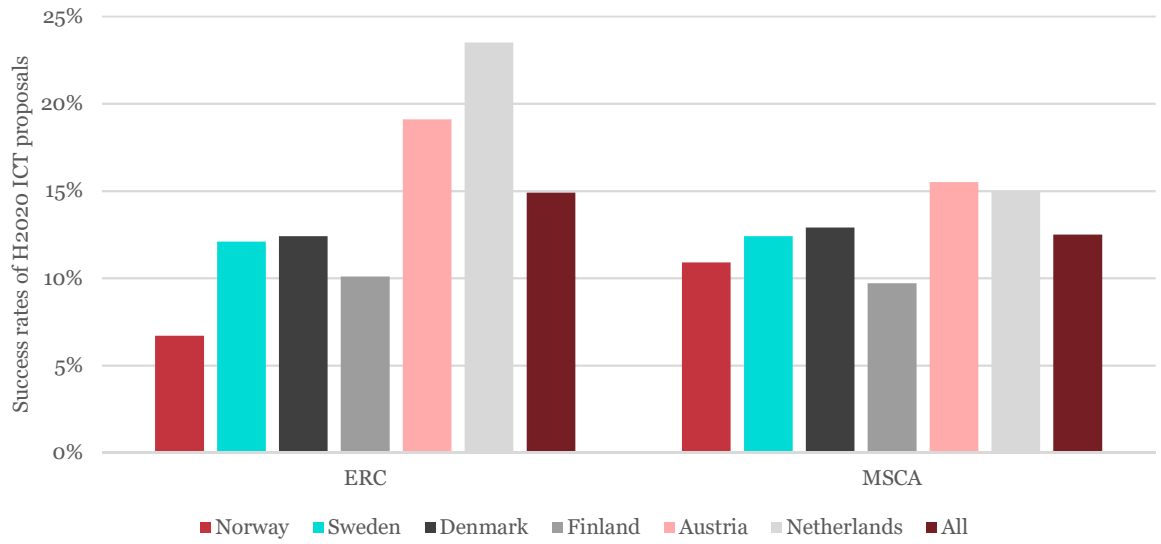
4.3.3 Participation in ERC and MSCA proposals

When it comes to the MSCA and ERC sub-programmes, the Norwegian proposal participation pattern is identical to that in health. In H2020, Norwegians have accounted for only 1 percent of the total

number of ERC proposals, a rate that is well below those of all comparator countries. The proportion of MSCA proposals from Norwegian researchers was at 3 percent also well below all other countries except Finland. (See Appendix D for details.)

Figure 60 shows that the success rate of the ERC proposals submitted by Norwegian researchers is well below those of all comparator countries, and also well below the overall average. Norwegian MSCA proposals do better, but also there, the success rate is below those of all comparator countries but Finland, and the overall average. Norway's relative ERC performance has fallen considerably since FP7 when only Dutch and Austrian researchers did better; most important, Norway is the only country among the comparator countries for which ERC success rates have fallen in H2020 rather than increased. Norwegian relative performance in MSCA, instead, remains unchanged in H2020 compared to FP7; there was a close-to-equal downward trend in success rates for all comparator countries. (See Appendix D for details.)

Figure 60 Success rates of H2020 ICT ERC and MSCA proposals involving Norway and its comparator countries.



Source: Technopolis analysis of eCorda data.

Seeing the focus of the ERC grants in terms of nature of research, these data suggest a relative weakness in Norwegian institutions related to fundamental research in ICT. The data therefore seem to correlate with the particularly low success rates for proposal participations by Norwegian Higher Education institutions (HES) compared to their peers in the comparator countries, see Figure 58.

4.3.4 EC contributions

So far in H2020, EC contributions to Norwegian participations in ICT projects total €99m, which equates to 1.3 percent of all H2020 funding in ICT. This is below the proportion realised by all comparator countries.

For Norway, the average H2020 funding per project participation (€475k), which is just below the average for the comparator countries, is lower than the average funding that was requested in the proposals (€553k). This implies that overall, Norwegian actors assume less important roles in the projects than they had originally envisaged.

4.3.5 Norwegian participation by stakeholder category

Recognising that eCorda organisation classifications do not suit Norwegian realities all that well, we reanalyse participation data using Norwegian stakeholder categories and types (cf. Table 6). Once again, our focus is on multi-partner projects and by necessity we analyse participations (and not proposals);

on average there are 1.6 Norwegian participations in each Norwegian multi-partner H2020 ICT proposal. In ICT, the concentration of proposal participations to the ten most frequent participants (see Table 11) is just over 50 percent in FP7 and just shy of 40 percent in H2020. In other words, the concentration is less pronounced in ICT than in health R&I.

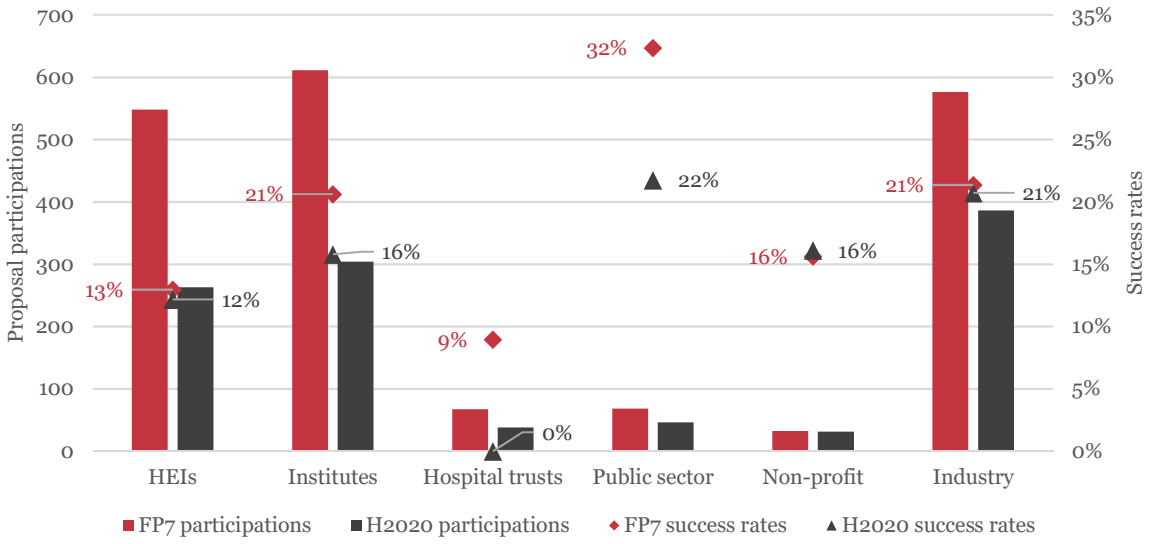
Table 11 List of key Norwegian ICT participants in FP7 and H2020 by number of proposals (top 10 in each FP).

Stakeholder type	Organisation	FP7	H2020
TI institute	SINTEF Group	391	147
University	Norwegian University of Science and Technology/Norges teknisk-naturvitenskapelige universitet (NTNU)	182	73
University	University of Oslo/Universitetet i Oslo (UiO)	144	70
University	University of Bergen/Universitetet i Bergen (UiB)	52	21
Other institute	Simula Research Laboratory	42	31
Large company	Telenor	49	14
TI institute	Norwegian Computing Center/Norsk Regnesentral	44	15
Hospital trust	Oslo universitetssykehus/Oslo University Hospital (OUS), including Rikshospitalet	41	12
SS institute	Norut Northern Research Institute	30	9
University	University of Agder/Universitetet i Agder (UiA) (including Agder University College/Høgskolen i Agder (HiA))	24	12
Hospital trust	University Hospital of North Norway/Universitetssykehuset Nord-Norge HF (UNN)	14	17
University	University of Tromsø/Universitetet i Tromsø (UiT)	14	15
University college	Oslo and Akershus University College of Applied Sciences/Høgskolen i Oslo og Akershus (HiOA)	5	13

In FP7, ICT proposals involved 386 Norwegian individual organisations, covering all stakeholder types, that accounted for 1,902 proposal participations. In H2020, the number of organisations involved is so far 405, accounting for 1,166 proposal participations. Figure 61 summarises ICT proposal participations and success rates by the main stakeholder categories, illustrating that in H2020, private-sector actors (industry) are the most frequent proposers, closely followed by institutes and HEIs.

In H2020, the success rates for industry and HEIs essentially remained the same as in FP7, whereas the rate for institutes dropped notably. This is a more benign development than in health, although there are notable decreases in ICT for hospital trusts and public-sector organisations. However, only industry, institutes and non-profit organisations have achieved or exceeded the 16 percent average Norwegian ICT success rate in H2020, whereas industry and institutes were above the FP7 Norwegian ICT average of 19 percent. HEIs obviously have not made the average in either FP, confirming the weak performance of these organisations noted in the sections above. As noted in the previous chapter, the H2020 success rates will likely change with time (up or down), but it is unlikely that changes will be dramatic.

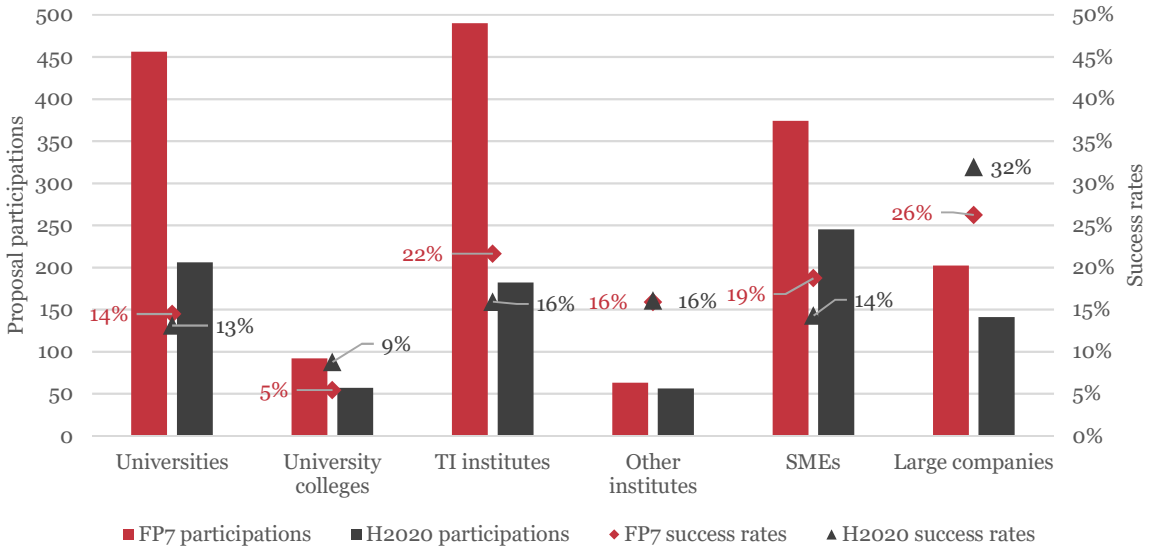
Figure 61 Norwegian ICT proposal participations (columns, left axis) and success rates (diamonds/triangles, right axis) in FP7 and H2020 by stakeholder category.



Source: Technopolis analysis of eCorda data.

Figure 62 shows the equivalent data for the stakeholder types that have so far in H2020 participated in at least 50 proposals. The private sector, university colleges and Other institutes have so far been more active than in FP7, whereas the TI institutes and the universities have been less active. Large companies have increased their success rates notably (contrary to the overall trend between FPs), while universities and Other institutes have maintained theirs, and the other subtypes have seen a decrease. Large companies have thus exceeded the H2020 ICT success rate by an impressive factor of two, whereas the TI institutes and Other institutes have just made the average. A clue to the high success rate for large companies lies in three companies with three proposals each, three companies with two proposals each, and 21 companies with one proposal that have enjoyed 100 percent success rate. The large companies with the largest number of ICT projects are DNV (5), Telenor (5), Elkem (4) and Borregaard (4) (with success rates in the range 23–57%).

Figure 62 Norwegian ICT proposal participations (columns, left axis) and success rates (diamonds/triangles, right axis) in FP7 and H2020 by most active stakeholder type.



Source: Technopolis analysis of eCorda data.

4.4 Participation patterns in the subject areas

In H2020, Norwegian actors have focused their proposal activity especially on the COMM and CONT areas. However, for the CONT area, this preference has not been matched with high success rates.

In the COMM area, the bulk of the proposals have been for R&I in Societal Challenges. As in FP7, key Norwegian actors are large companies, SMEs and TI institutes. The private sector has stepped up its activities (especially the SMEs), but while large companies have achieved impressive success rates, the SMEs are clearly struggling. The TI institutes have reduced their participations, but have succeeded in maintaining very high success rates. Universities, instead, have experienced a radical decrease in competitiveness.

In the H2020 CONT area, the proposals have focused mainly on calls in the LEIT programme, and universities and SMEs are the most frequent proposers. The success rates of SMEs and TI institutes are almost at the H2020 ICT average, while universities have seen their success rates drop considerably – and they have done particularly poorly in proposals for projects in the Societal Challenges.

R&I in the MICRONANO area is funded mainly through the LEIT programme and JTI ECSEL. The particularly active large companies and SMEs have both reached very high success rates, and the TI institutes have also realised a competitive success rate so far. However, they have all experienced notable drops in success rates compared to FP7, especially the TI institutes.

NEXTGEN is the one ICT area where universities have proven highly competitive, mainly thanks to the proposals in the FET HPC and the e-infrastructures action lines. The TI institutes are also quite active, but have seen their success rate plummet.

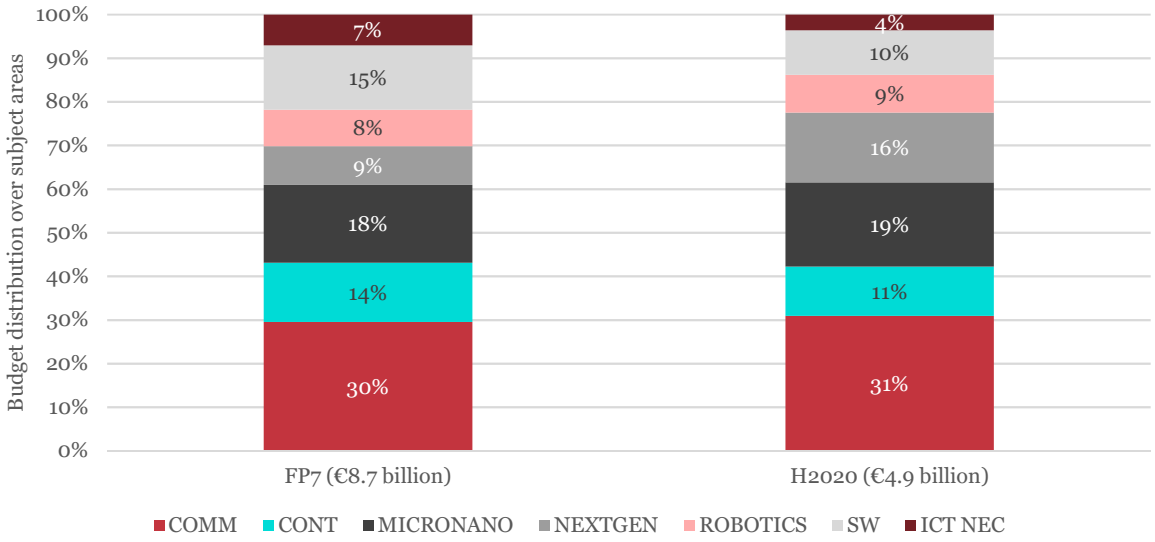
ROBOTICS is a niche area in Norwegian ICT R&I. There is a relatively strong increase in interest in H2020, especially by the TI institutes and universities, but so far without success.

The SW area is an area of interest for many stakeholder types in Norway, most of it focused on calls in the Societal Challenges. There clearly is an issue of lacking Norwegian competitiveness for all stakeholder types, but particularly for TI institutes, hospital trusts and university colleges. SMEs have significantly increased their participation and, like the universities, succeeded in maintaining their – rather low – FP7 success rates.

4.4.1 EU funding for ICT R&I in the subject areas

Figure 63 shows the proportion of the FP budgets for ICT R&I by subject area, illustrating that differences in ICT priorities between FPs are rather subtle, at least at this level of analysis. The increase in NEXTGEN funding in H2020 is linked to cloud computing and high-performance computing (HPC), funded mainly in the LEIT ICT programme. COMM funding mainly originates in Societal Challenges (e.g. in Transport, Health and Energy), as well as in LEIT for advanced 5G in and Internet of Things. CONT funding is tied to Big data, and ROBOTICS to manufacturing and medical applications. SW funding is linked to cybersecurity (both in LEIT and the Security Societal Challenge), as well as the Health Societal Challenge. MICRONANO funding regards especially R&I in the context of the JTIs, under the LEIT ICT programme.

Figure 63 Budget distribution into ICT subject areas.[32]



Source: Technopolis analysis of eCorda data.

4.4.2 Proposals and success rates

In terms of absolute numbers of proposals, Norwegian actors mainly focus on COMM and CONT in H2020, see However, it should be noted that the volume of participation in both NEXTGEN and ROBOTICS is low. The CONT area sees the second largest interest from Norwegian proposers, but here competitiveness is notably lower than in the previously discussed areas (and in H2020, below the ICT average of 16%). The SW area finally, appears to be a problem; participation has dropped by a lot, and so has the success rate, which is now very low.

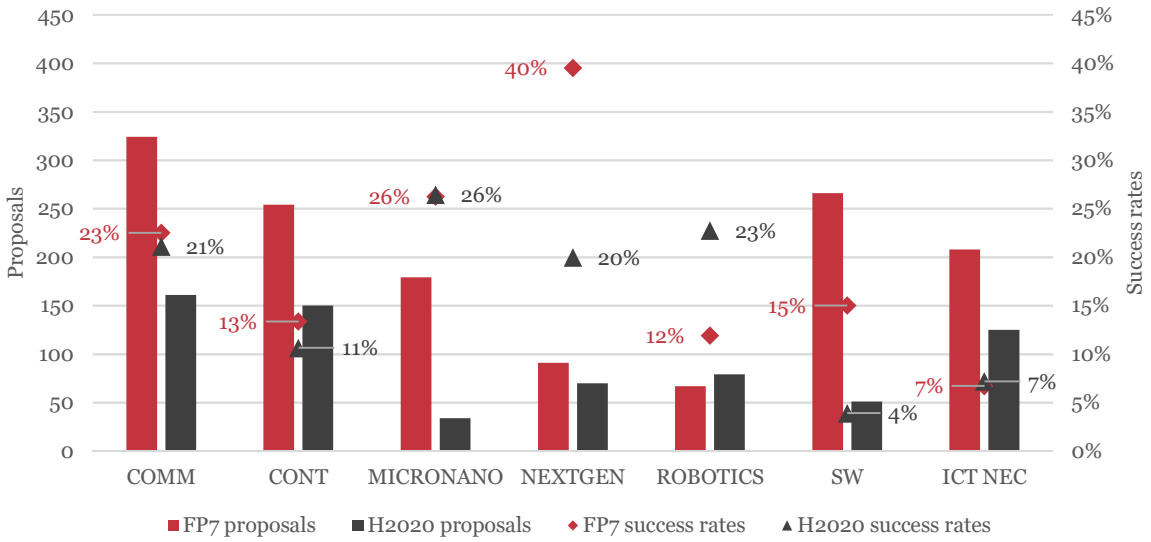
Figure 64. However, judging from H2020 success rates, Norwegian actors are the most competitive in COMM, MICRONANO, NEXTGEN and ROBOTICS, so performance is mixed:

- In COMM, participation is high and so is the success rate, which seems to have increased since FP7 (judging from the change in overall ICT success rates; FP7: 19%, H2020: 16%)
- MICRONANO is another Norwegian strength, but while success rates indeed are very high, the number of proposals dropped in H2020
- Participation in NEXTGEN is higher than in FP7 (considering that H2020 is barely half way); the success rate has halved from FP7, but still is above ICT average
- Participation in ROBOTICS has doubled compared to FP7, but the success rate dropped radically in H2020

However, it should be noted that the volume of participation in both NEXTGEN and ROBOTICS is low. The CONT area sees the second largest interest from Norwegian proposers, but here competitiveness is notably lower than in the previously discussed areas (and in H2020, below the ICT average of 16%). The SW area finally, appears to be a problem; participation has dropped by a lot, and so has the success rate, which is now very low.

[32] COMM = Communication technologies & infrastructure; CONT = technologies for digital content & information management and systems; MICRONANO = components and systems; NEXTGEN = Next-generation computer systems; SW = software & services; ROBOTICS = robotics, automation & smart environments.

Figure 64 Norwegian multi-partner proposals (columns, left axis) and success rates (diamonds/triangles, right axis) in FP7 and H2020 in ICT subject areas.



Source: Technopolis analysis of eCorda data.

These results do not correlate with our expectations based on the overarching analysis of bibliometric data in Section 4.2.3. That analysis made us expect a low level of competitiveness in the COMM, MICRONANO and ROBOTICS areas, and modest level in the CONT, NEXTGEN and SW areas. Using the average Norwegian multi-partner success rate in H2020 (16%) as a guide, we note that Norwegian proposers are competitive in COMM (21%), MICRONANO (26%), and NEXTGEN (20%), and underperform in CONT (11%), ROBOTICS (4%) and SW (7%). The most likely explanation for this apparent disagreement is that Norwegian ICT participation in H2020 is dominated by the private sector (success rate: 21%) and institutes (16%), whereas universities (12%) are less frequent participants, cf. Figure 61. The private sector hardly writes scientific publications at all, and institutes rather seldom. The bibliometric data are thus mainly based on the performance of HEIs, and as we shall see in subsequent subsections, universities have below-average success rates in most ICT areas.

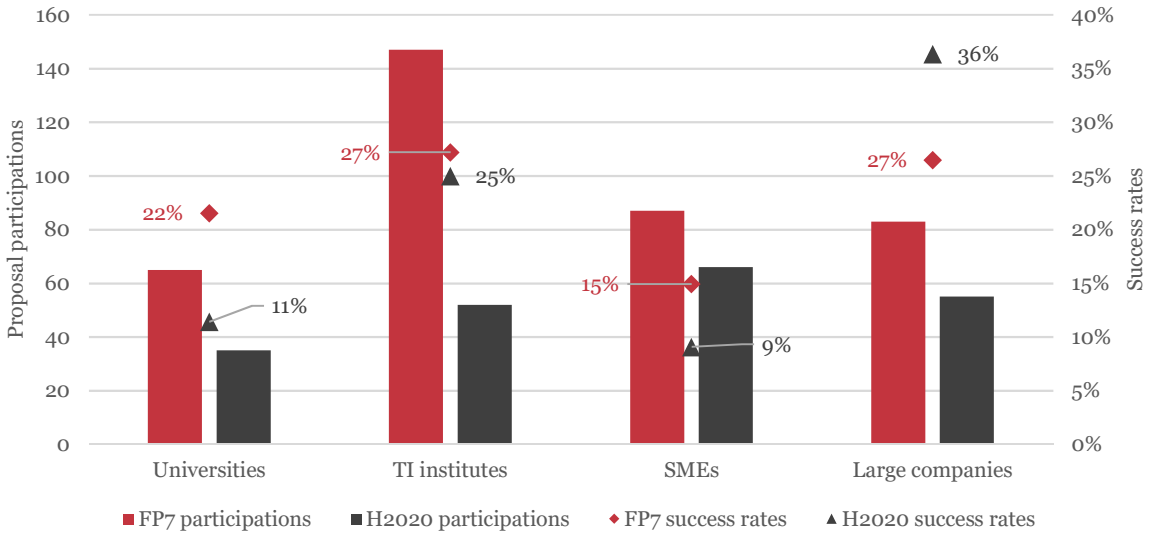
In the following area-level subsections, we only include stakeholder types that have participated in at least 15 multi-partner proposals in H2020 in our analyses, and since we want to harness multiple Norwegian participations, we analyse yet again proposal participations (and not proposals).

4.4.2.1 Communication technology and infrastructure (COMM)

In total, there were 290 participations by Norwegian actors in H2020 COMM proposals, which constitutes a slight increase compared to FP7 (465 participations), taking into consideration that H2020 is barely mid-way. Norwegian actors had also more joint proposals; the rate in H2020 was at 1.6, compared to 1.4 in FP7.

Figure 65 illustrates that throughout the FPs, the key Norwegian actors in this area are large companies, SMEs and TI institutes. H2020 data show a considerable shift in the weight of the private sector; companies (especially the SMEs) have stepped up their proposal activities, whereas the TI institutes have done the opposite. Large companies have managed to achieve an impressive success rate, and the TI institutes' rate is very high as well, whereas SMEs struggle in the competition, more than in FP7. Universities are less active than other actors (but at about the same level as in FP7) and their success rate has halved, indicating a radical decrease in competitiveness.

Figure 65 Norwegian multi-partner proposal participations (columns, left axis) and success rates (diamonds/triangles, right axis) in FP7 and H2020 in the COMM area.



Source: Technopolis analysis of eCorda data.

This trend needs to be set in the context of the shift towards ICT applications and cross-disciplinary R&I in H2020 (see Section 4.2.4). In H2020, 60 percent of the budget for COMM R&I was allocated in the Societal Challenges; it was also where Norwegian actors focused their proposals (70% of their proposal participations). Though not making it into the figure, it also allowed for a higher participation by the Environmental institutes (12 H2020 participations versus 14 in FP7) and of the Primary institutes (8 H2020 participations versus 1 in FP7); both showed high competitiveness with success rates of 25 percent and 38 percent in H2020, respectively (versus 21% and 0% in FP7).

4.4.2.2 Technologies for digital content and information management/systems (CONT)

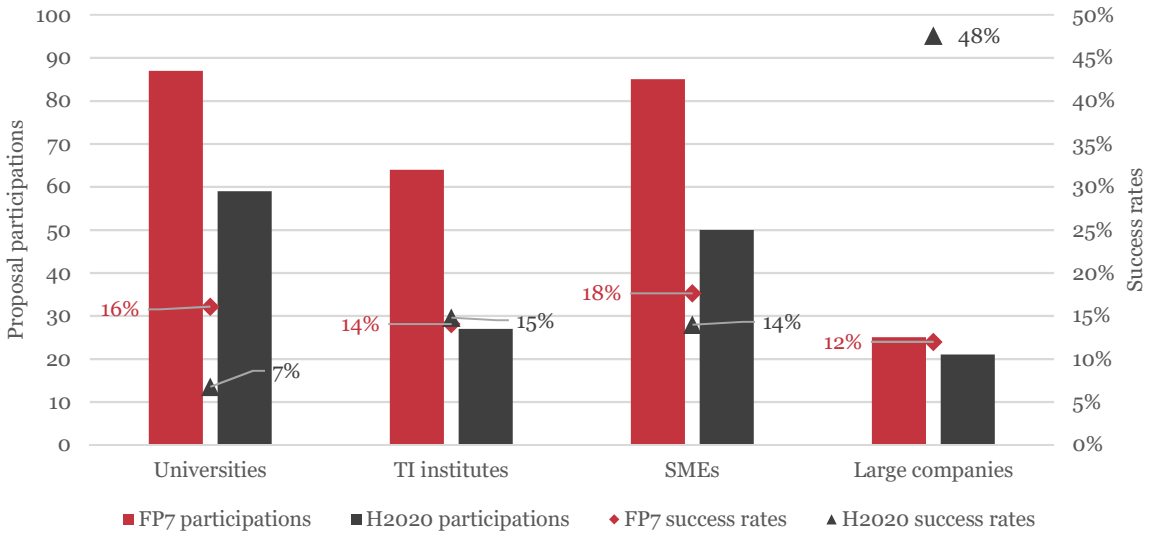
In the CONT area, participation in proposals was stable compared to FP7 (150 H2020 participations versus 254 participations in FP7). The H2020 joint proposal rate was 1.5, similar to the 1.3 in FP7.

Universities and SMEs are the most frequent proposers, see Figure 66. However, the only stakeholder type that has an above-average H2020 ICT success rate is large companies, and considering that it is four times higher than in FP7 and based on rather few proposals, there is a risk that it is not sustainable. While the success rates of SMEs and TI institutes are almost at the H2020 ICT average (16%), that of universities is far below the average and less than half of what they achieved in FP7, thus again suggesting a radical decrease in competitiveness (as for COMM above).

Setting these data in context, we note that except for the universities, all key proposers focused their participations on R&I funded under the LEIT programme, i.e. the "hard core" ICT R&I – despite the 30 percent of the H2020 budget for CONT R&I that was allocated in the Societal Challenges. For the universities, instead, 35 percent of their proposal participations were in the Societal Challenges and the bad success rates for the universities regard especially these applications: only one out of 25 proposals was successful.

Also in the case of CONT, the other research institutes (especially the Environmental and Other institutes) took the opportunity offered by H2020 and participated in total in 33 proposals, with a 21 percent success rate for the Environmental institutes (3 out of 14 participations), but 0 percent for the Other institutes (19 participations).

Figure 66 Norwegian multi-partner proposal participations (columns, left axis) and success rates (diamonds/triangles, right axis) in FP7 and H2020 in the CONT area.



Source: Technopolis analysis of eCorda data.

4.4.2.3 Components and systems (MICRONANO)

The interest in MICRONANO was at a similar (moderate) level in H2020 as in FP7: 144 participations by Norwegian actors in H2020 versus 290 in FP7. There was a significant increase in joint proposals, though: the rate was 2.1 in H2020 versus 1.6 in FP7.

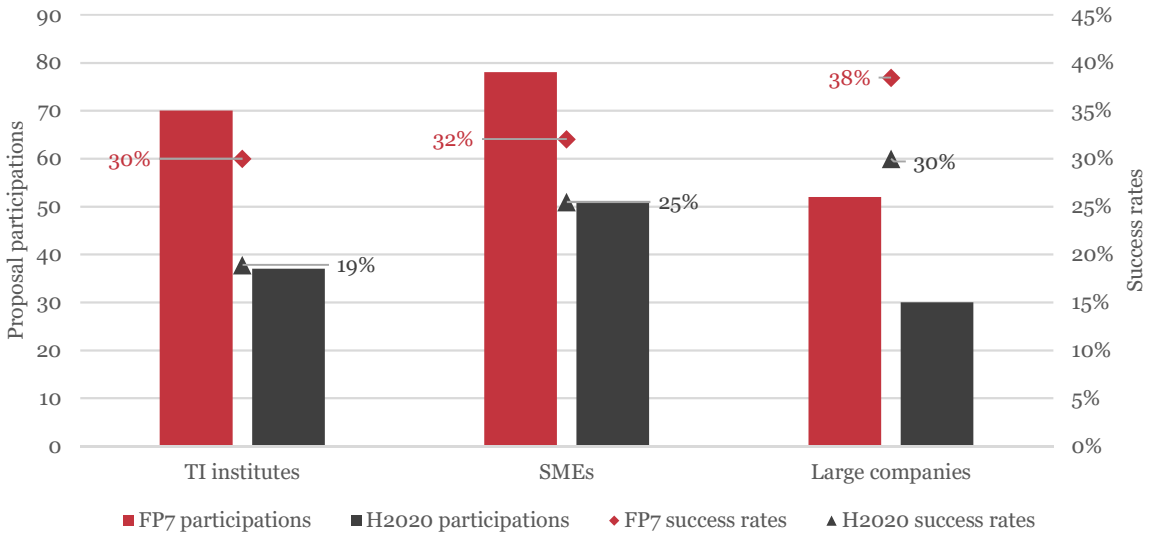
The private sector is again the most active, and both large companies and SMEs have achieved very high success rates, see Figure 67. The TI institutes are also quite active, and have realised a competitive success rate so far. However, all these stakeholder types have experienced notable drops in success rates from FP7 that are larger than the decrease in the overall ICT averages; the decrease is the largest for the TI institutes. While these three stakeholder types seem to have maintained or increased proposal activity in H2020, most of the decrease obvious in However, it should be noted that the volume of participation in both NEXTGEN and ROBOTICS is low. The CONT area sees the second largest interest from Norwegian proposers, but here competitiveness is notably lower than in the previously discussed areas (and in H2020, below the ICT average of 16%). The SW area finally, appears to be a problem; participation has dropped by a lot, and so has the success rate, which is now very low.

Figure 64 is explained by universities' decreased interest (49 proposals in H2020, 18 in H2020), although accompanied by a respectable increase in success rate from 12 percent to 25 percent in H2020 (the latter obviously based on small numbers).

Also in this case, we need to set these figures in the overall H2020 context to reach a correct understanding. In H2020, R&I in MICRONANO is funded mainly in the LEIT programme, including both "mainstream" ICT R&I and R&I funded under the JTI ECSEL. The success rates for these two streams of R&I are radically different: Norwegian proposal participations in ECSEL had an overall success rate of 33 percent, while the success rate in "mainstream" MICRONANO R&I is 9 percent.

The data highlight the importance of the JTI in this field: the large companies focused close to all their participations on R&I funded in the JTI; for the SMEs and TI institutes, it was about 35 percent; for the universities, it was half of their 16 participations. The increase in their success rate in H2020 is only thanks to their participation in JTI: none of the eight proposals in "mainstream" R&I was successful.

Figure 67 Norwegian multi-partner proposal participations (columns, left axis) and success rates (diamonds/triangles, right axis) in FP7 and H2020 in the MICRONANO area.



Source: Technopolis analysis of eCorda data.

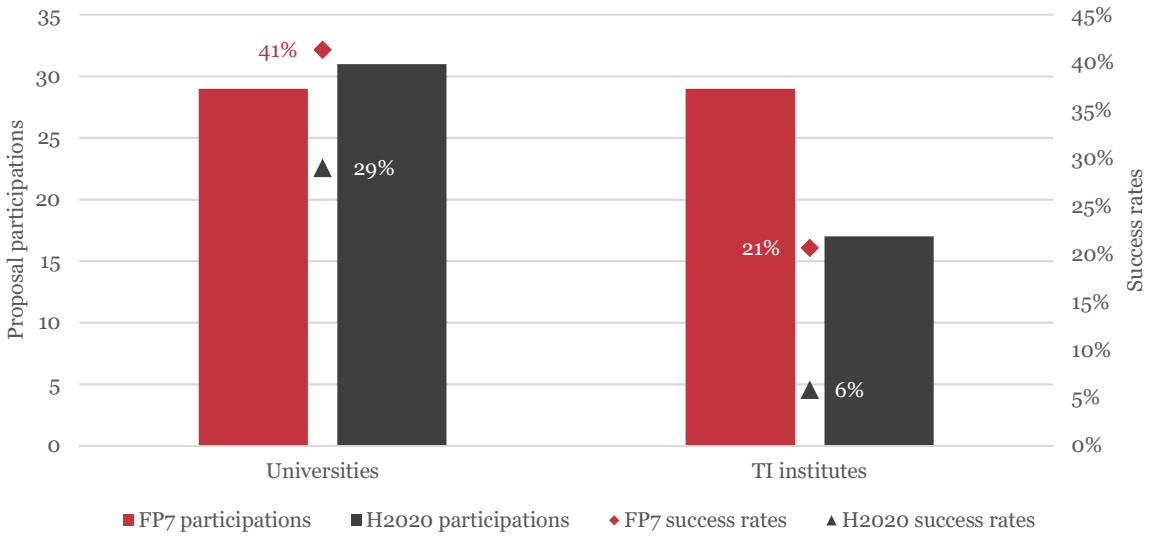
4.4.2.4 Next-generation computer systems (NEXTGEN)

This subject area, of limited interest for Norwegian R&I (cf. However, it should be noted that the volume of participation in both NEXTGEN and ROBOTICS is low. The CONT area sees the second largest interest from Norwegian proposers, but here competitiveness is notably lower than in the previously discussed areas (and in H2020, below the ICT average of 16%). The SW area finally, appears to be a problem; participation has dropped by a lot, and so has the success rate, which is now very low.

Figure 64), saw a high increase in proposal participation under H2020: 95 participations versus 115 in FP7; the joint proposal rates were similar (about 1.2).

This is the one ICT area where universities dominate in the proposal activity – with at almost mid-term H2020, an activity that is already higher than in FP7 – and where they have proven highly competitive (though less so than in FP7), see Figure 68. The TI institutes are also quite active at a level comparable to FP7, but their success rate has plummeted (one proposal of 17 has been successful so far).

Figure 68 Norwegian multi-partner proposal participations (columns, left axis) and success rates (diamonds/triangles, right axis) in FP7 and H2020 in the NEXTGEN area.



Source: Technopolis analysis of eCorda data.

The reason for the increase in university participation can be found in the shift towards more fundamental NEXTGEN R&I in H2020: 60 percent of the budget was in the Excellent Science pillar, i.e. the e-infrastructure – and the newly installed FET HPC action line. About 40 percent of the Norwegian proposal participations was for R&I in this pillar: half of those from the universities, and one by the TI institutes – which was also the only successful one. The drastic decrease in TI institute competitiveness is therefore in the "mainstream" R&I, but the participation numbers are small so this may be only temporary.

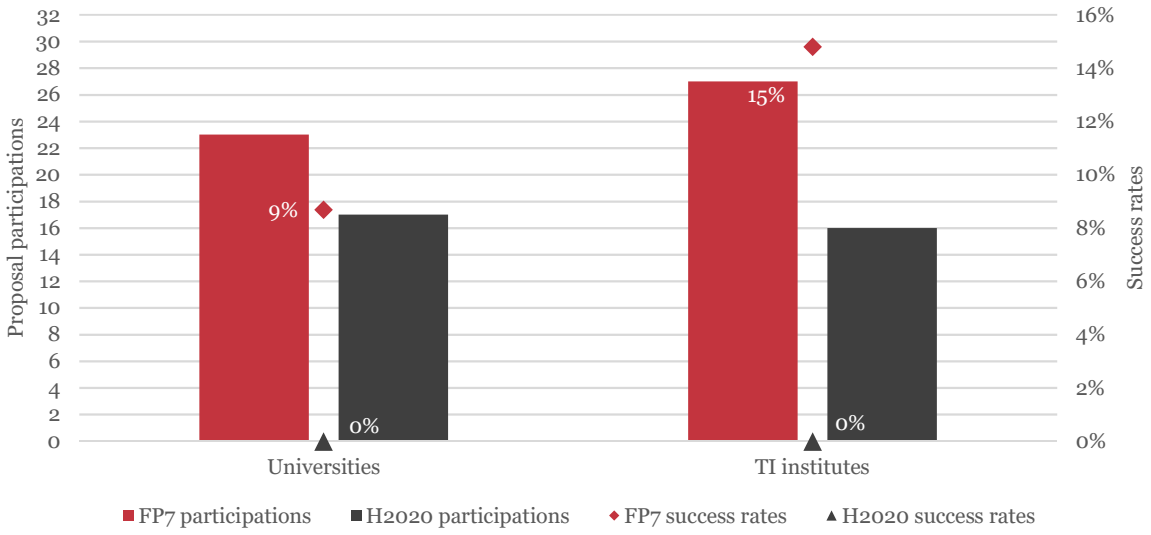
4.4.2.5 Robotics, automation and smart environments (ROBOTICS)

Just as in the NEXTGEN area, there is a strong increase in interest in ROBOTICS in H2020 (in total 75 H2020 participations versus 87 in FP7), but the area remains small for Norway (cf. However, it should be noted that the volume of participation in both NEXTGEN and ROBOTICS is low. The CONT area sees the second largest interest from Norwegian proposers, but here competitiveness is notably lower than in the previously discussed areas (and in H2020, below the ICT average of 16%). The SW area finally, appears to be a problem; participation has dropped by a lot, and so has the success rate, which is now very low.

Figure 64).

The TI institutes and universities dominate proposal activity as in FP7, but so far in H2020 completely without success, see Figure 69. Most interesting in this area is the increase in industry participation: SMEs participated in 14 H2020 proposals and large companies in 8 (and thus not included in the figure due to the 15-proposal cut-off); in contrast to the "traditional" stakeholders, they each got one proposal funded. The overall assessment is that Norwegian R&I clearly struggles to remain at least to some extent competitive in the ROBOTICs area.

Figure 69 Norwegian multi-partner proposal participations (columns, left axis) and success rates (diamonds/triangles, right axis) in FP7 and H2020 in the ROBOTICS area.



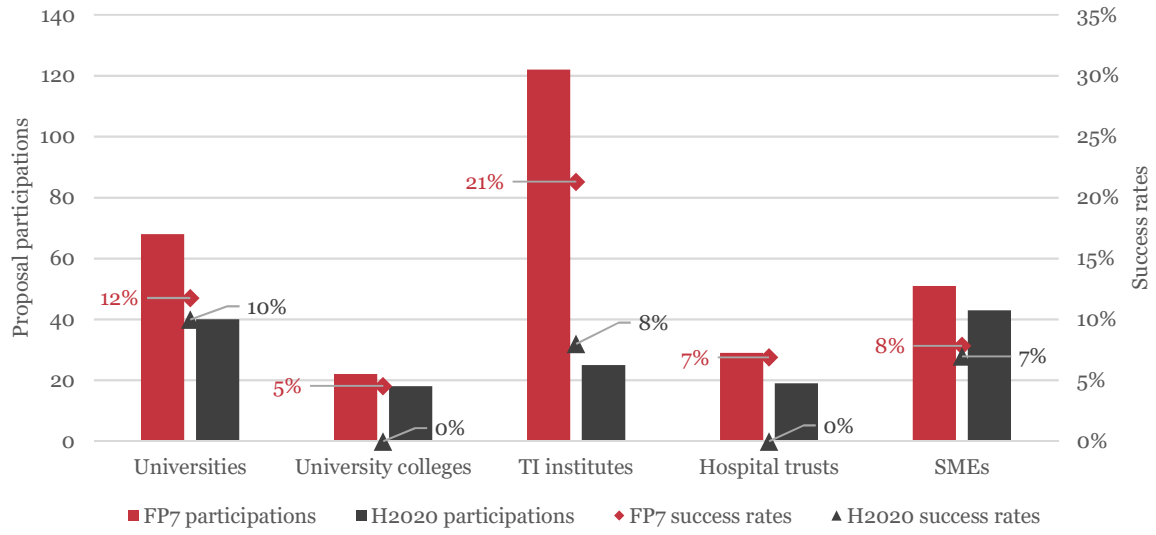
Source: Technopolis analysis of eCorda data.

4.4.2.6 Software and services (SW)

The interest in FP-funded R&I in SW is rather stable: Norwegian actors participated in 190 proposals in this area, which is at a similar rate as in FP7 (350 proposals); the joint proposal rate increased only slightly (1.5 in H2020 versus 1.3 in FP7). About 90 percent of the H2020 budget for SW is allocated in the Societal Challenges, which is reflected in the focus for the Norwegian actors' participation in proposals.

Since this area is apparently of interest to a broader spectrum of stakeholder types than the other ICT areas there is no clearly dominating stakeholder type, but SMEs and universities are a bit more active than others, while the TI institutes have dramatically decreased their proposal activities, see Figure 70. SMEs, instead, have nearly reached their FP7 participation rate in proposals and like the universities, succeeded in maintaining their – rather low – FP7 success rates. Overall, there is clearly an issue of lacking Norwegian competitiveness for all stakeholder types, but particularly for TI institutes, hospital trusts and university colleges.

Figure 70 Norwegian multi-partner proposal participations (columns, left axis) and success rates (diamonds/triangles, right axis) in FP7 and H2020 in the SW area.

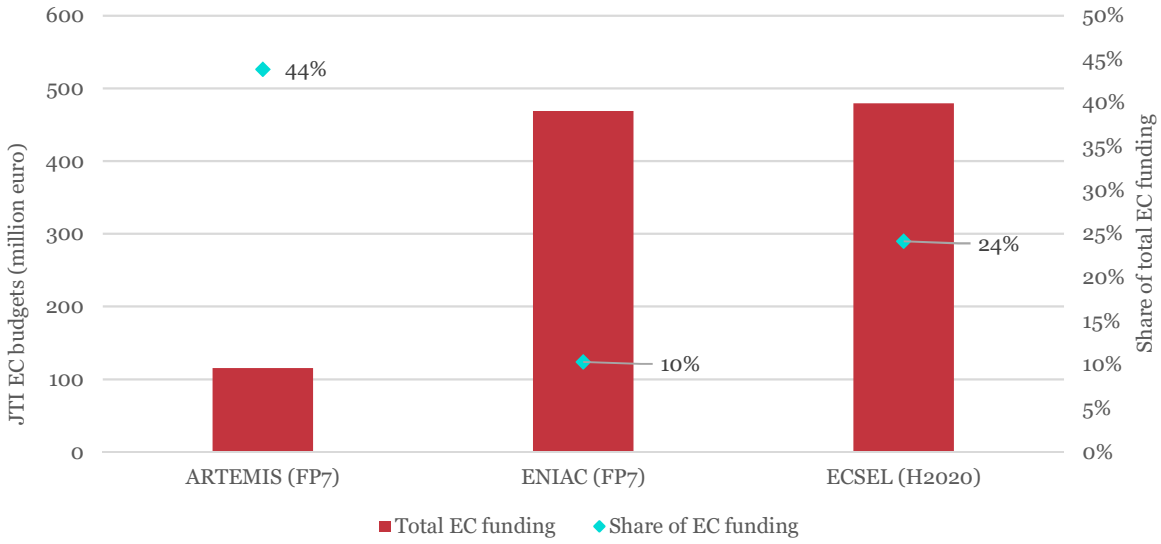


Source: Technopolis analysis of eCorda data.

4.4.3 *Participation in Joint Technology Initiatives*

The FP7 JTIs relevant to ICT were the JTI on integrated information systems (ARTEMIS) and on nanoelectronics (ENIAC), which in H2020 merged into the Electronic Components and Systems for European Leadership (ECSEL) JTI. Figure 71 shows the overall EC contributions to these three JTIs and the shares thereof for projects with Norwegian partners (i.e. total EC contributions to these projects, not funding to Norwegian participants). The figure shows a high degree of Norwegian integration in ARTEMIS, but less so in ENIAC. Integration in ECSEL is good, but it is limited by RCN's ability to co-fund Norwegian participants, according to an RCN representative.

Figure 71 EC contributions to JTI budgets (columns, left axis) and share thereof (diamonds, right axis) for projects involving Norwegian partners.

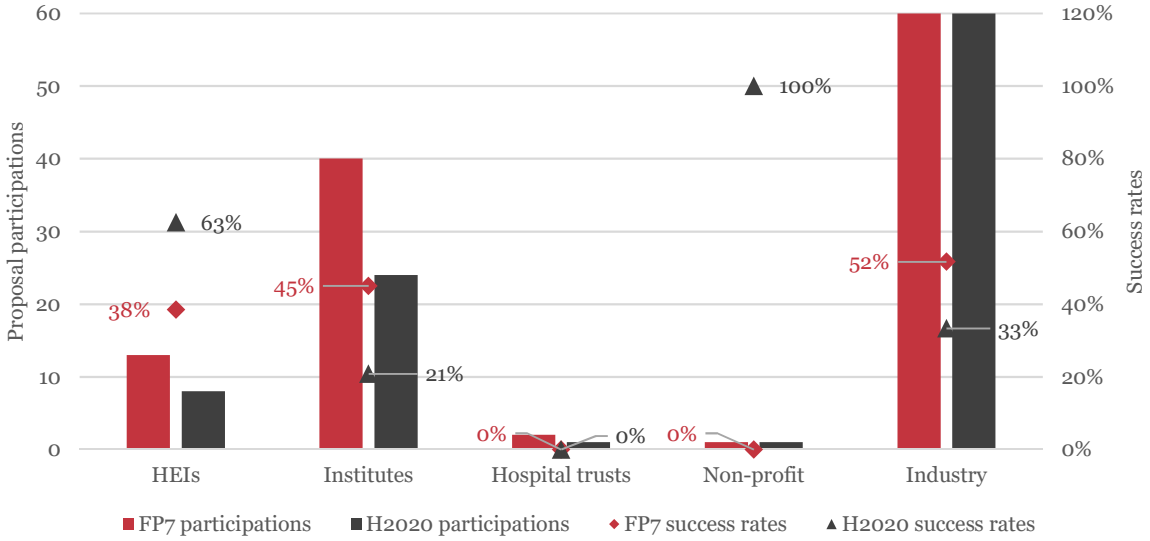


Source: Technopolis analysis of eCorda data.

As expected, Norwegian participation in the JTIs is strongly dominated by industry, but research institutes are also quite active, see Figure 72. Success rates have decreased notably in H2020 for both

stakeholder categories, whereas that for HEIs has increased significantly (though numbers in this case are very small).

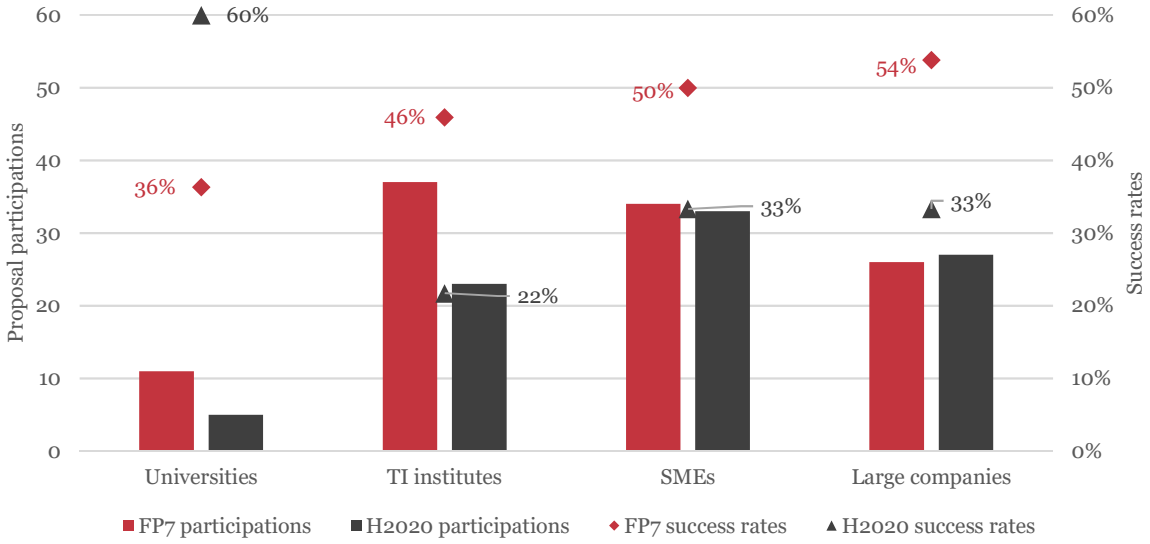
Figure 72 Norwegian multi-partner proposal participations (columns, left axis) and success rates (diamonds/triangles, right axis) in FP7 and H2020 in ICT JTIs.



Source: Technopolis analysis of eCorda data.

Looking at the stakeholder types that have participated in at least five proposals in H2020 (ECSEL), we find that so far SMEs have been the most active in H2020, followed by large companies and TI institutes, see Figure 73. As can be seen, the success rates have fallen for all three subtypes, but again the drop is the largest for the TI institutes. Universities have seen the opposite development, but again: numbers are very small (3 in 5 proposals have been successful).

Figure 73 Norwegian multi-partner proposal participations (columns, left axis) and success rates (diamonds/triangles, right axis) in FP7 and H2020 in ICT JTIs.



Source: Technopolis analysis of eCorda data.

4.5 Potential for increased participation in H2020

In the following discussion, we group the six ICT areas into three categories; areas of strength, potential areas of strength, and questionable areas.

The only area that we believe is a Norwegian area of strength is the Communication technology and infrastructure (COMM) subject area. In this area, success rates for proposals in which Norwegians participated are high (about 22%) and the focus of the R&I funded in H2020 in these areas seems to be in line also with the interest in the community, as is shown in the increased number of participation proposals. Most important, it is also the area where we see an increase in (successful) participation by other research institutes, exploiting the trend towards more cross-disciplinary R&I funding in H2020. The only ones struggling in keeping up their competitiveness in this area are the SMEs and especially, the universities.

We went more in-depth in this analysis by investigating the capacity of the key stakeholders to coordinate proposals in this area and the extent to which they are integrated in competitive international networks. An indicator for the first criterion is the success rate of the proposals where they acted as coordinators; a proxy for the second criterion is the success rate of the proposals led by partner organisations.

In Table 12 we summarise the stakeholders' H2020 performance for these two criteria. The table informs us that in this area, TI institutes are key to Norwegian participation, both by virtue of proposal volume and by high success rates as both coordinators and partners (as indicated by boldface in the table). They are well qualified to coordinate H2020 proposals in the COMM area (33% success rate as coordinators) and are well networked (23% success rate as partners). They are also quite active in taking up a coordinators role: they coordinate close to one in four of the proposals in which they participate.

Table 12 Norwegian H2020 performance in COMM by most active stakeholder types.

Subject area	Stakeholder types	Proposal participations	As coordinator		As partner	
			Share of participations	Success rate	Share of participations	Success rate
COMM	Universities	35	14%	0%	86%	13%
	TI institutes	**52**	**23%**	**33%**	**77%**	**23%**
	SMEs	66	6%	0%	94%	10%
	Large companies	55	4%	0%	96%	38%

Source: Technopolis analysis of eCorda data.

Large companies equally seem to be well integrated in quality networks. For the other key stakeholders, i.e. universities and SMEs, the results are less positive: universities were little active in taking up a coordination role – and even less so SMEs, and both were unsuccessful; however, they seem reasonably well networked since their success rates as partners is above average for the area (cells not shaded).

We categorised three subject areas in the group of potential areas of strength, namely MICRONANO, CONT and NEXTGEN.

Norwegian actors enjoy high participation success rates in the Components and systems (MICRONANO) subject area and there also is an increase in joint proposals, showing the existence of an integrated Norwegian "critical mass", see Table 13. However, Norwegian actors seem to be struggling in two areas: 1) the R&I funded under the JTI which may be related to the more interdisciplinary and slight change in focus in the R&I funded because of the merging of ARTEMIS and ENIAC, and 2) the "mainstream" R&I in this field, where Norwegian actors show a low level of competitiveness. The data on the key stakeholders' coordination capacities and quality networks are striking: there is a very strong reliance – and dependence – on the competence of the partner organisations: none of the very few proposals led by Norwegian actors was successful. Key for the success of Norwegian R&I in this subject area is therefore the integration in the networks, i.e. the JTI.

Table 13 Norwegian H2020 performance in MICRONANO, CONT and NEXTGEN by most active stakeholder types.

Subject area	Stakeholder types	Proposal participations	As coordinator		As partner	
			Share of participations	Success rate	Share of participations	Success rate
MICRONANO	TI institutes	37	11%	0%	89%	21%
	SMEs	51	2%	0%	98%	26%
	Large companies	30	0%	–	100%	30%
CONT	Universities	59	15%	0%	85%	8%
	TI institutes	**27**	**22%**	**50%**	78%	5%
	SMEs	50	8%	0%	92%	15%
	Large companies	21	5%	0%	95%	50%
NEXTGEN	**Universities**	**31**	**16%**	**20%**	**84%**	**31%**
	TI institutes	17	29%	0%	71%	8%
	SMEs	11	0%	–	100%	27%
	Large companies	11	0%	–	100%	27%

Source: Technopolis analysis of eCorda data.

The data on Norwegian participation in the Technologies for digital content and information management/systems (CONT) area reported above showed that there is quite a stable level of participation in proposals, and success rates are moderate. The potential of this area lies in the increasing participation of other research institutes (e.g. the Environmental ones) exploiting the trends in H2020. In this area, Norwegian success builds upon the integration in quality networks of the SMEs and especially the large companies. Universities and TI institutes, instead, are very badly connected (cells shaded to indicate below average success rate as partners). When the TI institutes do decide to take up leadership (one in five participations), they are particularly successful. Key for an enhanced Norwegian participation is especially the increase in competence for application-oriented R&I in this field among the universities, more attention for international networking for both universities and TI institutes; and a strengthened participation and integration in international networks for the other research institutes.

Moving on to Next-generation computer systems (NEXTGEN), this is no doubt a niche area of interest and competence for Norwegian actors, especially in the universities. Universities are key to Norwegian participation, with many proposals and high success rates as both coordinators and partners. Private-sector actors seem well networked, but have not attempted coordination. By contrast, TI institutes have not proven to be qualified as coordinators and seem to engage in uncompetitive networks (cell shaded to indicate below average success rate as partners). NEXTGEN is the ICT subject area where the joint proposal rate was lowest (1.2); an enhanced University–TI institute collaboration in this area would be beneficial to boost a more wide-spread competence in this field.

The questionable areas are ROBOTICS and SW. In these two areas, we see little future for Norwegian participation without RCN intervention.

Robotics, automation and smart environments (ROBOTICS) R&I is another niche area for Norwegian actors, but it saw an increase in interest especially among SMEs; the private sector (both SMEs and large companies) are the only actors in Norway that have reached at least some result from their proposal efforts (as Table 14 shows, thanks to partner organisations). Universities and TI institutes seem unqualified as coordinators and all stakeholder types seem to be in the wrong networks. Overall, Norwegian performance in this area is in dismal. More attention from RCN to fund R&I in this field may be useful, seeing the rising importance of robotics R&I in H2020 – obviously, provided there is a minimal critical mass.

Table 14 Norwegian H2020 performance in ROBOTICS and SW by most active stakeholder types.

Subject area	Stakeholder types	Proposal participations	As coordinator		As partner	
			Share of participations	Success rate	Share of participations	Success rate
ROBOTICS	Universities	17	29%	0%	71%	0%
	TI institutes	16	13%	0%	88%	0%
	SMEs	14	0%	–	100%	7%
SW	**Universities**	**40**	**28%**	**18%**	73%	7%
	TI institutes	25	16%	0%	84%	10%
	SMEs	43	21%	0%	79%	9%

Source: Technopolis analysis of eCorda data.

The situation in the Software and services (SW) area is somewhat more encouraging. There is a strong increase in SME participation, but both SMEs and universities – the key actors in this area – have rather low success rates. Universities show capacity, including to act as coordinators (about one in four proposal participations), but are clearly not integrated in quality networks. The TI institutes were the key actors in this field in FP7 and are slightly better integrated, but their participation rate has collapsed, as has their success rate. The only reason we can see is that the pronounced application-orientation in H2020 is an issue for these actors. Also in this case, an intervention by RCN to strengthen the competitiveness of the key actors in those fields of H2020 that are of most interest to both the actors and policy makers in Norway seems to be the only possible action.

Given the massive proposal activity from Norwegian actors in several ICT areas, there ought to be opportunity to increase success rates by on the one hand providing would-be coordinators with hands-on support to increase proposal quality and keeping a watchful eye on being critical on consortium composition. On the other hand, would-be partners ought to be made aware of them often having the wrong international networks, and that they might as well refrain from joining consortia that are not obviously of high quality. TI institutes are key to Norwegian participation in two areas and frequent proposers in all other ones, so their falling success rates in several areas is an important issue to address for both institute managements and RCN. The low success rates of universities in four ICT areas is an equally important issue for university management and their EU support functions to forcefully address.

In addition to the above conclusions for collaborative R&I, there is clearly an opportunity to increase Norwegian participation in ERC projects also within ICT, since the Norwegian proposal participation pattern in ICT is essentially identical to that in health. The Norwegian ERC success rate in ICT in H2020 is at 6.7 percent well below that of all comparator countries and the overall ERC average of 14.9 percent. Norwegian researchers' success rate in ICT is less than two-thirds of their Swedish, Danish and Finnish peers' success rates, and around a third of their Dutch and Austrian peers'. Again, such differences cannot only be explained by Norwegian researchers in ICT being less competitive, although bibliometric data on citations indicate that Norwegian researchers in some ICT areas perhaps may be somewhat less competitive than their peers in some of the comparator countries. As we argued for health, we believe that the low Norwegian ERC success rate in ICT is due to researchers not dedicating sufficient time to their proposals.

5 Participation in industry-relevant research and innovation

In this chapter, we employ an analysis methodology and a chapter structure consistent with Chapters 3 and 4. We set out by identifying the industry sectors that are considered most relevant for this study. We then use statistics to illustrate that – relative to the comparator countries – Norwegian industry's investments in R&D are low; public investments in industrial production and technology are average; the number of researchers is low; and indicators for innovation performance are low.

Our analyses of eCorda data reveal that Norway is quite active in proposals for industry-relevant R&I, and success rates are between average and high. High success rates for multi-partner proposals indicate a very good integration in competitive international networks, as well as Norwegian competence. In the SME instrument, Norwegian SMEs have among the highest participation rates in phase 1 and have reached the highest phase 2 success rate. EC contributions to Norwegian participations in industry-relevant H2020 projects so far in H2020 equates to 2.3 percent of all funding to industry-relevant R&I.

Focusing then on multi-partner proposals and projects, our analyses show that in H2020 Norwegian companies have taken over the leading position in industry-relevant proposals from institutes. Large companies have success rates above the Norwegian and the overall FP averages, while SMEs have seen their success rates drop below the FP average. Universities are moderately competitive, while university colleges continue having low success rates. In general, also institutes have success rates above the Norwegian and the overall FP averages, but the TI institutes have decreased their participation in proposals and their success rates have dropped significantly since FP7. The other institute groups have increased their participation and are now all more competitive than the TI institutes.

Analysing participation by area, we find that Norwegian R&I is most competitive in the OCEAN and BIOECONOMY areas of H2020. Going into more detail, we find that in the BIOECONOMY area the Primary institutes are key players and they show a particularly high level of competitiveness, while involvement in the BBI JU strongly supports large companies. In the ENERGY area, the drastic drop in success rates for all stakeholders suggests a reduced alignment of Norwegian R&I competence with the change in focus and/or nature of R&I in H2020 (innovation rather than research), but participation in the FCH JU has helped reduce the negative effect in the area. In industry-relevant ICT, as well as in the other areas, SMEs have become the main actors, but with moderate success rates. There is a rise also in large company involvement, with particularly high levels of competitiveness. MFCT (manufacturing) is one of the few areas with an increase in TI institute proposals, mainly in the LEIT programme, and with high success rates. OCEAN is one of the few areas where universities have doubled their participations, while remaining highly competitive. Success rates are high for all actors in this area, except SMEs. Norwegian competitiveness in the TRANSPORT area is under considerable strain in H2020.

Our analysis of Norwegian participation in the JTIs/JUs/PPPs under H2020 shows a considerable increase in proposal participation, on the way to doubling participation in FP7. However, there is a strong reliance on partner organisations. Most of the (few) efforts to coordinate these proposals have been taken by the TI institutes – and especially SINTEF.

5.1 Introduction

To identify areas of interest for industry, we first identified the industry sectors upon which to focus for our mapping of FP action lines. This was based on the information provided in the 2013 report "Næringslivet og europeisk forsknings- og innovasjonssamarbeid"[33], as well as on data on Intramural R&D expenditures in the Business Enterprise sector (2015) from Statistics Norway. Table 15 thus lists the 14 most R&D-intensive industry sectors in Norway, sorted by their relative shares (the sectors listed together account for 78 percent of the total).

[33] "Næringslivet og europeisk forsknings- og innovasjonssamarbeid", delrapport fra prosjektgruppen om næringslivet til Nasjonal strategi for forsknings- og innovasjonssamarbeid med EU, 2013.

Table 15 Intramural R&D expenditure in the Business Enterprise sector 2015 by industry sector.

	Total R&D expenditure (NOK million)	Share of total R&D expenditure
A-N All industries	**27,782.4**	**100.0%**
J62 Computer programming, consultancy	4,204.5	15.1%
M71 Architecture, engineering activities	2,793.0	10.1%
J58.2 Software publishing	2,242.1	8.1%
C26 Electronic and optical products	1,953.5	7.0%
B06, B09.1 Extraction of crude petroleum and natural gas, and support activities petroleum extraction	1,723.7	6.2%
C25 Fabricated metal products	1,358.1	4.9%
C28 Machinery and equipment NEC	1,356.2	4.9%
C10-C11 Food products and beverages	1,057.4	3.8%
C26.5 Manufacturing of testing instruments/appliances	1,041.4	3.7%
J61 Telecommunications	985.3	3.5%
C19-C20 Refined petroleum products, chemicals and chemical products	947.8	3.4%
A03 Fishing and aquaculture	734.9	2.6%
C30.1 Building of ships and boats	691.4	2.5%
M72 Scientific research and development	620.0	2.2%

Source: Statistics Norway.

Table 16 lists the key industry sectors in Norway that are considered most relevant for this study, together with the description of the developments in R&I that are of foremost relevance for these sectors, based on the aforementioned report. The 14 most R&D-intensive sectors are highlighted in pink. A limit in mapping industry sectors onto FP action lines is that the supply chain for innovations in specific areas cannot be taken into account. We have tried to overcome this limitation by identifying also industry sectors that typically have this function, using technological rather than sectorial indicators, i.e. ICT, electronics, materials and production (NMP), manufacturing (MFCT) and biotechnology (BIOTECH). In addition, some FP action lines that focus on larger industry sectors, such as the bio-based industries or ocean-based industries may be of relevance. In those cases where we could not identify a single target industry sector, we used "overarching codes", i.e. BBI (bio-based industries), Energy, and Ocean (ocean-based industries). Finally, we marked the other action lines of potential interest for industry in the sphere of Transport (beyond maritime); where no specific area could be defined or was not relevant, we used the general coding "IND" (industry), and for instruments specifically targeting SMEs, the coding "SME".

Table 16 Categorisation of actions in the FPs of relevance to industry.

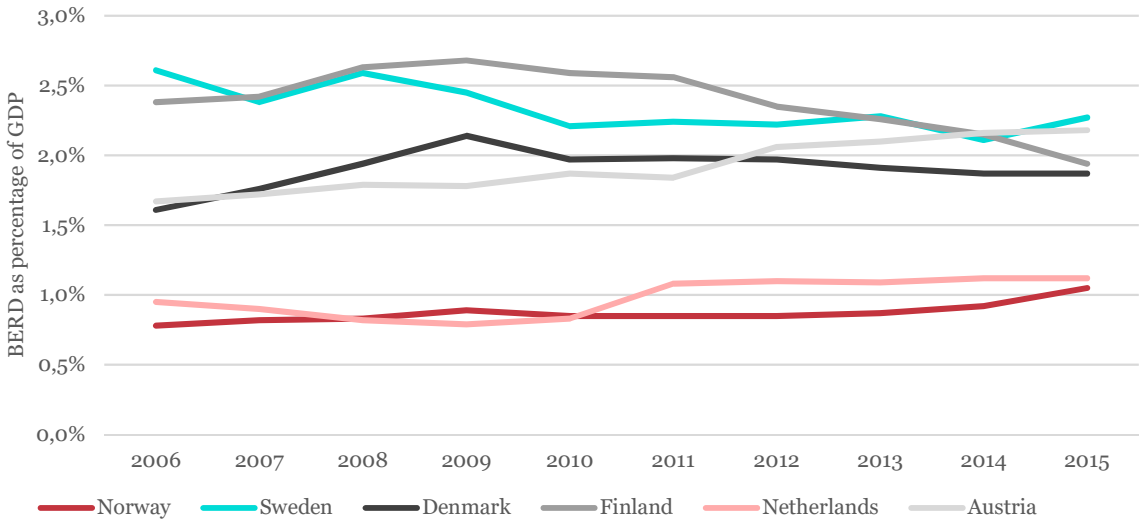
Industry sector	Areas of R&I	Main code	Overarching codes
A. Agriculture, forestry and fishing	Industrial processes based on biotechnology and bioprocessing /increased food production, food safety, climate change, environmental considerations and the development of new products and production methods based on renewable biological resources in line with the emerging bioeconomics	BBI	BIOECONOMY
A02 Forestry	Processing of renewable bio-raw materials for ingredients, materials and chemicals	FORESTRY	
C10-C11 Food products and beverages	Industrial processes based on biotechnology and bioprocessing /increased food production, food safety, climate change, environmental considerations and the development of new products and production methods based on renewable biological resources in line with the emerging bioeconomics / Biotech / Sustainable Food Production / Production methods better resource utilization, healthy products and meals	FOOD	
A03 Fishing and aquaculture	Industrial processes based on biotechnology and bioprocessing / increased food production, food safety, climate change, environmental considerations and the development of new products and production methods based on renewable biological resources in line with the emerging bioeconomics / Marine research, Biotech / Resources of the Sea and Fisheries / Sustainable aquaculture	MARINE	OCEAN
B06, B09.1 Extraction of crude petroleum and natural gas, and support activities petroleum extraction	(Vessel technology, robotics, surveillance systems, etc.) / Offshore technologies, oil readiness and marine pollution, as well as technologies for marine monitoring and Resources in the sea. / Energy: biofuels, hydrogen fuel cells	OIL&GAS	ENERGY
D Electricity, gas, steam and air conditioning supply	Hydropower and balance power, ocean-based wind power, energy systems / power transmission and CO_2 handling	ENERGY	
G Wholesale of solid, liquid & gaseous fuels and related products		ENERGY	
C30.1 Building of ships and boats	(Vessel technology, robotics, surveillance systems, etc.) Energy efficiency and reduced ship emissions / Transport mode in Green and integrated transport / Ship operations and traffic management / System modelling and lifetime optimization for vessels	MARITIME	OCEAN
E water collection, treatment and supply	Water research, offshore technologies, oil readiness and marine pollution, as well as technologies for marine monitoring and Resources in the sea.	MARINE	
J58.2 Software publishing		ICT	ICT
J61 Telecommunications		ICT	
J62 Computer programming, consultancy		ICT	
C26 Electronic and optical products	Robotics, electronics, electro optics, nanotech	ELECTRONICS	
C26.5 Manufacturing of testing instruments/ appliances	Sensors	ELECTRONICS	
C19-C20 Refined petroleum products, chemicals and chemical products	Material technology	NMP	MFCT
C25 Fabricated metal products		MFCT	
C28 Machinery and equipment NEC		MFCT	
M71 Architecture, engineering activities	Engineering; marine, offshore and engineering consultancy	MFCT	
M72 Scientific research and development	Biotech research	BIOTECH	BIOECONOMY

5.2 The background

5.2.1 Financial dimensions

Figure 74 shows Business Enterprise Expenditure on R&D (BERD) as share of GDP for Norway and its comparator countries. Companies in Norway and the Netherlands invest the least in R&D and companies in the other four countries invest around double as much, relatively speaking. However, Norwegian BERD as share of GDP has increased by 35 percent in the period, while Finland's and Sweden's shares have declined. Once again, we recall that Norway's oil-and-gas–dominated GDP partly distorts the picture since the oil and gas industry does not engage in R&D in proportion to its contribution to GDP (cf. 6.2% share in Table 15 (B06, B09.1) to 20% share in Figure 3 (91% of category B)).

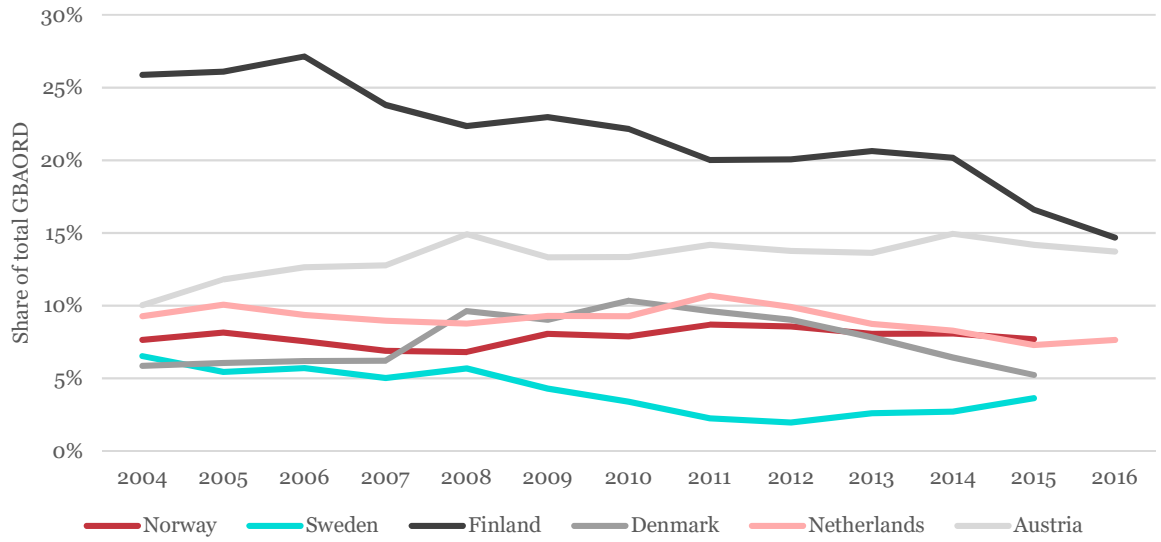
Figure 74 BERD as percentage of GDP for Norway and its comparator countries.



Source: EuroStat.

Figure 75 shows the share of GBAORD that goes to R&D on industrial production and technology, which is as close we get to "industry" with standard statistics categories. The Finnish and Austrian governments invest the most in R&D related to industrial production and technology. Over the period, only the Austrian government has increased investments in the field, while Norwegian investments have been neutral and developments in the remaining countries, particularly Finland, has been negative.

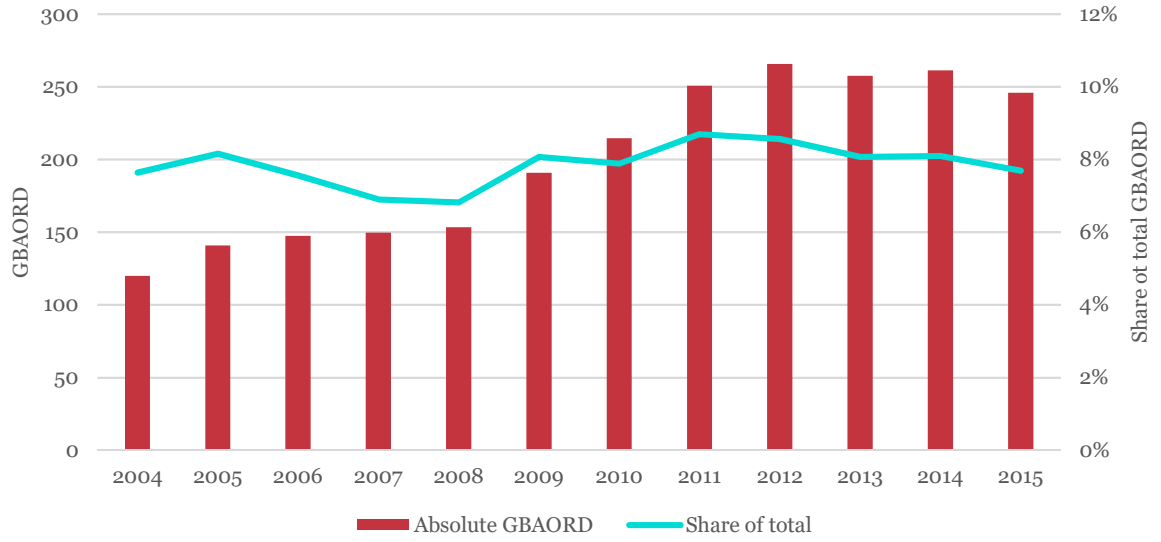
Figure 75 GBAORD in industrial production and technology as share of total GBAORD in Norway and its comparator countries.



Source: EuroStat.

Figure 76 illustrates that while the Norwegian government's R&D investments in industrial production and technology essentially have been neutral in relative terms in the period, they have doubled in absolute terms.

Figure 76 Norwegian GBAORD in industrial production and technology in million euro (columns, left axis) and as share of total GBAORD (line, right axis).

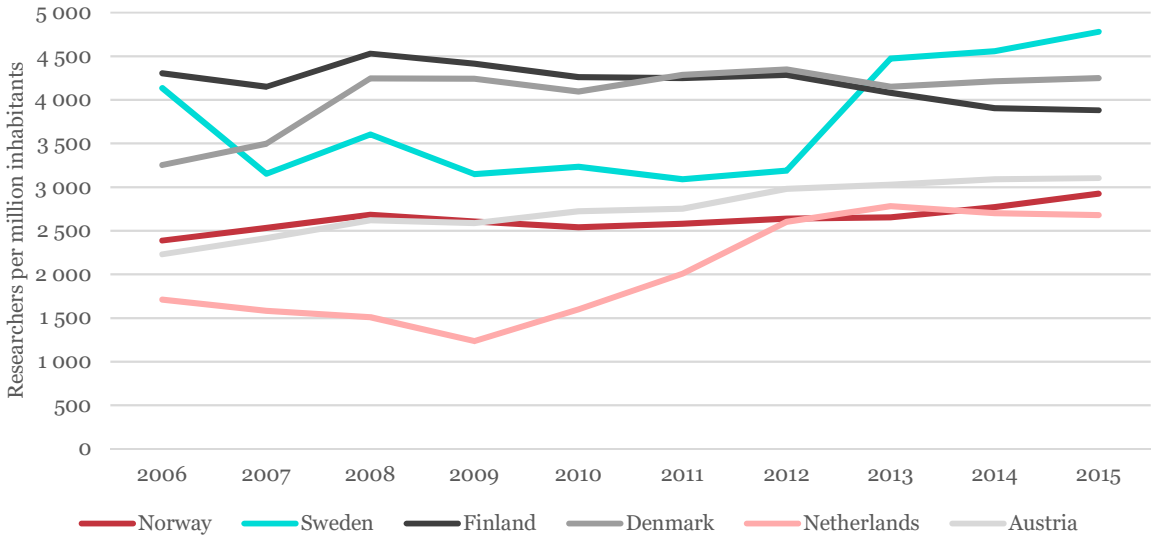


Source: Eurostat.

5.2.2 Human resources

Figure 77 shows the number of researchers in industry per million inhabitants in Norway and in its comparator countries. Norwegian industry has about the same number of researchers per million inhabitants as the Netherlands and Austria, whereas the other three countries have considerably more researchers in industry relatively speaking. All countries, except for Finland, have seen an increase over the last decade.

Figure 77 Researchers in industry (FTE) per million inhabitants.



Source: Eurostat.

Figure 10 further reveals that the number of researchers in Norwegian industry has increased rapidly over the past two decades, and there are now supposedly more researchers in industry than in HEIs. However, this observation suggests that the criteria for who is considered a researcher is probably rather relaxed. (It is also clear, though not shown in the figures, that definitions differ between Eurostat and NIFU's national statistics. For example, according to Eurostat Norway had 13 553 researchers (FTE) in industry in 2013, whereas the corresponding NIFU figure is 11 508. This explains why there appears to be a discrepancy between Figure 77 and Figure 10.)

5.2.3 Degree of innovation

We refrain from using the word quality when it comes to industry's R&D, and instead look at intellectual property (IP) indicators as a proxy for degree of innovation. We noted in Section 2.3.3 that Norwegian organisations are much less likely to apply for patents and trademarks than their counterparts in all comparator countries (cf. Figure 15–Figure 17). It seems reasonable to assume that organisations that apply for patents and trademarks are heavily dominated by companies.

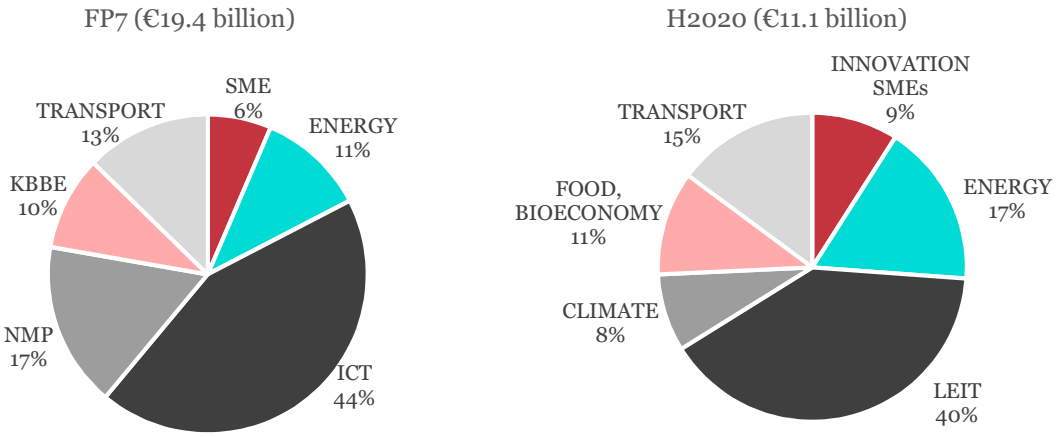
5.2.4 EU funding for R&I of relevance to industry in FP7 and H2020

Figure 78 shows the distribution of funding for industry-relevant R&I in the sub-programmes of FP7 and H2020. A major change in H2020 has been the drive towards more "innovation". Essentially, this has meant that the focus in industry-relevant R&I shifted away from the longer-term risky R&I in previous FPs (which typically saw the participation of large enterprises and high-tech SMEs) to R&I projects that have as specific aim to move technological developments as much and as quickly as possible up the Technology Readiness Level (TRL) scale. Combined with the strategic focus on addressing the Societal Challenges, it implies that the focus in funding opportunities for industry are concentrated on applications in the Societal Challenges. These developments have created some important opportunities for Norway, seeing the profile of its industry and the national policy priorities (cf. Figure 78):

- The energy programme has a higher share in the H2020 budget than in FP7. Energy is an area of high R&D expenditure in Norway – and in H2020. Oil and gas, an important sector for Norway, has come on the agenda in H2020. Renewable energy is another Norwegian area of strength that receives a lot of attention in H2020
- R&I related to the food sector (part of KBBE in FP7) and transport have slightly higher shares in H2020

- In FP7, "ocean" became an action line in the Environment programme, encompassing marine and maritime R&I ("blue growth"); it has grown in H2020 and now cuts across several Societal Challenges, as well as LEIT

Figure 78 Budget distribution over the main programmes for industry-relevant R&I in FP7 (left) and H2020 (right).



Source: Technopolis analysis of eCorda data.

5.3 Participation patterns in FP7 and H2020 – a comparative analysis

Norway is particularly active in proposals for industry-relevant R&I, and proposal success rates are the highest among the comparator countries. For the specific stakeholder groups, the participation success rates are nevertheless only average compared to the comparator countries, due to the different rates in joint proposals and especially, success in joint proposals led by the actors in the countries. The high success rates of multi-partner proposals, whether led by Norwegians or not, indicate a very good integration in competitive international networks, as well as Norwegian competence. In the SME instrument, Norwegian SMEs have among the highest participation rates in phase 1 and reached the highest phase 2 success rate, which suggests a high level of selectivity and capacity to self-assess competitiveness.

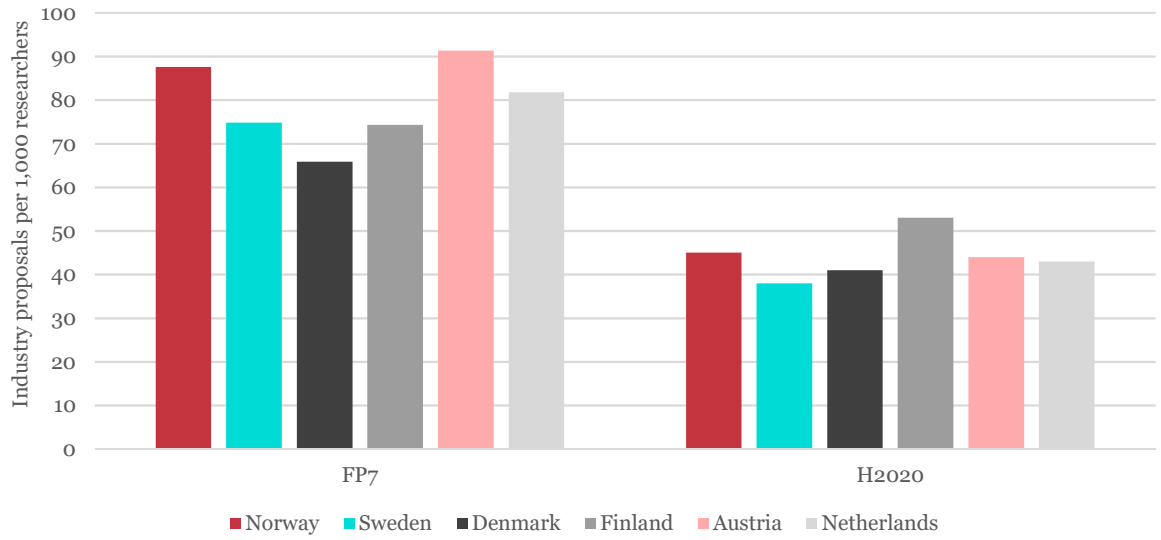
In H2020, companies have taken over the leading position in participations in industry-relevant multi-partner proposals from institutes. Large companies have success rates above the Norwegian and the overall FP averages, while SMEs have seen their success rates drop below the FP average. Universities are moderately competitive, while university colleges continue having low success rates. In general, also institutes have success rates above the Norwegian and the overall FP averages, but the TI institutes have decreased their participation in FP proposals and their success rates have dropped significantly. In contrast, all other research institute groups have increased their participation and are now more competitive than the TI institutes.

5.3.1 Participation overall

Figure 79 illustrates that, when normalising with the number of researchers, Norway has had the second highest number of proposals for industry-relevant R&I among the six countries in both FP7 and H2020, in the former case beaten by Austria and in the latter by Finland.[34] Throughout this chapter, industry-relevant proposals (and later industry-relevant projects) refer to all industry-relevant proposals in FP7 and H2020 identified using the mapping methodology explained in Section 3.1, regardless of sub-programme.

[34] For lack of data on researchers in the three topic areas, normalisations by number of researchers have been made using the overall number of researchers per country. This is not ideal, but it is consistent between countries.

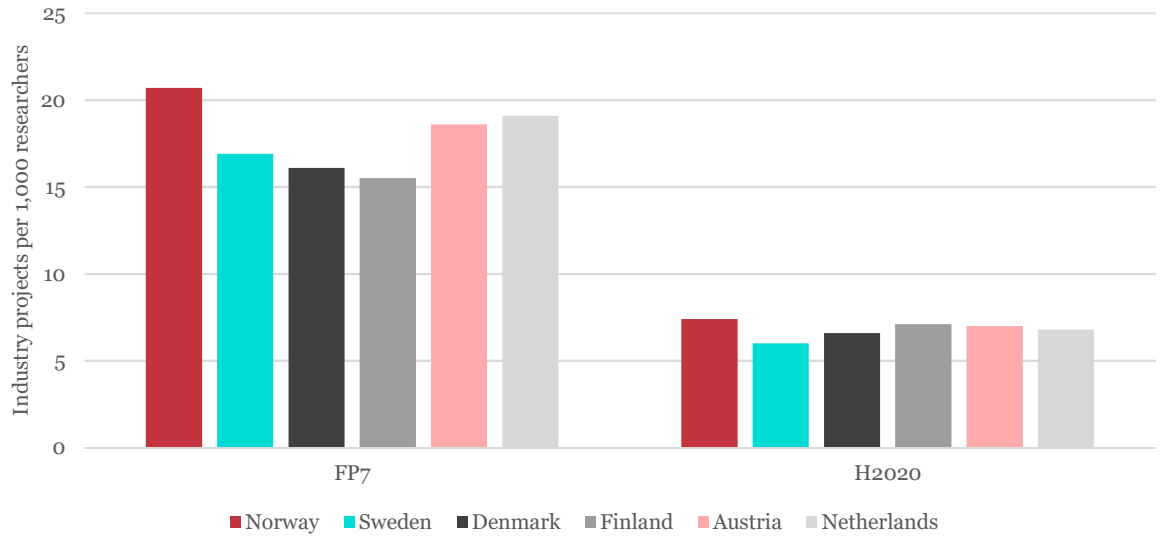
Figure 79 Number of FP7 and H2020 proposals for industry-relevant R&I involving Norway and its comparator countries normalised with the number of researchers in each country.



Source: Technopolis analysis of eCorda and UIS data.

By February 2017, 300 H2020 grants had been awarded to industry-relevant projects involving Norway, which represents 7.2 percent of all grants to industry-relevant R&I in H2020. Figure 80 shows that Norway has had more projects per researcher than any of the comparator countries, in both FP7 and H2020. As cautioned in previous chapters, the eCorda proposal database for H2020 includes proposals that have not yet been evaluated, meaning that the number of H2020 projects is likely a slight underestimate, but this applies to all countries and on average to the same extent.

Figure 80 Number of industry-relevant FP7 and H2020 projects involving Norway and its comparator countries normalised with the number of researchers in each country.

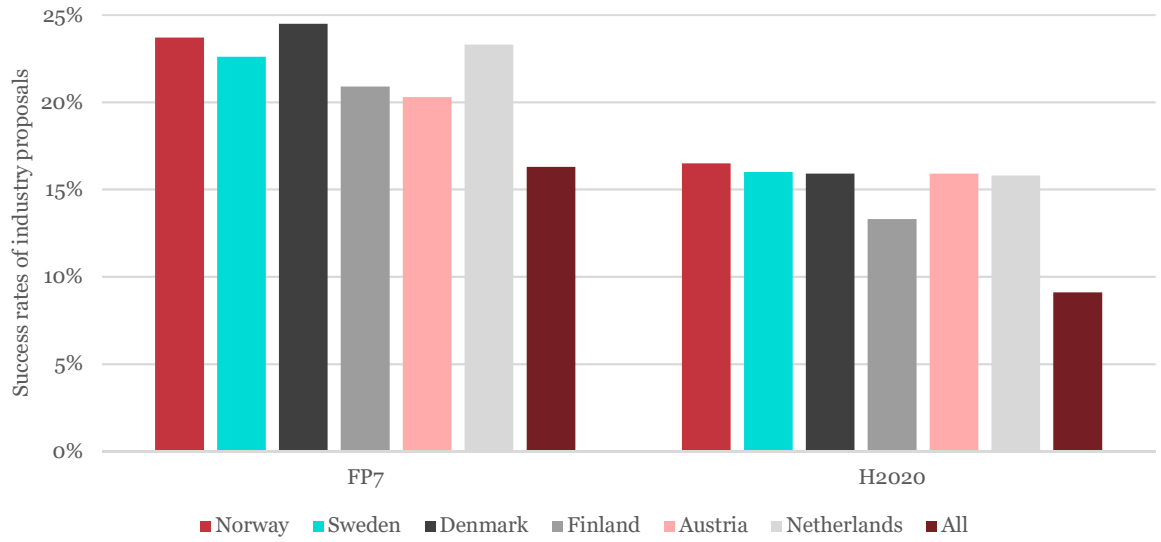


Source: Technopolis analysis of eCorda and UIS data.

The Norwegian success rate for proposals for industry-relevant R&I was the second highest in FP7 (after Denmark) and is the highest so far in H2020, in both cases far above the overall averages, see Figure 81. This picture agrees very well with that for overall success rates (in both FP7 and H2020; cf. Figure 23). Taking a closer look at Norwegian H2020 performance by sub-programme, Norway performs very well

in the BIOTECH programme – where it clearly outshines all comparator countries – and in the ICT programme, and it does reasonably well in the Environment Societal Challenge (see Appendix D.6 for details).

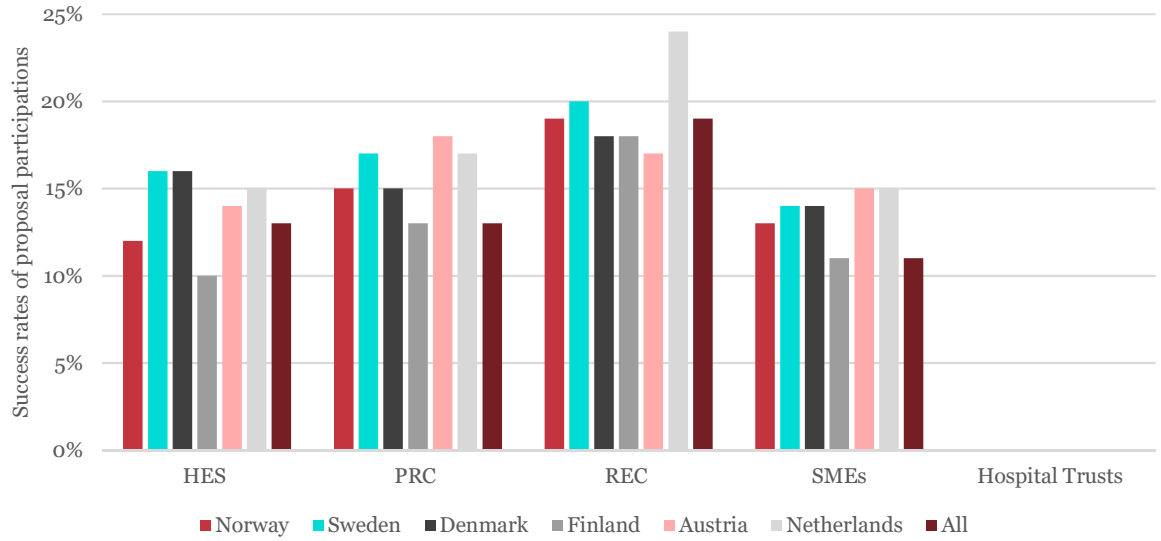
Figure 81 Success rates of FP7 and H2020 proposals for industry-relevant R&I involving Norway and its comparator countries.



Source: Technopolis analysis of eCorda data.

Data on success rates at eCorda organisational level, see Figure 82, shows that in H2020 both the private sector (PRC) overall and the SME subset perform considerably better than the overall average, but only around average relative to the comparator countries. Research organisations (REC) perform at the overall average and are only beaten by their counterparts in the Netherlands and Sweden, whereas HEIs (HES) perform just below average and are beaten by all but the Finns. Hospital trusts obviously greatly underperform with no success at all (from 42 proposal participations). Overall, this indicates an average performance, so how can this be compatible with Figure 81, which placed Norway in the lead in H2020?

Figure 82 Success rates of H2020 participations in proposals for industry-relevant R&I Norway and its comparator countries by eCorda organisation type.



Source: Technopolis analysis of eCorda data.

The answer lies in the difference between proposals (Figure 81) and proposal participations (Figure 82). In the previous chapters on health and ICT, we have largely glossed over the differences between these two indicators not to confuse the reader more than necessary, since the difference has not been significant (but the details are to be found in Appendix D), but in this topic area the difference is important. While the success rates for Norway are almost the same for proposals and proposal participations specifically in industry-relevant R&I, the comparator countries have higher success rates based on participations. This means that while Norway is ranked first on proposal success rates, it is only number five in terms of participation success rates.

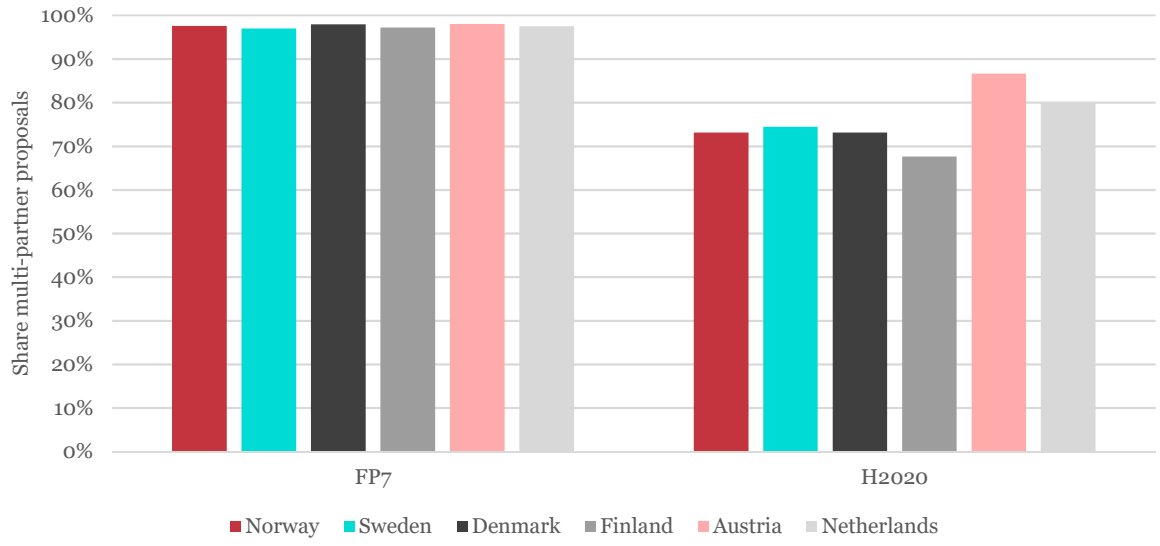
All comparator countries have a higher number of domestic participants (i.e. higher joint proposal rates) in their successful proposals than in their unsuccessful ones, while for Norway there is no difference (the average joint proposal rate is 1.4 in both cases). To illustrate with an example, the Netherlands has 1.8 participants in its successful proposals and 1.5 participants in its unsuccessful proposals. This difference may seem small, but when applied to the 840 H2020 industry projects that the Netherlands is involved in, it equates to an additional 250 project participations (a 20% boost). This is why the Norwegian success rate is pretty much the same regardless of whether you look at it by proposals (16.5%) or proposal participations (16.8%), whereas for the Netherlands the two figures are quite different (15.8% and 18.3%, respectively).

In summary, Norwegian H2020 participation in industry-relevant R&I is high compared to the comparator countries when looking at proposals and projects, but average when it comes to individual participations in those proposals and projects.

5.3.2 Participation in multi-partner proposals

While almost all industry-relevant projects in FP7 had multiple partners, this is not the case in H2020, see Figure 83. So far in H2020, Norwegian prevalence for multi-partner proposals is equal or lower than most comparator countries; only Finland's is lower (tie with Denmark). "Single-partner" projects in industry-related R&I are funded predominantly in the SME instrument (see Section 5.3.3 below).

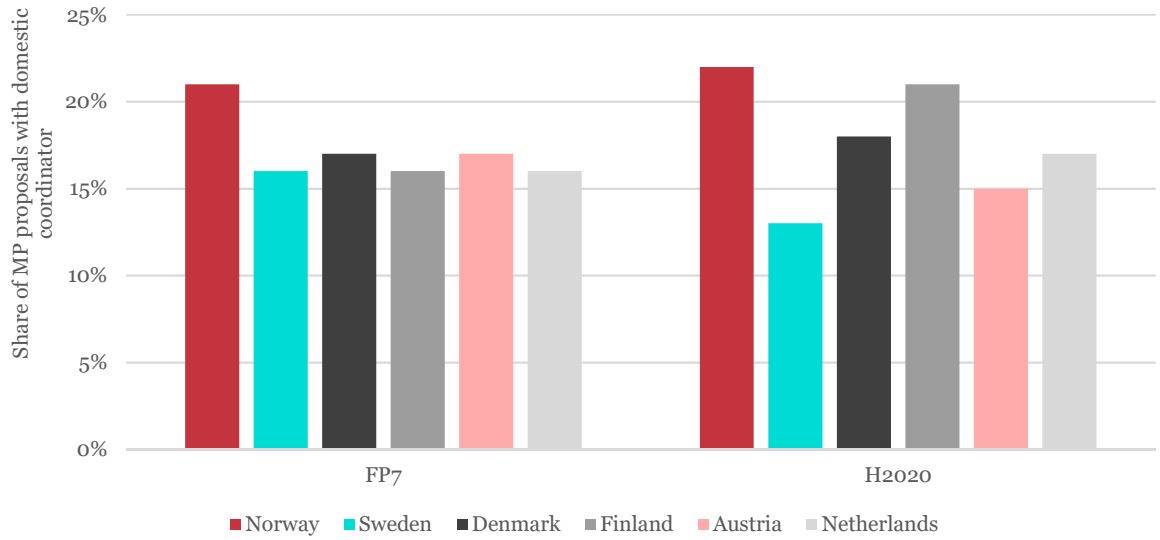
Figure 83 Share of all proposals for industrially relevant R&I that have multiple partners for Norway and its comparator countries.



Source: Technopolis analysis of eCorda data.

Figure 84 reveals that Norwegian actors are more prone to take the lead in multi-partner proposals in both FP7 and H2020.

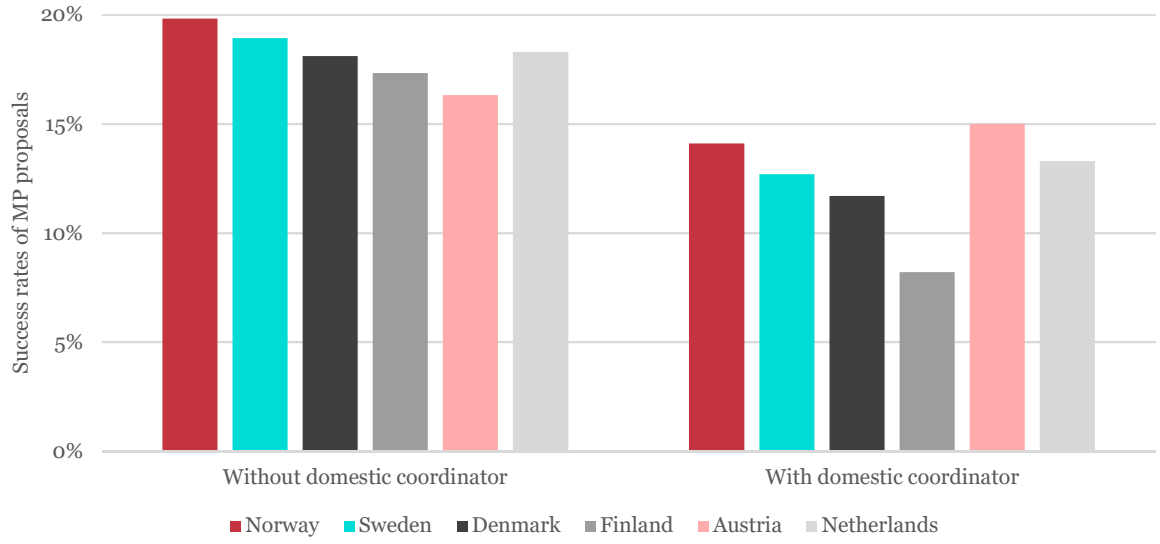
Figure 84 Share of multi-partner (MP) proposals with domestic coordinator for Norway and its comparator countries.



Source: Technopolis analysis of eCorda data.

In contrast to health and ICT, multi-partner proposals for industry-relevant R&I in H2020 that are led by partners in other countries have higher success rates for Norway than for any of the comparator countries, see left set of columns in Figure 85. This suggests that Norwegian actors overall are well-integrated in competitive international networks. Moreover, success rates for multi-partner proposals coordinated by Norwegians are higher than for all comparator countries except Austria (right set of columns in the figure), indicating that Norwegian actors on average are competitive as coordinators.

Figure 85 Success rates of H2020 multi-partner (MP) proposals involving Norway and its comparator countries.



Source: Technopolis analysis of eCorda data.

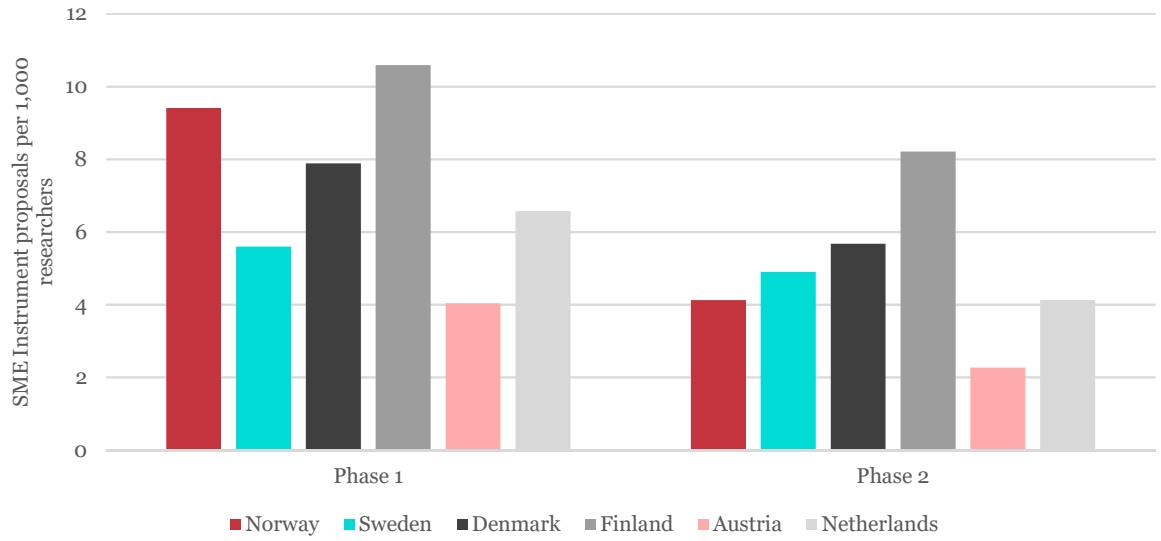
5.3.3 Participation in the SME instrument

The main reason for the lower prevalence for multi-partner proposals in H2020 (cf. Figure 83) is the introduction of a new SME instrument in H2020. The instrument supports close-to-market activities with the aim of contributing to breakthrough innovation, and primarily targets highly innovative SMEs

with a clear commercial ambition and a potential for high growth and internationalisation. There are two phases, feasibility assessments (phase 1) with a €50k lump-sum funding, and innovation projects (phase 2) with funding in the range €500k–€2.5m, normally covering up to 70 percent of eligible costs.

Figure 86 shows that Norwegian SMEs have been very active in phase 1, but considerably less so in phase 2, when normalising with the number of researchers.[35]

Figure 86 Number of SME instrument proposals involving Norway and its comparator countries normalised with the number of researchers in each country.



Source: Technopolis analysis of eCorda and UIS data.

Figure 87 shows that while the Norwegian success rate in phase 1 only is above that of Finland and the Netherlands, it is the highest in phase 2 (in both cases well above the overall averages). Phase 2 projects are proper development projects and where most of the funding is, so this is much more important. When comparing the proposal activity in Figure 86 with the success rates in Figure 87 by phase an interesting picture emerges suggesting a high level of selectivity and capacity to self-assess competitiveness, probably including significant attention to the quality of the proposal idea.

5.3.4 EC contributions

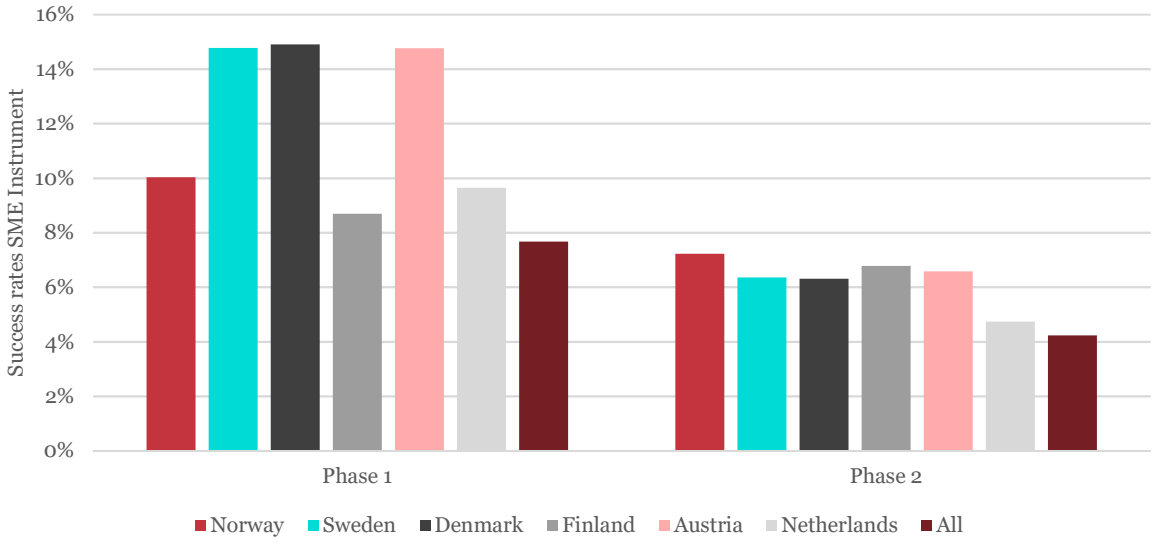
EC contributions to Norwegian participations in industry-relevant H2020 projects so far is in total €223m, which equates to 2.3 percent of all funding to industry-relevant R&I. This is below the proportion realised by each of the other comparator countries' participations to date (but above Norway's overall 2% target).

However, when considering average contributions per participation, the picture emerging is again one of successful self-selection and priority-setting. The average contribution to each Norwegian participation in industry-relevant projects (at €531k) is well above that achieved by all comparator countries, and far above the overall average.

Norway has secured a whopping 7 percent of all disbursed funding in the SME sub-programme in H2020, which is double as much as the comparator country that comes closest has mustered (the Netherlands).

35 Although it may be argued that normalising with the number of researchers is less relevant for close-to-market projects, we have nevertheless done so also in this case in the name of consistency throughout this report.

Figure 87 Success rates of SME instrument proposals involving Norway and its comparator countries.



Source: Technopolis analysis of eCorda data.

5.3.5 Norwegian participation by stakeholder category

Just as in the two previous chapters, we then turn to multi-partner projects and re-analyse participation (not proposal) data using Norwegian stakeholder categories and types (cf. Table 6). Table 17 lists the top-ten participants in both FPs, which suggests that industry-relevant participation is dominated by other stakeholders than companies. The listed stakeholders accounted for 45 percent of all Norwegian participations in FP7 and 35 percent of all Norwegian participations in H2020 so far, thus less of a concentration than in ICT and health.

Table 17 List of key Norwegian participants in all types of FP7 and H2020 proposals for industry-relevant R&I by number of proposals (top 10 in each FP).

Stakeholder type	Organisation	FP7	H2020
TI institute	SINTEF Group	729	342
University	Norwegian University of Science and Technology/Norges teknisk-naturvitenskapelige universitet (NTNU)	329	168
University	University of Oslo/Universitetet i Oslo (UiO)	202	77
University	University of Bergen/Universitetet i Bergen (UiB)	100	50
University	Norwegian University of Life Sciences/Norges miljø- og biovitenskapelige universitet (NMBU)	78	43
Primary institute	NOFIMA AS	86	31
Primary institute	Norwegian Institute of Bioeconomy Research/Norsk institutt for bioøkonomi (NIBIO)	63	52
Large company	Det Norske Veritas AS	65	22
University	University of Tromsø/Universitetet i Tromsø (UiT)	47	37
Environmental institute	Institute of Transport Economics/Transportøkonomisk institutt (TØI)	51	25
Other institute	Simula Research Laboratory	38	32
Large company	Telenor ASA	48	14
Environmental institute	NILU – Norwegian Institute for Air Research/NILU – Norsk institutt for luftforskning	34	26

Table 18 lists the top-ten participating companies in each FP. These companies accounted for 8 percent of all Norwegian industry-relevant participations in FP7 and a mere 4 percent in H2020 so far.

Table 18 List of key Norwegian company participants in all types of FP7 and H2020 proposals for industrially relevant R&I by number of proposals (top 10 in each FP).

Stakeholder type	Organisation	FP7	H2020
Large company	Det Norske Veritas AS	65	22
Large company	Telenor ASA	48	14
Large company	Statoil ASA	47	14
SME	Marlo AS	28	0
Large company	Borregaard AS	14	7
SME	Uninett AS	20	0
Large company	Kongsberg Maritime AS	11	9
Large company	Q-Free ASA	17	2
Large company	CMR Prototech AS	10	9
SME	Nor-Tek Teknologisenter AS	17	0
Large company	Elkem AS	4	12
SME	Norsk Elektro Optikk AS	15	0
Large company	Sensonor AS	14	0
Large company	NxTech AS	0	9
Large company	BNW Energy AS	0	7
Large company	GKN Aerospace Norway AS	0	6

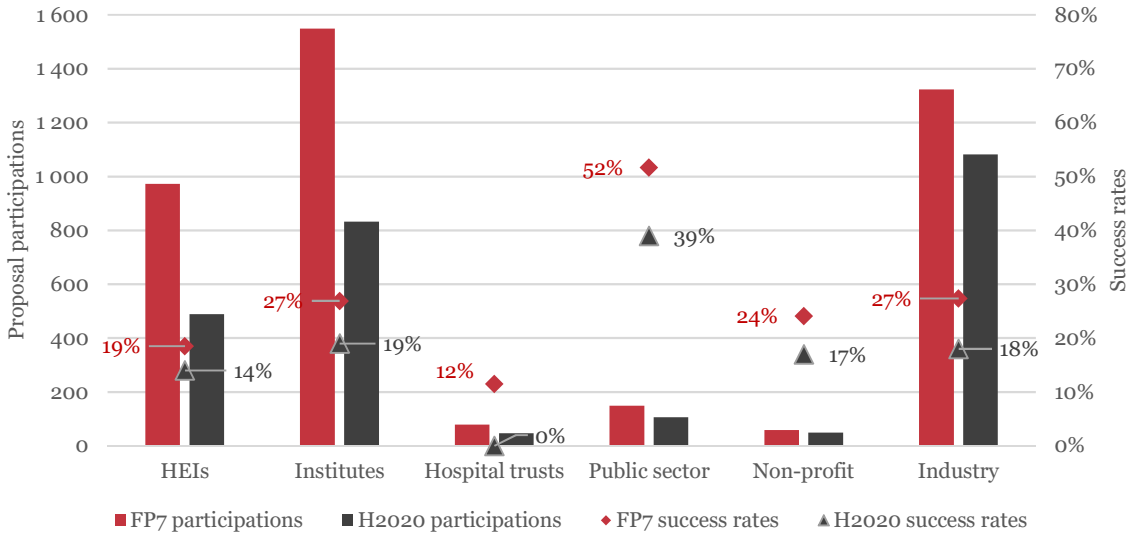
In H2020, companies have taken over the leading position in participations to industry-relevant proposals from the institutes. Both companies and institutes have success rates above the Norwegian and the overall FP average.

These two tables may lead one to believe that participation in industry-relevant proposals is massively dominated by other stakeholders than companies, but that is not the case. In H2020, companies account for 42 percent of all participations, up from 32 percent in FP7. These 10 percent "come from" institutes and HEIs in roughly equal shares. The explanation lies in the fact that in H2020 there are almost seven times as many individual companies that have participated as there are institutes and HEIs.

Figure 88 summarises industry-relevant proposal activity and success rates by main stakeholder categories, illustrating that in H2020 companies are the most frequent proposers, closely followed by institutes and thereafter universities. This contrasts with FP7, where institutes were the most active, followed by companies and universities. It should be noted that for the sake of comparability and consistency, we have excluded proposals for the SME instruments from these analyses.

Success rates for all stakeholder categories have decreased significantly in H2020 compared to FP7, reflecting the FP trend overall. However, only industry, institutes and public-sector organisations have achieved or exceeded the 18 percent average success rate for Norway in H2020 industry-relevant R&I (and the 15% FP average); industry and institutes were above the average also in FP7 (26% for Norway, 21% FP average). Universities obviously have not made the average in either FP. As noted in the previous chapter, the H2020 success rates will likely change with time (up or down), but it is unlikely that changes will be dramatic.

Figure 88 Norwegian industry-relevant proposal participations (columns, left axis) and success rates (diamonds/triangles, right axis) in FP7 and H2020 by stakeholder category.

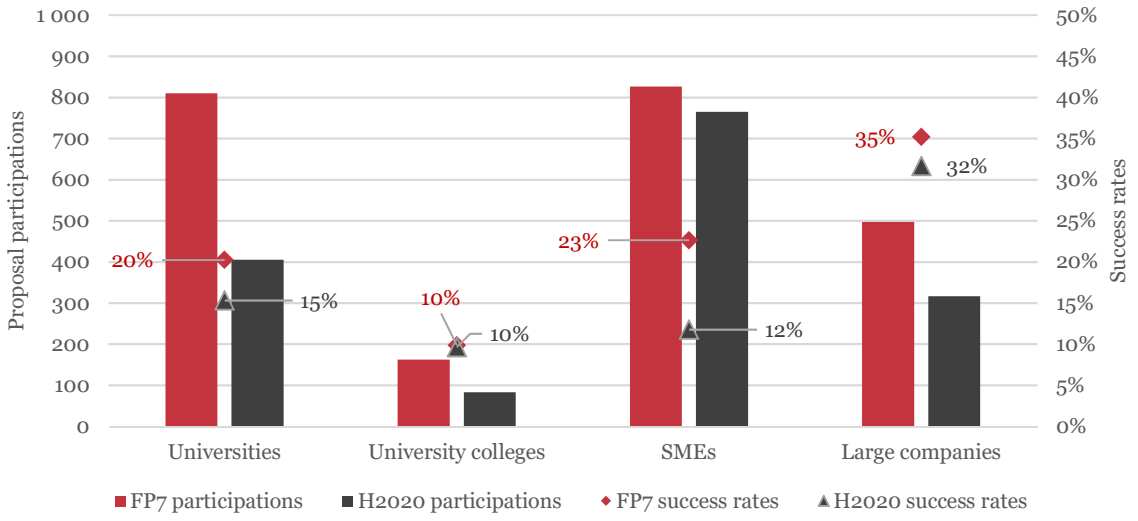


Source: Technopolis analysis of eCorda data.

SMEs are very active, but saw their success rates drop below the FP average; large companies, instead, are very successful. Universities are moderately competitive; university colleges continue having low success rates.

Figure 89 and Figure 90 show the equivalent data for the stakeholder types that have so far in H2020 submitted at least 40 proposals. SMEs have so far been the most active in H2020 and taking into account that H2020 is not quite mid-way, they have nearly doubled their participations (without counting the SME instruments); also the large companies show higher participation rates. Whereas SMEs have seen their success rate halved, falling below the 15 percent FP average, large companies managed to maintain a very high success rate. Universities and university colleges seem to be about as active in H2020 as in FP7. Whereas universities have seen their success rate fall notably (but are at the FP average, both in H2020 and FP7), university colleges have maintained their (low) rate.

Figure 89 Norwegian industry-relevant proposal participations (columns, left axis) and success rates (diamonds/triangles, right axis) in FP7 and H2020 by most active stakeholder type, HEIs and industry.

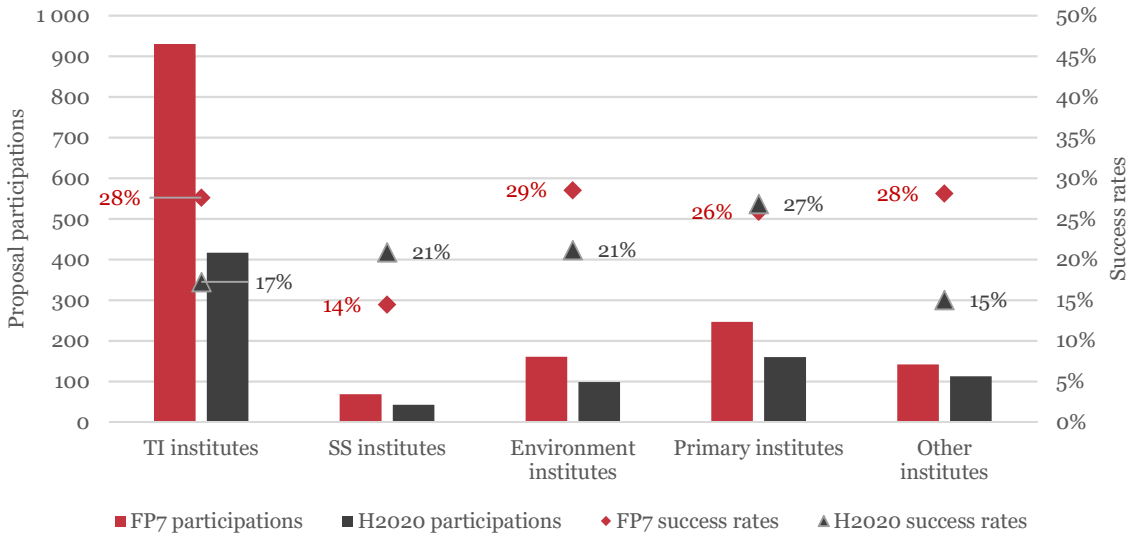


Source: Technopolis analysis of eCorda data.

TI institutes are decreasing their participation in FP proposals and their success rates dropped significantly. All other research institutes, instead, increased their participation and are now more competitive than the TI institutes

Figure 90 reveals that the TI institutes, which were very active in FP7, have been less active in H2020, and saw their success rate drop sharply, down to the FP average for H2020. In contrast, all other institute groups seem to be more active in H2020; this regards especially the Other institutes. The SS and Primary institutes have seen their success rates increase; the Environmental and Other institutes have seen a decrease. The TI institutes have the lowest success rate among the institute groups in base funding system.

Figure 90 Norwegian industry-relevant proposal participations (columns, left axis) and success rates (diamonds/triangles, right axis) in FP7 and H2020 by most active stakeholder type, institutes.



Source: Technopolis analysis of eCorda data.

5.4 Participation patterns in the subject areas

Our analysis reported below shows various levels of competitiveness among Norwegian actors and especially in the private sector. The main finding is that Norwegian R&I is most competitive in the Ocean and Bioeconomy areas in H2020. Going more into the detail, we find that in the BIOECONOMY area, Primary institutes are the key players and they show a particularly high level of competitiveness, while involvement in the BBI JU strongly supports the large companies. In the area of ENERGY, the drastic drop in success rates for all stakeholders suggests a reduced alignment of Norwegian R&I competence with the change in focus and/or nature of R&I in H2020; participation in FCH JU has helped reducing the negative effect in this area. Like in the other areas, also in the field of industry-relevant ICT, SMEs have become the main actors, with moderate success rates. There is a rise also in large company involvement, with particularly high levels of competitiveness. MFCT is one of the few areas with an increase in TI institute proposals, and with high success rates. R&I is mainly funded through the LEIT programme. OCEAN is one of the few areas where universities have doubled their participations, while remaining highly competitive. Success rates are high for all actors in this field, except for SMEs. Norwegian competitiveness in the field of industry-relevant TRANSPORT R&I is under considerable strain in H2020.

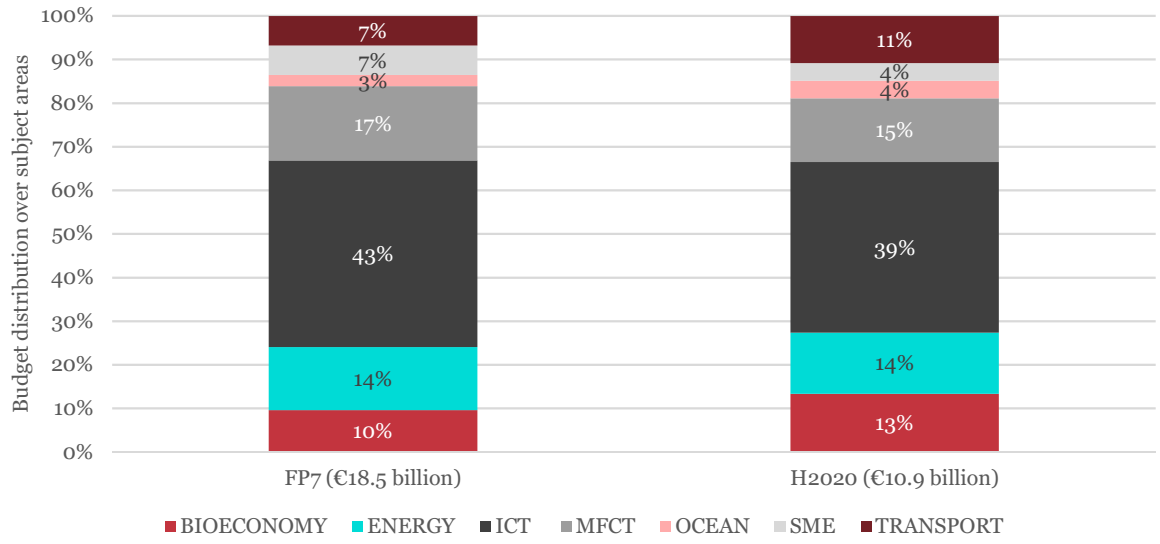
Our analysis of Norwegian participation in the JTIs/JUs/PPPs under H2020 shows a considerable increase in proposal participation, on the way to doubling the participations in FP7. However, there is a strong reliance on the competence, initiative and efforts of the partner organisations. Most of the (few) efforts to coordinate these proposals have been taken by the TI institutes – and especially SINTEF.

5.4.1 *EU funding for industrially relevant R&I in the subject areas*

Figure 91 shows the distribution of the FP budgets for multi-partner projects over the industry-relevant subject areas (cf. Table 16). The distribution of the R&I in H2020 over the different programmes is yet again an illustration of the different programme design philosophy in the FPs:

- Bioeconomy R&I is in H2020 mainly funded in the Food and bioeconomy Societal Challenge, but some more fundamental R&I is conducted also in the LEIT area
- A similar pattern can be seen for Energy R&I: the core is in the Energy Societal Challenge, but energy-relevant R&I is conducted also in the Transport and Climate Societal Challenges, as well as in LEIT
- Industry-relevant ICT R&I is distributed over close to all Societal Challenges and programmes
- R&I that we classified as R&I relevant for the general manufacturing sector is funded especially in the LEIT and Environment and Climate Societal Challenges
- "Ocean-related" R&I, i.e. marine and maritime R&I, is funded in the Climate, Food, Security and Transport Societal Challenges
- R&I relevant for the transport sector is an exception to the rule and mainly funded under the transport Societal Challenge

Figure 91 Budget distribution for industry-relevant R&I over the subject areas.

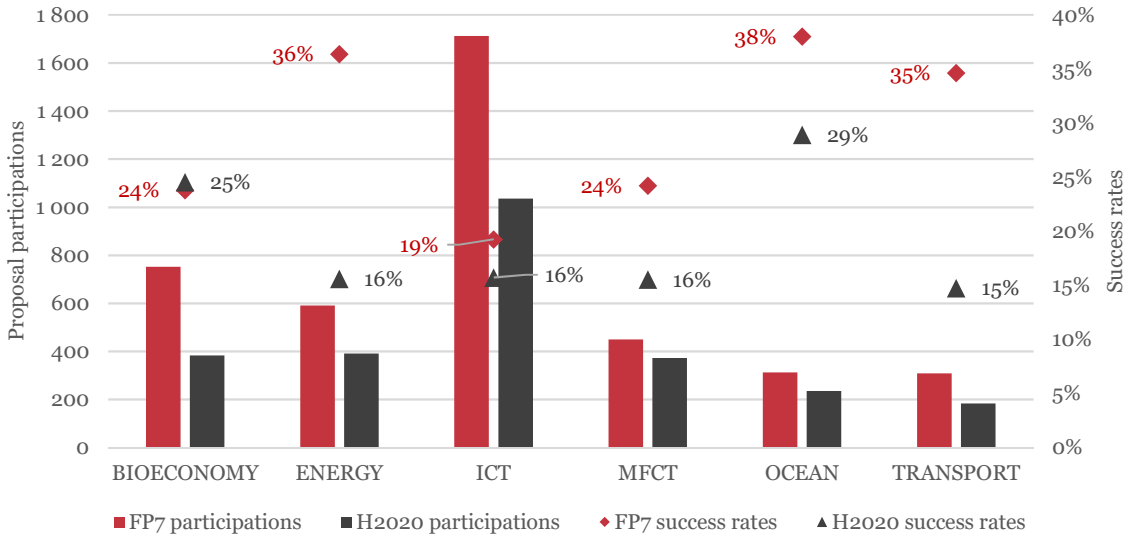


Source: Technopolis analysis of eCorda data.

5.4.2 *Proposals and success rates*

In terms of number of proposal participations, Norwegian organisations mainly focused on industry-relevant ICT R&I in H2020, as in FP7, see Figure 92. There is also a good deal of proposal activity in Bioeconomy, Energy, and R&I relevant to the Manufacturing sector. The focus is changing compared to FP7, with an increase in proposal participations in the sphere of Energy, ICT, Manufacturing and Ocean. Judging from the success rates in H2020, Norwegian proposers are the most competitive in the field of Ocean and Bioeconomy; in the other areas, the success rates are at the overall H2020 rate (15 percent), which however implies a fall in competitiveness because they were higher than the FP average in FP7 (21 percent) – in all areas but ICT.

Figure 92 Norwegian participations in multi-partner proposals (columns, left axis) and success rates (diamonds/triangles, right axis) for industry-relevant R&I in FP7 and H2020 in industry-relevant areas.



Source: Technopolis analysis of eCorda data.

In the following subsections, we only include stakeholder types that have participated in at least 15 multi-partner proposals in H2020 in our analyses.

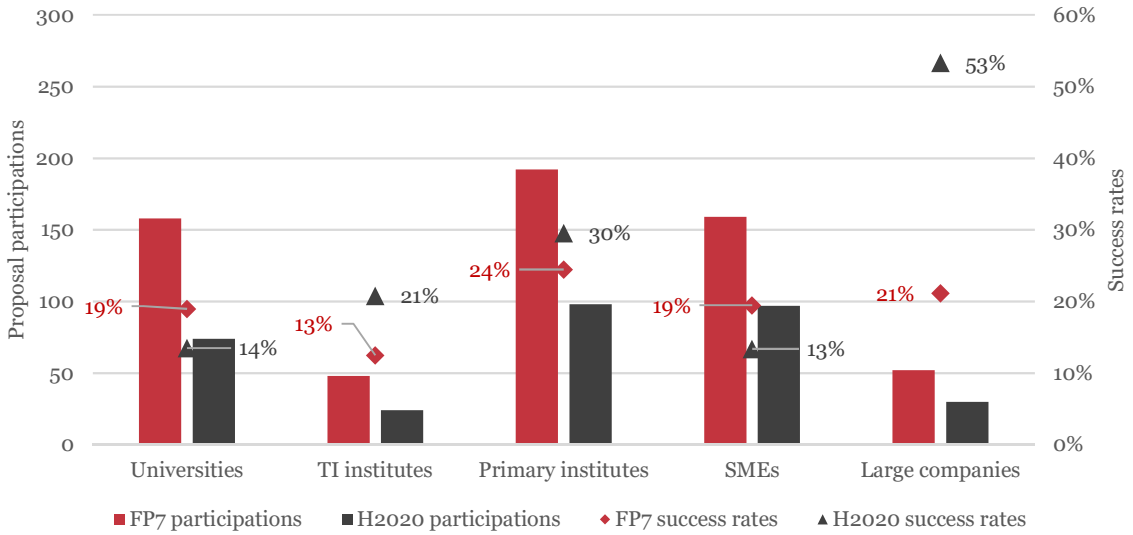
5.4.2.1 BIOECONOMY

Norwegian actors participated in total in about 380 proposals in this industry-relevant field of R&I, which is about the same level as in FP7. Also, the joint proposal rate remained the same at about 1.5 Norwegian participations per proposal.

Primary institutes, universities and SMEs are the most active stakeholder types in this area, but show quite different success rates, Figure 93. The Primary institutes reach a remarkably high success rate for the proposals they participate in, and increased it even compared to FP7. Key actors there are NIBIO and NOFIMA. Universities and SMEs, instead, seem to struggle in the competition, and saw their success rates drop to a level slightly below the FP average. Especially NMBU struggled: only two out of the 33 proposals it participated in were successful.

Very successful, instead, are the large companies, even though their participation is less intensive. These organisations owe their high success rate especially to their involvement in the Bio-Based Industries JU (BBI). Key actors are Borregaard and Elkem. The TI institutes (predominantly SINTEF) equally show little involvement, but reached success rates below the Norwegian average in this area of R&I (25%). Indicative here is that only one proposal by these institutes was related to the BBI JU.

Figure 93 Norwegian participations in multi-partner proposals (columns, left axis) and success rates (diamonds/triangles, right axis) for industry-relevant R&I in BIOECONOMY, FP7 and H2020.



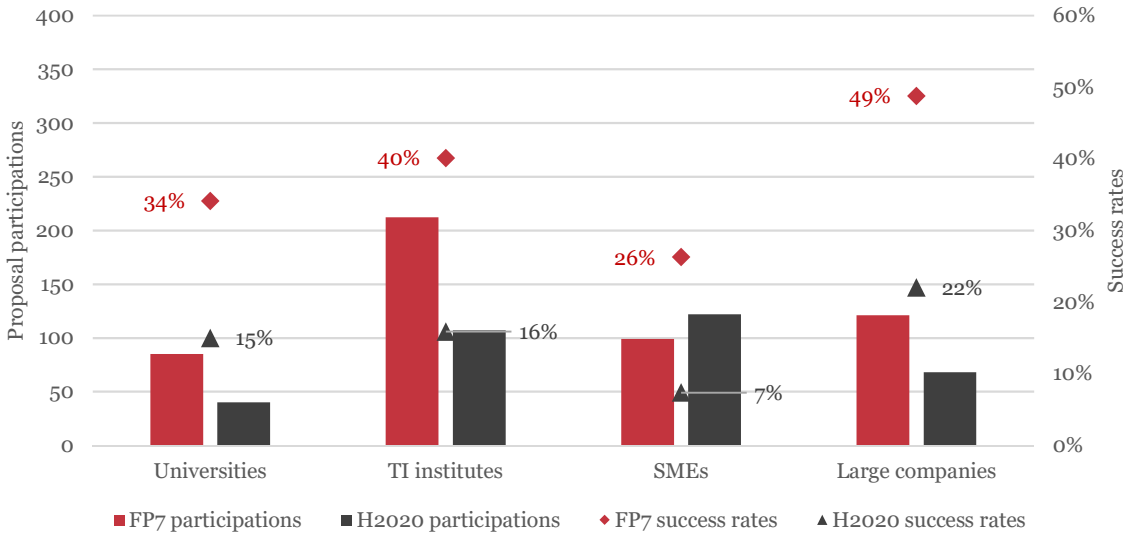
Source: Technopolis analysis of eCorda data.

5.4.2.2 ENERGY

Participations in proposals saw a slight increase in this area compared to FP7 (391 in H2020, versus 591 in FP7). Norwegian actors teamed more up for the proposals, though: the joint proposal rate was 1.8 in H2020, versus 1.5 in FP7.

The TI institutes are the most active Norwegian actors in industry-relevant energy R&I, see Figure 94. It bears no surprise that this regards especially SINTEF. The most remarkable development is the drastic drop in success rates for these institutes: from 40 percent in FP7 to 16 percent (FP average) in H2020. However, a similar drop in success rates can be noted also for the universities and even for the large companies – not to mention the SMEs.

Figure 94 Norwegian participations in multi-partner proposals (columns, left axis) and success rates (diamonds/triangles, right axis) for industry-relevant R&I in ENERGY, FP7 and H2020.



Source: Technopolis analysis of eCorda data.

The impression arising is that there is a general fall in competitiveness for Norwegian R&I in industry-relevant FP R&I. There are two possible explanations: there was a particularly strong competition for R&I projects in these fields under H2020, or the focus or nature of R&I funded under H2020 has shifted towards an area of more limited competence for Norwegian actors.

In Table 19 lists the action lines both in FP7 and H2020 where Norwegian actors participated in at least 20 proposals. In H2020, the only action lines where success rates were up to the FP7 levels were the two related to the FCH JU (see also Section 5.4.3 below).

Table 19 Proposal participations and success rates in ENERGY-related R&I action lines in FP7 and H2020.

	Action lines	Total participations	Successful participation	Success rate
FP7				
ENERGY	CO2 capture and storage technologies for zero emission power generation	88	38	43%
	Energy efficiency and savings	62	15	24%
	Novel nanostructured materials for hydrogen storage	74	16	22%
	Renewable fuel production	22	5	23%
	Renewables for heating and cooling	33	8	24%
	Smart energy networks	59	29	49%
NMP	Energy-efficient buildings	21	9	43%
H2020				
ENERGY	Alternative fuels and mobile energy sources	42	5	12%
	FCH2 (energy objectives)	22	5	23%
	Low-cost, low-carbon energy supply	128	24	19%
	Reducing energy consumption and carbon footprint by smart and sustainable use	79	10	13%
TRANSPORT	FCH2 (transport objectives)	28	8	29%

Source: Technopolis analysis of eCorda data.

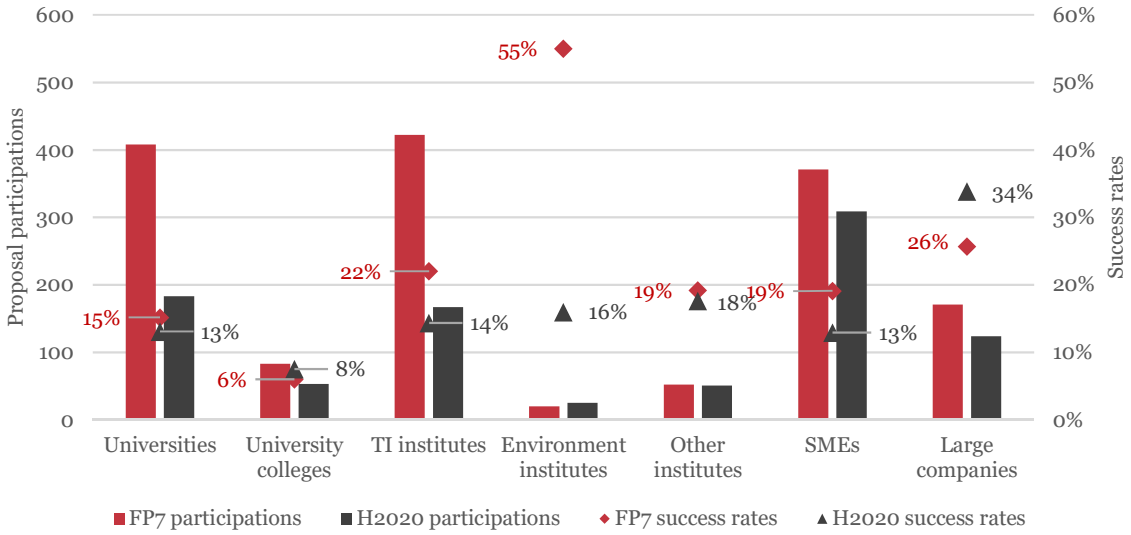
5.4.2.3 Industry-relevant ICT

This is the largest of the industry-relevant R&I areas in terms of proposal participation. It should be noted that we included in this category also R&I in the field of electronics. Overall there is an increase in proposal participation: 1,036 participations in H2020, versus 1,712 in FP7. Also in this case, we see an increase in joint proposals: it is at a rate of 1.8 in H2020, versus 1.4 in FP7.

TI institutes and universities were the key players in this field in FP7, but have been overtaken by SMEs in H2020, see Figure 95. For all three key actors, success rates in H2020 are low, below the FP average for industry-relevant R&I, i.e. 15 percent.

Large companies have increased their participation, as well as their success rates that were high already in FP7. Minor players, but of rising importance, are the Environmental institutes and the Other institutes, both moderately successful in H2020 (but however more than the TI institutes and universities). Large companies and SMEs involved were predominantly active in the ICT, professional services and manufacturing sector. Large companies were, e.g. Telenor, but also Evry Norge, Kongsberg Maritime, and DNV and NxTech AS. There were also quite some proposals involving companies active in the electricity distribution sector such as Frederikstad Energi Nett and Lyse, specifically for proposals in the field of smart cities and smart energy grid networks. Somewhat surprisingly, only one in ten proposals was made in the context of the relevant JTIs or JUs like ECSEL, FOF and FIRE+.

Figure 95 Norwegian participations in multi-partner proposals (columns, left axis) and success rates (diamonds/triangles, right axis) for industry-relevant R&I in ICT, FP7 and H2020.

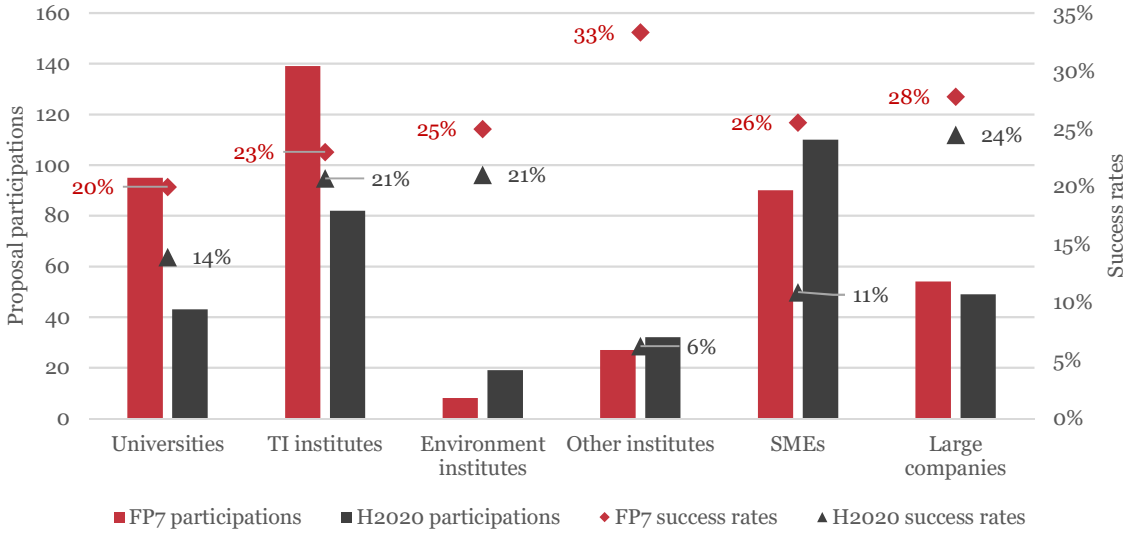


Source: Technopolis analysis of eCorda data.

5.4.2.4 MFCT

Norwegian actors increased their participation also in proposals for R&I projects relevant for the manufacturing sector (including material technologies and engineering): they participated in 373 proposals, versus 450 participations in FP7). The joint proposal rate remained moderate, i.e. around 1.5. About half of these proposal participations regarded the JUs/PPPs, including the Factories of the Future (FoF), European Green Vehicles Initiative (EGVI), Sustainable Process Industry (SPIRE) and Energy-efficient Buildings (EeB).

Figure 96 Norwegian participations in multi-partner proposals (columns, left axis) and success rates (diamonds/triangles, right axis) for industry-relevant R&I in MFCT, FP7 and H2020.



Source: Technopolis analysis of eCorda data.

Also in this field, SMEs have surpassed TI institutes and universities in their proposal activity, reaching below-average success rates, though, see Figure 96. However, it is one of the few areas where we see an increase in TI institutes' proposals, and one of the few where they succeed in maintaining their FP7 high

success rates; the main – and close to only – TI institute involved was SINTEF. We can see a similar pattern for the large companies. Once again, Environmental institutes and Other institutes are the upcoming new players; the former with a very good success. Universities remain stable in their participation, and have a moderate success rate.

It is interesting to note that the TI institutes predominantly participated in proposals for R&I funded under the LEIT programme (one out of three participations were in the JTIs/JUs/PPPs). SMEs, large companies, and especially universities (e.g. NTNU), instead, took a broader approach and applied also for R&I funded under the Climate or Energy Societal Challenge.

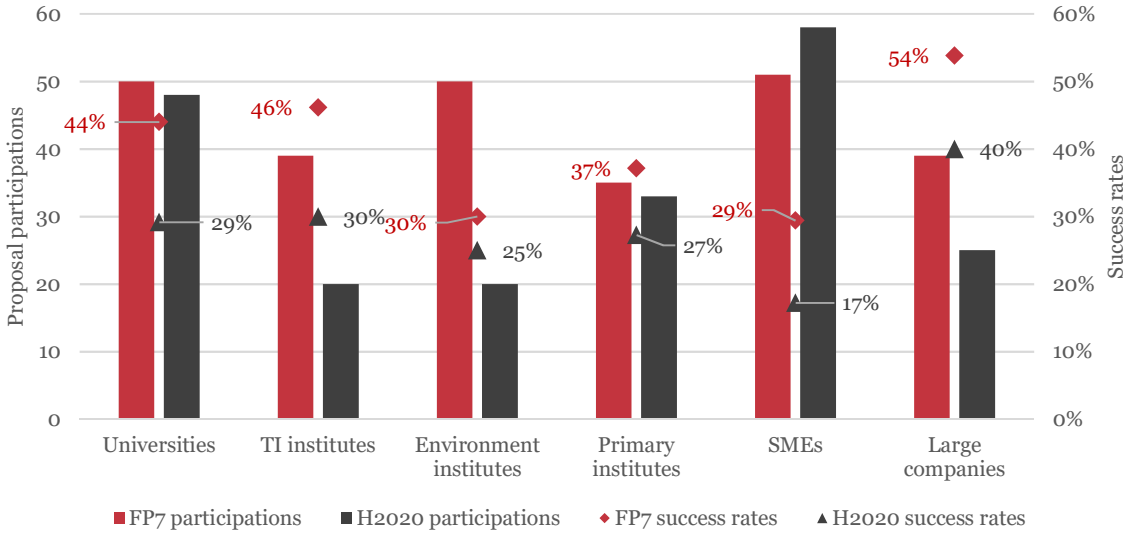
5.4.2.5 OCEAN

There was a rise in proposal participations also in this area of R&I, reaching 235 participations in H2020 versus 313 in FP7. The joint proposal rate was high already in FP7 (1.7) and increased in H2020 to 2.0 Norwegian participations per proposal. It is to be noted that there is no JTI/JU/PPP relevant for this area.

Industry-relevant R&I in the field of Ocean encompass both marine and maritime R&I, and is an area where many actors in the Norwegian research community are involved. R&I in this field is funded mainly in the Food and Climate Societal Challenges.

Most active are the SMEs and universities, the latter also with a very good success rate in H2020, see Figure 97. The main universities involved are UiB, UiT and NTNU. Both SMEs and universities have considerably increased their proposal activity in H2020. So did the Institute of Marine Research (IMR), showing high competitiveness. Also in this case, large companies reach the highest success rates in H2020; a major player is Kongsberg Maritime.

Figure 97 Norwegian participations in multi-partner proposals (columns, left axis) and success rates (diamonds/triangles, right axis) for industry-relevant R&I in OCEAN, FP7 and H2020.



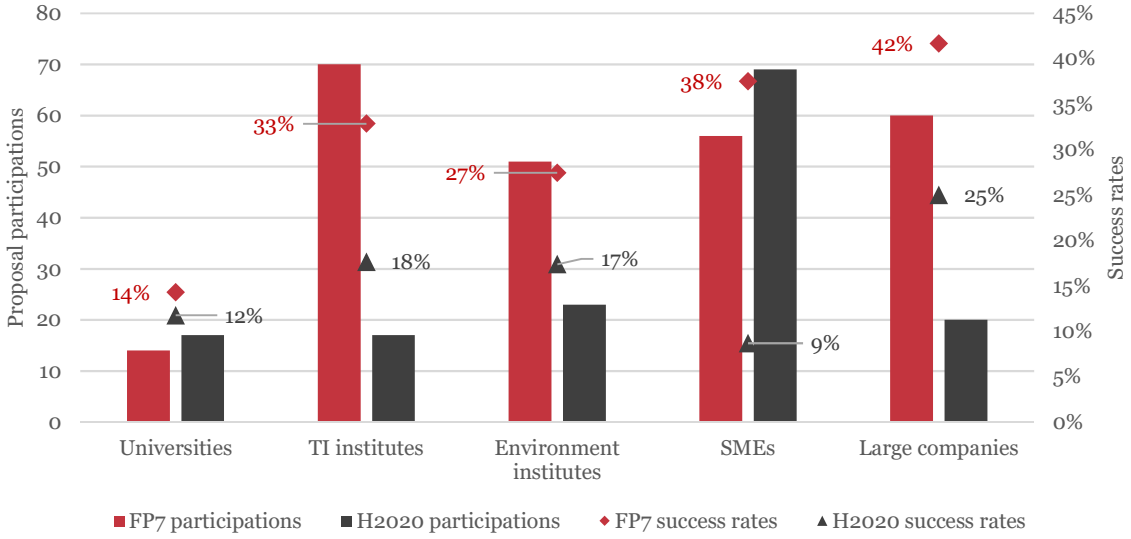
Source: Technopolis analysis of eCorda data.

5.4.2.6 TRANSPORT

Participation in proposals in industry-relevant transport R&I is overall stable over the Framework Programmes. A major change is the strong increase in joint proposals: from 1.4 participations per proposal in FP7 to 2.0 participations per proposal in H2020. R&I in this area is funded close-to-uniquely in the Transport Societal Challenge. EGVI is the PPP that is relevant for this area of R&I; only 5 percent of the proposals in which Norwegian actors participated was in the context of this PPP.

The ever-returning pattern is visible also in this area, see Figure 98: a strong rise in interest among SMEs, but reaching only a low success rate. The most striking development in this area is the drastic drop in proposal participation among the TI institutes (SINTEF is the close-to-unique proposer) and the large companies, accompanied with a strong decrease in success rates. The Environmental institutes (actually, only one: the Institute of Transport Economics, TØI) keep a rather stable level of participation, but equally see their success rates fall – albeit still above the FP average. Universities double their (low) participation, and keep their low success rate. In sum: an area of strength in FP7, with high levels of competitiveness especially among the TI institutes and large companies, that seem to be struggling in H2020 to keep up its position.

Figure 98 Norwegian participations in multi-partner proposals (columns, left axis) and success rates (diamonds/triangles, right axis) for industry- relevant R&I in TRANSPORT, FP7 and H2020.



Source: Technopolis analysis of eCorda data.

5.4.3 Participation in JTIs/PPPs/JUs

Figure 99 shows the shares of the overall EC contributions to projects funded under the JTIs/PPPs/JUs in which Norwegian organisations participated (i.e. total EC contributions to these projects, not funding to Norwegian participants). The figure shows a high degree of Norwegian integration in Bio-Based Industries (BBI), Fuel Cells and Hydrogen (FCH), ECSEL (including ARTEMIS and ENIAC in FP7), Future Internet Research & Experimentation (FIRE+) and Single European Sky ATM Research (SESAR). Of these, BBI, FCH and ECSEL are at the core of Norwegian industry's interest and competitiveness. Integration is also relatively good in Sustainable Process Industry (SPIRE) and Factories of the Future (FoF), but the developments in Energy-efficient Buildings (EeB), European Green Vehicles Initiative (EGVI) and Innovative Medicines Initiative (IMI) are discouraging.

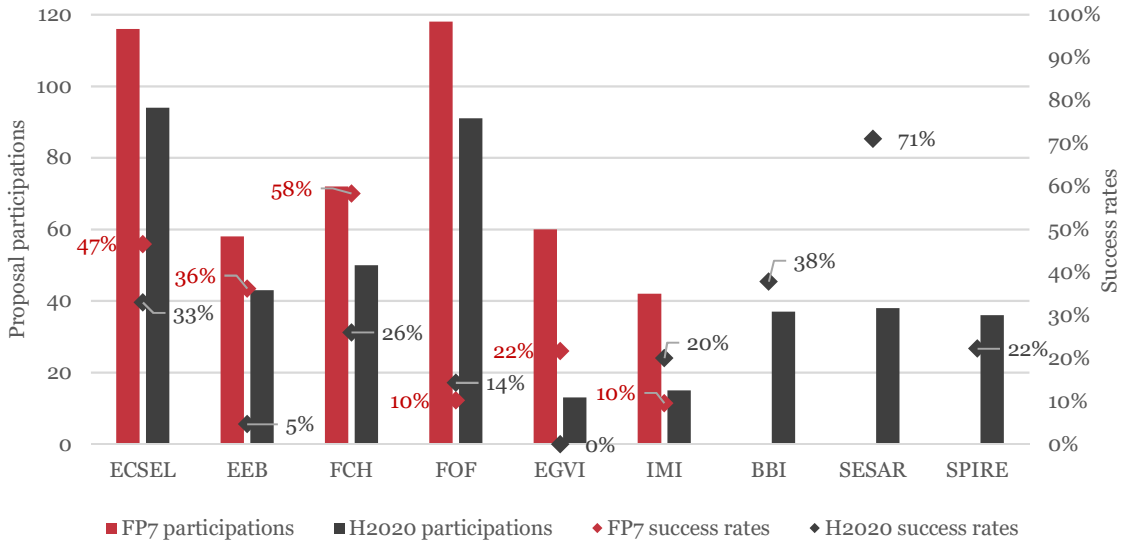
In H2020, Norwegian actors participated in total in 424 proposals for R&I funded through these partnerships. Taking into consideration that H2020 is not quite mid-way, this implies nearly a doubling of the participations in FP7 (470 proposals).

Figure 99 Share of EC contributions for JTI/PPP/JU projects involving Norwegian researchers.

Source: Technopolis analysis of eCorda data.

ECSEL and FOF are the partnerships with most participations in H2020, see Figure 100, followed by the other partnerships at a close to equal level, i.e. EeB, FCH, and the new BBI, SESAR and SPIRE. In contrast to the general trend, Norwegian proposal activity dropped in EGVI and IMI. Not shown in the graph are the few proposals in the CLEAN SKY JTI under FP7 (four participations, one of which successful); the three participations in the FIRE+ JTI – all in one (successful) proposal; and the four participations in two SHIFT2RAIL proposals, of which one was successful.

Figure 100 Norwegian participations in proposals (columns, left axis) and success rates (diamonds/triangles, right axis) for R&I in the JTIs/PPPs/JUs, FP7 and H2020.



Source: Technopolis analysis of eCorda data.

In H2020, Norwegian proposal participations in the JTI/JU/PPPs had an average success rate of 27 percent; in FP7, it was 31 percent. The SESAR JU, targeting the aviation sector, was the partnership where proposals with Norwegian participation reached the highest success rates; they were high also for the BBI, ECSEL, and FCH. In the FOF, instead, success rates are low even though slightly increasing

compared to FP7, despite the high number of participations. For the EeB, participations increased, but success rates heavily dropped. As for the EGVI, proposal participation dropped drastically and none of the 13 proposal participations was successful.

Norwegian actors teamed up relatively little for these proposal participations: joint proposal rates are around 1.4 in the BBI, EGVI, FCH, IMI, and only 1.2 in SESAR. The exceptions are ECSEL (a joint proposal rate of 2.9), EeB (1.8), FOF (1.7), and SPIRE (1.7).

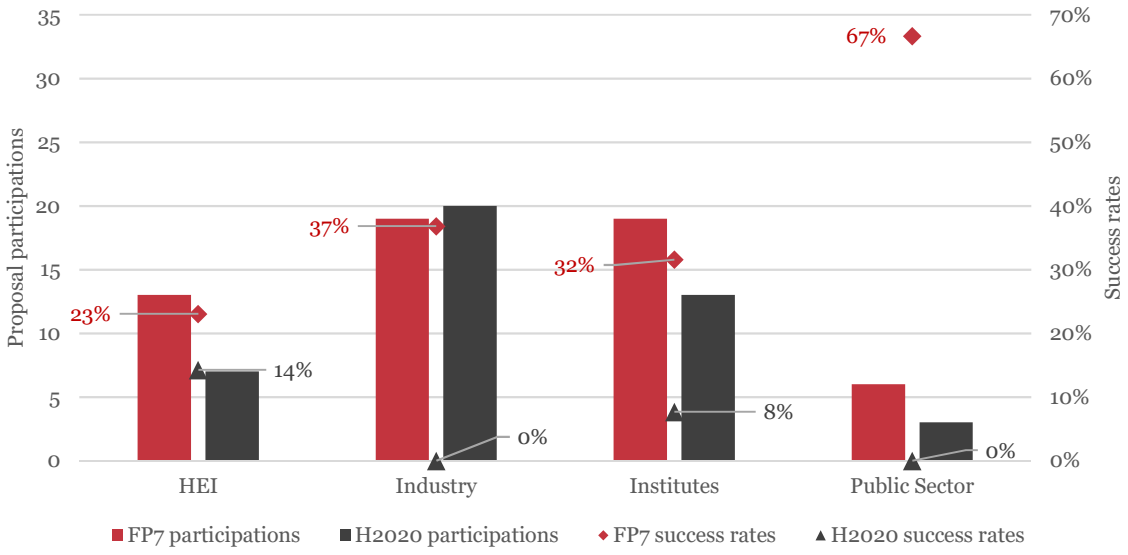
It is striking that Norwegian actors coordinated only 54 out of the 424 proposals they participated in. The majority of these coordinations (38 out of the 54) were taken up by the research institutes – and 35 of them by SINTEF (7 were successful). The NTNU accounted for 7 proposals coordinated, one of them successful.

We noted in Chapter 3 that Norwegian participation in IMI JTI is dominated by universities and hospital trusts, and that industry has so far not participated at all in H2020 (cf. Figure 48), and we noted in Chapter 4 that participation in the ICT JTIs (ARTEMIS and ENIAC in FP7, ECSEL in H2020) is strongly dominated by industry, but that research institutes are also quite active (cf. Figure 72).

Below we briefly cover the remaining main JTIs/PPPs/JUs – except for EGVI where none of the few proposal participations were successful so far.

The picture for the EeB PPP, predominantly supporting R&I in the industry-relevant Energy area, is one of a strong increase in industry interest (mainly SMEs), consistently failing; success rates dropped also for the institutes (predominantly TI institutes, i.e. SINTEF), see Figure 101. HEIs and institutes had one successful proposal participation each.

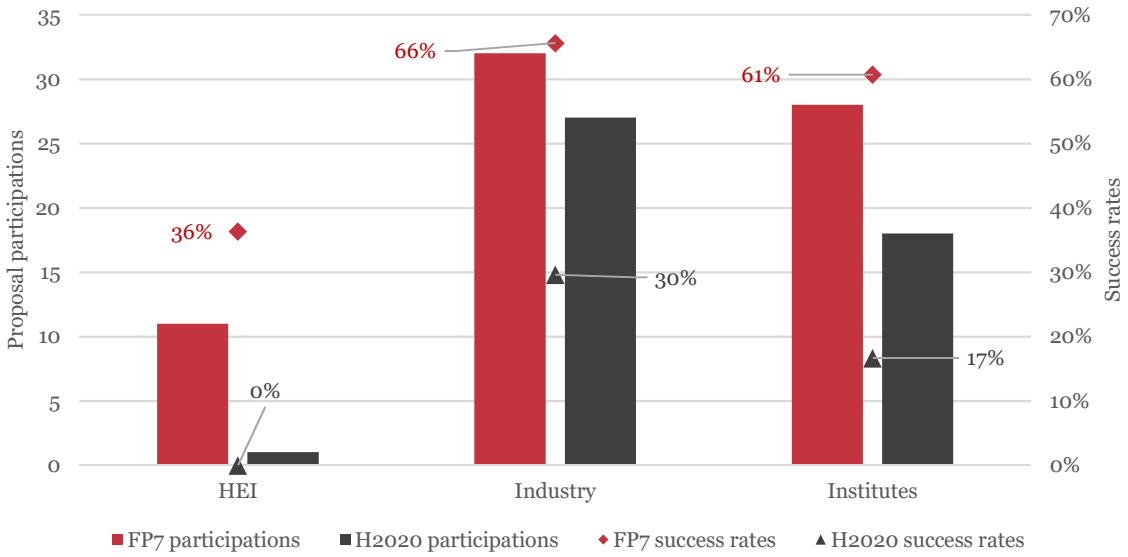
Figure 101 Norwegian participations in proposals (columns, left axis) and success rates (diamonds/triangles, right axis) in the EeB PPP, FP7 and H2020.



Source: Technopolis analysis of eCorda data.

In the FCH JU, equally addressing Energy research, we find that industry and institutes dominate participation, but both have seen drastic reductions in success rates in H2020 – even though for industry they are still above the Norwegian 27 percent average, see Figure 102. Universities did very well in FP7, but proposal activity has almost ceased in H2020. The TI institutes participating were SINTEF and IFE; a main actor among the large companies was Prototech. Only one large company, Gexcon, coordinated a proposal, and was successful.

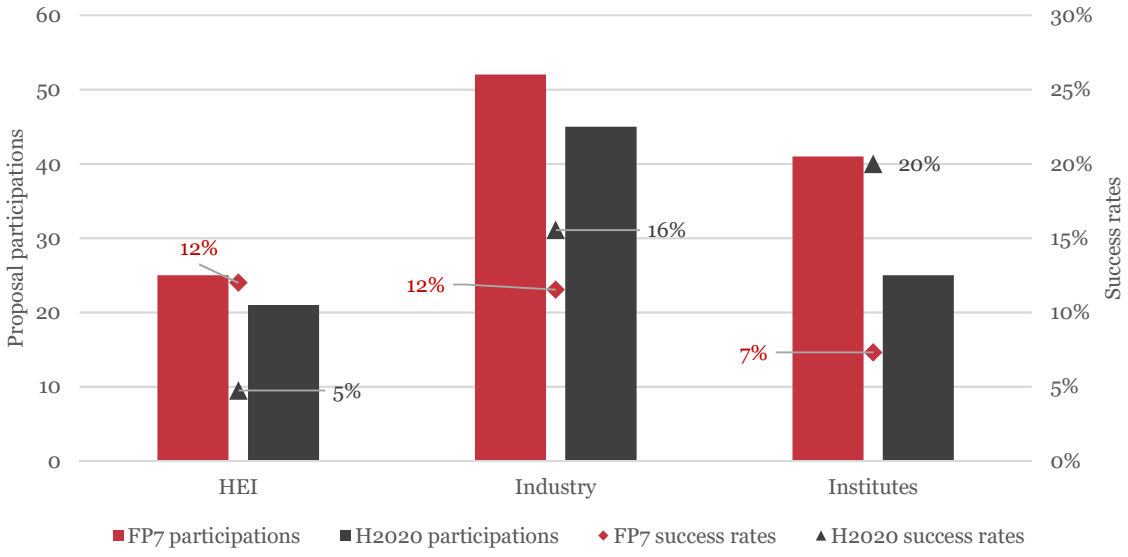
Figure 102 Norwegian participations in proposals (columns, left axis) and success rates (diamonds/triangles, right axis) in the FCH JU, FP7 and H2020.[36]



Source: Technopolis analysis of eCorda data.

In the FOF JU, covering a mix of industry-relevant R&I in ICT and Manufacturing, the picture is more positive, especially for industry where we see an increase in participations and success rates (even though still quite modest), see Figure 103. The institutes (mainly SINTEF and SINTEF Raufoss Manufacturing) kept a quite stable level of participation, but significantly increased their success rates. For the universities (mainly NTNU), instead, the success rates that were already quite low in FP7, dropped even more, despite the increase in participations. experienced a large decrease in H2020.

Figure 103 Norwegian participations in proposals (columns, left axis) and success rates (diamonds/triangles, right axis) in the FOF JU, FP7 and H2020.



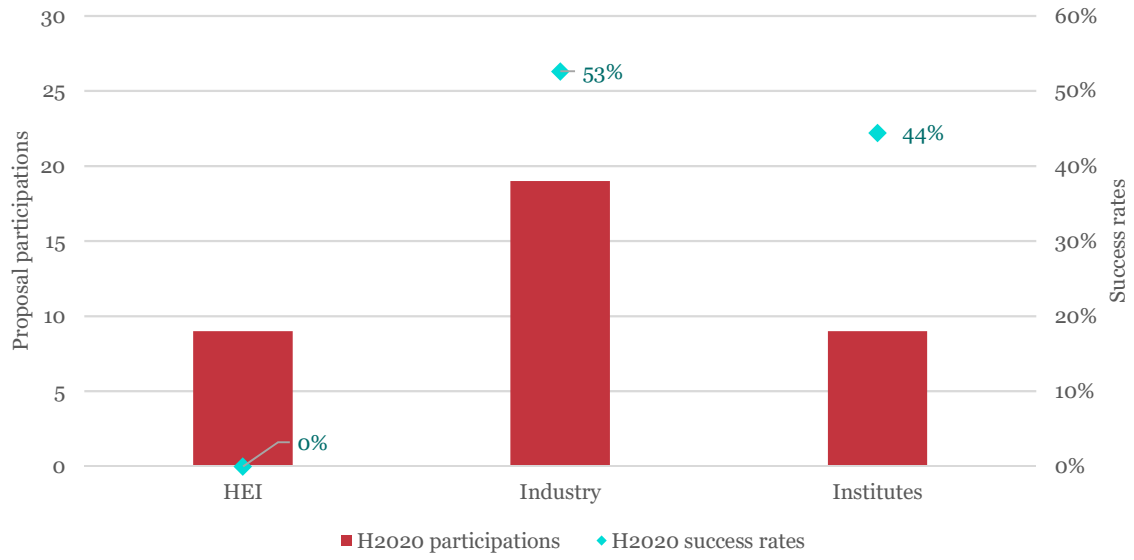
Source: Technopolis analysis of eCorda data.

[36] The figure does not include three participations by non-profit associations in H2020, and one involving a public agency.

Going over to the JUs launched in H2020, industry clearly dominates participation also in the BBI JU targeting the Bioeconomy sector, and it has achieved a phenomenal success rate, see Figure 104. Institute participation is considerably lower, but they have also achieved a high success rate. In contrast, universities have consistently failed, despite a proposal activity matching that of the institutes.

The main actor in the industry sector is Borregaard; proposal participations by the institutes included a mix of Primary and SS institutes, including NIBIO, NOFIMA, and Østfoldforskning. Universities involved were mainly NTNU and NMBU. Borregaard and NIBIO coordinated one proposal each, both successful.

Figure 104 Norwegian participations in proposals (columns, left axis) and success rates (diamonds, right axis) in the BBI JU, H2020.

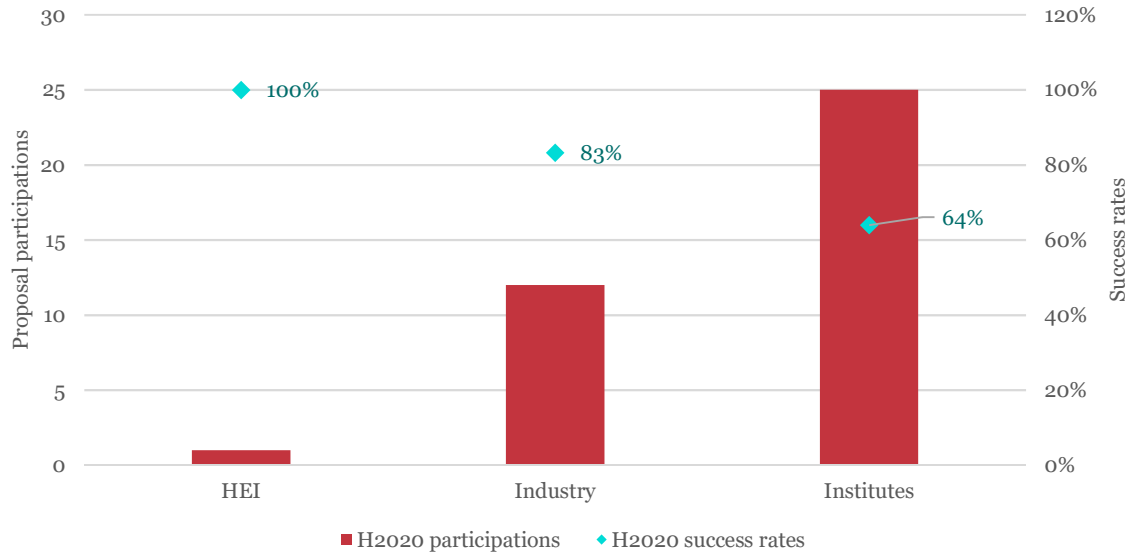


Source: Technopolis analysis of eCorda data.

The participation activity in proposals for the SESAR JU, in the field of aviation, was highly successful but also highly concentrated, see Figure 105. AVINOR accounted for nine out of the twelve industry proposals, all of them successful (and all as a partner organisation); SINTEF accounts for all but one of the institutes' participations, in seven cases as coordinator, but only once successful. NTNU was the only university involved (as partner).

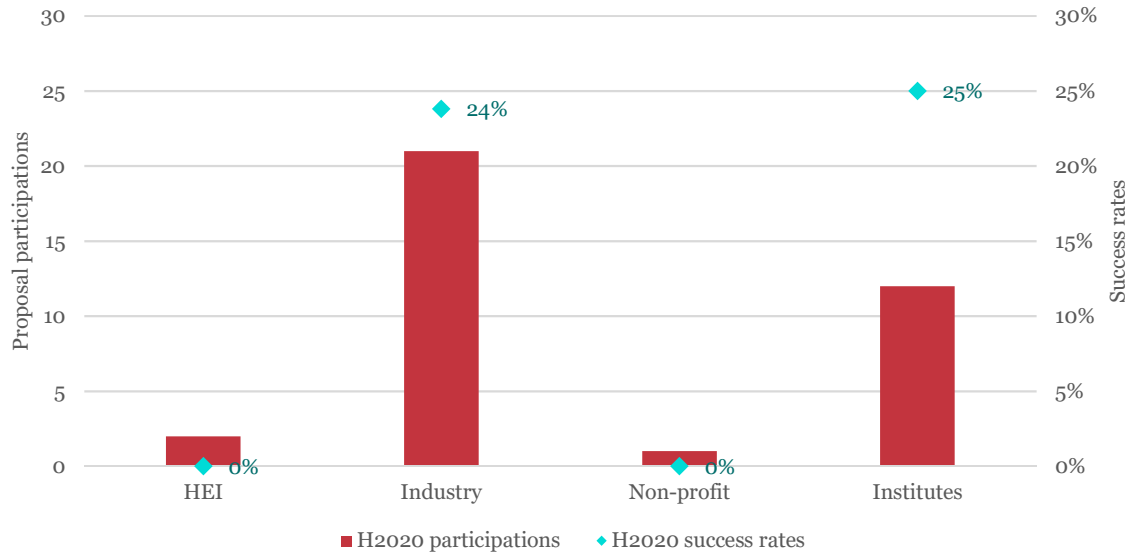
Industry dominates Norwegian participation in the SPIRE PPP targeting the process industries, see Figure 106, even though institutes are quite active as well; both have achieved respectable success rates. Industry actors involved were a mix of professional services and manufacturing companies, both SMEs and large companies. Main actors were Cybernetica and Elkem. The institute most involved was SINTEF, which coordinated four out of the twelve proposals (two of them successful). Tel-Tek and Norner Research had two proposal participations each, of which only one was successful (Tel-Tek).

Figure 105 Norwegian participations in proposals (columns, left axis) and success rates (diamonds, right axis) in the SESAR JU, H2020.



Source: Technopolis analysis of eCorda data.

Figure 106 Norwegian participations in proposals (columns, left axis) and success rates (diamonds, right axis) in the SPIRE PPP, H2020.



Source: Technopolis analysis of eCorda data.

5.4.4 Participation in Eurostars

We conducted a separate analysis of Norwegian participation in the Eurostars programme, based on proposal and project information provided by RCN, as well as data available from the programme.

RCN's records show that between 2014 and (the first call of) 2017, there were 324 Norwegian participations in 234 proposals to Eurostar calls, see Table 20. This means that proposals involving Norway included (on average) 1.4 Norwegian organisations each. The majority of these Norwegian participations are accounted for by SMEs (76%), while universities (10%), research institutes (7%) and large companies (5%) each constitute a much smaller proportion. A total of 2,331 proposals were submitted during this period overall (i.e. across all countries), meaning that Norway participated in 10

percent of the total. This rate has varied between 8 and 13 percent, depending on the call, but with no obvious trend over time. Around two-fifths of proposals involving Norway *qualified* for funding (42% or 98 proposals), while over a third were eventually funded (35% or 81 proposals).

Table 20 Norwegian participation in Eurostar proposals and projects.

Call	Proposals (all)	% of proposals with NO involvement	NO participations in proposals	Funded proposals with NO involvement	% of NO proposals that are funded
1 (2014)	299	11%	45	12	35%
2 (2014)	356	10%	45	11	31%
3 (2015)	266	8%	28	7	35%
4 (2015)	333	8%	35	12	48%
5 (2016)	299	12%	49	19	54%
6 (2016)	376	9%	41	9	28%
7 (2017)	402	13%	81	11	21%
Total	2,331	10%	324	81	35%

Source: Technopolis analysis of RCN data.

Overall, there have been 139 Norwegian participations in 135 Eurostars projects starting between 2008 and 2016. On average, there have been 15–16 new participations each year, although there is quite some variability (from 3 new participations in 2008 to 31 new participations in 2016). While there is no consistent trend over the years, the three most recent years (2014–2016, i.e. the first period of H2020) have seen an average of 21 Norwegian participations started each year, compared to 13 in the previous six years (2008-2013, FP7), suggesting increased Norwegian involvement in the programme over time.

There are 107 separate Norwegian organisations listed as project participants during the 2008–2016 period, meaning that some (16) appear more than once. Those with 4 or more entries are: Pubgene (6), Corticalis (4), Novelda (4) and Smerud Medical Research International (4). The projects last for around three years on average, meaning that most of those started in the last few years are still ongoing. Budgets for Norwegian participations range from NOK71k to NOK21.2m, with an average per participation of NOK3.7m (six participations with negative or zero budget and have been excluded from this analysis).

To put Norwegian participation in context, we have looked at separate programme-level Eurostars data (online project portfolio[37]). This database also includes 135 projects involving Norway, matching the total given in the RCN database. However, the exact details of individual projects do no always match between these two sources (e.g. often the start and end dates of projects are different).

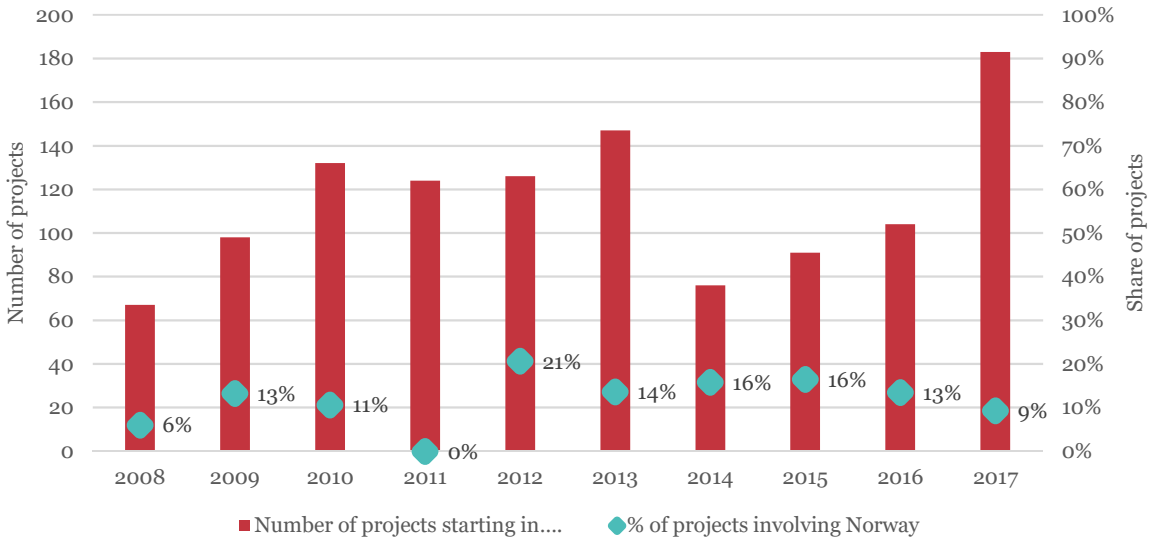
The programme data shows that a total of 1,148 Eurostars projects have begun between 2008 and 2017 (inclusive), with Norway participating in 135 (11.8%) of these. This is a higher proportion than Austria (9%) or Finland (5%), but lower than Sweden (19%), the Netherlands (20%) and Denmark (12.4%).

The total number of projects starting each year has varied, see Figure 107, but it has tended to increase during each funding period (i.e. between 2008 to 2013 for FP7, and between 2004 to 2017 for H2020). Within this overall pattern, Norway's relative level of involvement has also varied – from 0 percent of projects in 2011 to 21 percent of projects in 2012.

During the H2020 period, the absolute number of projects with Norwegian involvement has tended to rise slightly (12, 15, 14 and 17 projects each year from 2014 to 2017). However, the total number of projects has also risen – and more rapidly – during the same period. As a result, Norway's relative involvement has tended to decrease (from 16% of all projects in 2014, to just 9% in 2017).

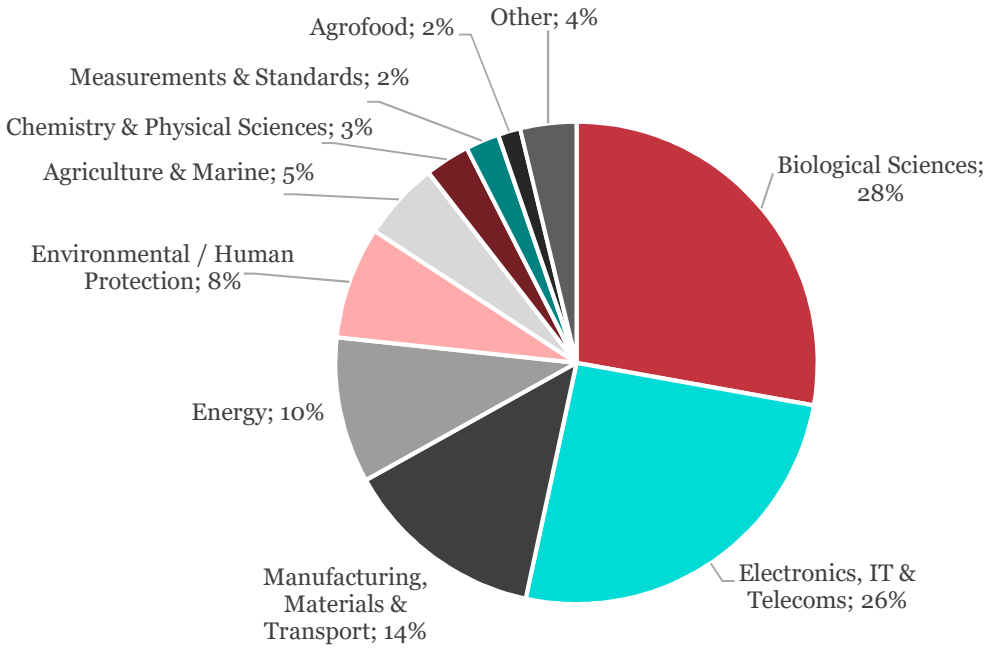
37 www.eurostars-eureka.eu/eurostars-projects.

Figure 107 Total number of Eurostars projects started (columns, left axis) and proportion with Norwegian participation (diamonds, right axis).



Source: Technopolis analysis of data from Eurostars website.

Figure 108 Eurostars projects involving Norway, by technological area (projects starting 2008-17)



Source: Technopolis analysis of data from Eurostars website.

Norway's pattern of participation is also not even across **technological areas**. As Figure 108 shows, two-thirds of projects involving Norway fall into three areas: biological sciences and technologies; electronics, IT and telecoms technology; and industrial manufacturing material and transport. The same three areas also dominate in the portfolio as a whole, accounting for 73 percent of all Eurostar projects (regardless of participating country). The main differences between Norway's pattern of participation and that of participants more generally are in the areas of energy and human/environmental protection, where Norway participates in 22 and 19 percent of projects, respectively (compared to 12% of projects

across all sectors). At the same time, Norway is relatively under-represented in other technological areas – particularly measurement/standards, agrofood and manufacturing/transport, where Norway participates in 8, 9 and 9 percent of projects, respectively.

5.5 Potential for increased participation in H2020

In the following discussion, we group the six industry-relevant areas of R&I into three categories; areas of strength, potential areas of strength, and questionable areas.

The areas that we believe are Norwegian areas of strength are Bioeconomy and Ocean. In Table 21 we summarise H2020 performance in these areas in more detail. We still focus on multi-partner proposals and limit the analysis to the most active stakeholder types in H2020. Our analyses follow the same structure as for the previous two chapters, and our reasoning is explained in greater detail in Chapter 3. Success rates are compared to the average Norwegian success rate for R&I in the specific area, thus identifying the strength of the actors in this specific research community.

Data reported in the sections above showed that Bioeconomy and Ocean are the two areas where Norwegian competitiveness was highest. In both areas, Norwegian competitiveness builds upon the strength of the research institutes (in the former, the Environmental institutes; in the latter also the Primary and TI ones) and a good involvement of competitive large companies – in the case of Bioeconomy, sustained by the BBI JU. The Norwegian critical mass for competitive R&I is high especially in the Ocean area, where also universities show a very good performance. These findings find their confirmation in Table 21, below.

Table 21 Norwegian H2020 performance in BIOECONOMY and OCEAN by most active stakeholder types.

Subject area	Stakeholder type	Proposal participations	As coordinator		As partner	
			Share of participations	Success rate	Share of participations	Success rate
BIOECONOMY	Universities	74	19%	0%	81%	17%
	TI institutes	24	13%	0%	88%	24%
	Primary institutes	**98**	**18%**	**22%**	**82%**	**31%**
	SMEs	97	1%	0%	99%	13%
	Large companies	30	3%	100%	97%	52%
OCEAN	**Universities**	**48**	**19%**	**22%**	**81%**	**31%**
	Primary institutes	33	15%	0%	85%	32%
	SMEs	58	10%	0%	90%	17%
	Large companies	25	4%	0%	96%	42%

Source: Technopolis analysis of eCorda data.

In the area of Bioeconomy, Primary institutes are key to Norwegian participation, both by virtue of proposal volume and by high success rates as both coordinators and partners (as indicated by boldface in the table). Primary institutes are well qualified to coordinate H2020 proposals (22% success rate as coordinators) and they are well networked (31% success rate as partners). The table also suggests that large companies may be well qualified to coordinate in Bioeconomy, but the 100 percent success rate as coordinator is based on one proposal only, so this may be jumping to conclusions. However, there is no doubt that large companies are also very well networked. The other stakeholder types have not proven qualified as coordinators (0% success rates) and they all score below the Norwegian average success rate for this area (25%) also for their participations as partners, showing poor networking.

More active involvement in the BBI JU of the TI institutes and universities no doubt would strengthen Norwegian performance in this area. Considering that the joint proposal rate was modest in this area (an average of 1.5 Norwegian participations per proposal), there is room for strengthening the integration of the Norwegian community in this field.

Moving on to Ocean, universities are key to Norwegian participation, with many proposals and above-average success rates as both coordinators and partners (the average Norwegian success rate for this area is 30% in H2020). Primary institutes and large companies equally are well networked, but have not proven qualified as coordinators. It should be noted also that the joint proposal rate was very high in this area showing an average of two Norwegian actors per proposal.

In both areas, the SMEs are the weak link; these actors see their high interest and efforts very poorly rewarded. A stronger integration of the SMEs in the Norwegian research communities would be beneficial here.

Potential areas of strength are the industry-relevant Manufacturing and ICT areas. For both of these areas, the picture emerging from the data reported in the sections above is one of a rising interest in the industry sector, both among SMEs and large companies; while the latter enjoyed also good success rates showing high competitiveness, the results for the SMEs were discouraging. The traditionally strong players in these areas, TI institutes and universities, show different patterns. While the TI institutes keep up their strong competitiveness and increase their participation in the field of MFCT (which encompasses material technologies and engineering), they are losing competitiveness in the field of ICT (including electronics); universities, instead, are losing competitiveness in both areas.

We consider these areas to be areas for potential growth also because the dynamics in H2020 towards more interdisciplinary R&I create more opportunities for the involvement of the environment and Other institutes, especially the former showing high levels of competitiveness in both areas.

Table 22 confirms these conclusions and sheds some light on the possible reasons for the trends among the key actors. The main conclusion is that while no doubt the competitiveness is there (especially in R&I for manufacturing), the key flaw is in the integration in quality international networks.

Table 22 Norwegian H2020 performance in MFCT and ICT by most active stakeholder types.

Subject area	Stakeholder type	Proposal participations	As coordinator		As partner	
			Share of participations	Success rate	Share of participations	Success rate
MFCT	Universities	43	19%	25%	81%	11%
	TI institutes	**82**	**28%**	**35%**	72%	15%
	Other institutes	32	19%	0	81%	2%
	SMEs	110	15%	18%	85%	10%
	Large companies	49	8%	25%	92%	24%
ICT	Universities	183	20%	11%	80%	14%
	TI institutes	**167**	**18%**	**17%**	82%	14%
	SMEs	309	7%	0%	93%	13%
	Large companies	124	3%	0%	97%	35%

Source: Technopolis analysis of eCorda data.

The table shows that the TI institutes are the core players in both areas, showing high competence in proposal coordination; in the Manufacturing area, coordination competence is high also among the universities and large companies, and somewhat striking, also among SMEs. However, except for the large companies, in both areas all main stakeholders involved lack in their integration in quality international networks and have success rates for their participations as partners that are below the Norwegian average success rates, i.e. 16 percent for MFCT and 15 percent for ICT.

The two areas where we see the potential for growth in Norwegian participation to be questionable are Energy and Transport. Even though average success rates in the Energy area are (still) relatively good (19%) and higher than the ones in the ICT and MFCT areas (15% and 16%), the drastic drop in these success rates for all stakeholders involved made us conclude that there may be an issue in the alignment of Norwegian R&I competence in the field with the focus and/or nature of R&I in H2020. This picture was confirmed in our analysis of the participations in the energy-relevant EeB PPP and FCH JU.

In the transport area, which is the area with the smallest number of Norwegian proposal participations, we drew a similar conclusion: Norwegian stakeholders with high levels of competitiveness (in this case especially among TI institutes and large companies) that were struggling to keep up their positioning. The average Norwegian success rate in this area was 17 percent.

Table 23 shows that in this case, the issue is not in the lack of integration in competitive international networks: most actors have average or above-average success rates for participations as partners in the proposals. In both areas and for all actors, the flaw is in the competence to act as proposal coordinators. The only exception is for the TI institutes in the Transport area.

Table 23 Norwegian H2020 performance in ENERGY and TRANSPORT by most active stakeholder types.

Subject area	Stakeholder type	Proposal participations	As coordinator		As partner	
			Share of participations	Success rate	Share of participations	Success rate
ENERGY	Universities	40	23%	11%	78%	16%
	TI institutes	**107**	44%	9%	**56%**	**22%**
	SMEs	122	8%	14%	92%	7%
	Large companies	68	0%		100%	22%
TRANSPORT	Universities	17	12%	0%	88%	13%
	TI institutes	**17**	**35%**	**17%**	**65%**	**18%**
	Environmental institutes	23	30%	14%	70%	19%
	SMEs	69	14%	0%	86%	10%
	Large companies	20	5%	0%	95%	25%

Source: Technopolis analysis of eCorda data.

6 FP-related policies and measures

This chapter first recapitulates Norwegian FP-related policies and then compares them to their equivalents in the comparator countries to reveal that Norway clearly stands out in terms of the number and rigour of FP-related policies and strategies of all kinds, both generic and topic area-specific. The next section similarly describes the existing measures designed to facilitate FP-participation of Norwegian actors, followed by a comparison with those of the comparator countries. We conclude that the Norwegian measures in general are more all-encompassing and more generous than those in any of the comparator countries. The full descriptions of the comparator countries' policies and measures are summarised in an appendix, which also takes a look at best practices beyond the comparator countries.

The chapter ends with a summary of a covariance analysis of Norwegian national R&I funding and Norwegian FP participation, which suggests that anticipated changes in national funding levels may encourage compensatory changes in FP demand from Norwegian actors. A more detailed description of this analysis is available in an appendix.

6.1 FP-related policies

6.1.1 Norwegian FP-related policy

This subsection first outlines the development of Norway's overall FP policy and then moves on to policy documents that focus on health, ICT and industry, as far as possible ones that mention FP participation as a means to achieve area-specific objectives.

Although not an EU member state, Norway became associated to the FPs through the European Economic Area (EEA) agreement, which entered into force on 1 January 1994 thus bringing together the EU Member States and three of the European Free Trade Association (EFTA) States (Iceland, Liechtenstein and Norway) in a single market.[38] Norway has thus participated in the FPs since the beginning of 1994, i.e. in FP4.

Norway's financial contribution to the FPs is calculated based on its GDP and it is paid explicitly; the annual cost for participating in H2020 is around €447m.[39] The fact that the cost is explicit and quite substantial has led to a clear policy focus on making the most of the FP association, and a series of research white papers and national strategies have therefore focused on the importance of increasing Norwegian participation to gain as much benefit as possible.

The 2005 research white paper *Vilje til forskning* (Commitment to research) highlighted that internationalisation of Norwegian research is a main objective of the government's research policy, and specifically emphasised the importance of active participation in the FPs.[40] The white paper led to the development of a Strategy for Norway's research collaboration with the EU, which set the objective for the 2007–2010 timeframe that Norwegian organisations should bring back funding from the competitive parts of the FP corresponding to Norway's contribution to the overall FP budget.[41]

The 2009 research white paper *Klima for forskning* (Climate for research) stated that participation in the FPs is a crucial part of the internationalisation of Norwegian research. The white paper reiterated the *juste-retour* objective for the 2007–2010 timeframe from the 2008 strategy, but went on to note that this would be difficult to achieve.[42]

The 2013 research white paper *Lange linjer – kunnskap gir muligheter* (Long-term perspectives – knowledge provides opportunity) confirmed that participation in the FPs is the government's most

38 www.efta.int/eea/eea-agreement, viewed on 25 August 2017.

39 www.regjeringen.no/no/tema/europapolitikk/tema-norge-eu/okonomiske-bidrag/id684932/, viewed on 4 April 2017.

40 St.meld. nr. 20 (2004–2005), *Vilje til forskning*.

41 "Strategi for Norges samarbeid med EU om forskning og utvikling", MER, 2008.

42 St.meld. nr. 30 (2008–2009), *Klima for forskning*.

important instrument for promoting internationalisation of Norwegian research. The white paper clarified that cooperation with Europe is essential, regardless of the form of association that Norway would choose for H2020.[43]

In 2014, Norway decided to associate itself with H2020, and shortly thereafter the government presented its Strategy for research and innovation cooperation with the EU, which set four qualitative objectives:[44]

- Participation shall increase the quality of Norwegian research and innovation and help Norwegian research and innovation succeed internationally
- Participation shall contribute to increased innovation capacity, value creation and sustainable economic development
- Participation shall contribute to improved social welfare and more sustainable social development through research and innovation that enable us to deal with major societal challenges
- Participation shall help to develop our own research and innovation sector, both through further development of policies and instruments and through new patterns of cooperation across national borders, sectors and fields

In addition, the government announced the ambition that Norwegian organisations should bring back two percent of the competitive funds in H2020, while noting that economic factors perhaps should not be the main motive for participation. The strategy concluded that universities and university colleges, research institutes, hospital trusts and the private sector have significant potential for greater participation.

The 2014 white paper *Langtidsplan for forskning og høyere utdanning 2015–2024* (Long-term plan for research and higher education) emphasised the need to reinforce research and education to meet challenges and seize opportunities in the Norwegian knowledge society in the coming decade. The importance of continued internationalisation was stressed, and the white paper noted that for the two percent goal to be reached, the scope of Norwegian activities must increase radically. The white paper concluded that there is an inherent potential to increase the scope of participation in all sectors. In cooperation with RCN, the government therefore was to develop a set of measures and instruments to respond to the needs of various sectors, taking the Strategy for research and innovation cooperation with the EU as a point of departure. The white paper emphasised that different sectors have different needs. Research institutes were described as needing support to meet the gap between costs covered by EC funding and actual costs. Since the institutes play an important role in mobilising industry, support to institutes also was seen as a means of increasing company participation. The higher education (HE) sector and the hospital trusts were described as needing information and support for positioning activities, writing proposals, and establishing and conducting projects. Industry's greatest need was said to be funding to mobilise companies to take part, and assist them in establishing projects.[45]

6.1.1.1 Health-related priorities

The 2009 research white paper *Klima for forskning*, which stated that participation in the FPs is a crucial part of the internationalisation of Norwegian research, specifically pointed out improved health and health services as one of five strategic objectives.[46]

In the 2011 white paper *Nasjonal helse- og omsorgsplan* (National health care plan), the Ministry of Health and Care Services (HOD) stated that it is an objective to strengthen Norway's international research and innovation collaboration bilaterally, through the EU, at the Nordic level and through the World Health Organization (WHO). The white paper explained that systematic work was underway to

43 St.meld. nr. 18 (2012–2013), *Lange linjer – kunnskap gir muligheter*.

44 "Strategi for forsknings- og innovasjonssamarbeidet med EU. Horisont 2020 og ERA" ("Strategy for research and innovation cooperation with the EU. Horizon 2020 and ERA"), MER, 2014.

45 St.meld. nr. 7 (2014–2015), *Langtidsplan for forskning og høyere utdanning 2015–2024*.

46 St.meld. nr. 30 (2008–2009), *Klima for forskning*.

increase Norwegian participation in the FPs and in *randsoneaktiviteter*[47], and that a strategy to engage additional research groups in medicine and health care was to be developed.[48] Annual instructions from HOD to regional health authorities have subsequently included the objective to increase their participation in FP7 and in *randsoneaktiviteter*.

The 2014 white paper *Langtidsplan for forskning og høyere utdanning* 2015–2024, which emphasised the need to reinforce research and education to meet challenges and seize opportunities in the Norwegian knowledge society in the coming decade, stressed the importance of quality and efficiency of health services. To increase FP participation, the white paper suggested that hospital trusts need information and support with positioning activities, to write proposals and to establish and run projects, rather than economic support.[49]

The *HelseOmsorg21* (Health&Care21) strategy was presented to the government in 2014. The strategy forms the basis for long-term, comprehensive development of research, development and innovation in public health and for health and care services, and points to a pent-up potential for international research cooperation and business development in health. The strategy provides a comprehensive picture of key priorities, challenges and capabilities in the Norwegian health sector and related industries. The aim of the strategy is threefold. By supporting R&I, the strategy seeks to contribute to:[50]

- **Better public health** – for individuals and the population as a whole, quality of care, patient safety, user involvement, innovation and efficiency
- **Breakthrough research at a high international level** – research excellence, world-leading research groups, and research in its own right
- **National economic and business development** – profitable and internationally competitive health and care industries, increased foreign investments in health-related R&D and innovation

The three objectives are intended to be complementary and they include several policy areas that are interconnected. The strategy prioritises ten broad but distinct strategic initiatives:

- Increased user involvement
- The health care industry as an industrial policy priority
- Knowledge mobilisation for the municipalities
- Health data as a national comparative advantage
- Improved clinical interventions
- Efficient and effective services
- Meeting global health challenges
- Increased, high-quality internationalisation
- Development of human resources
- Strategic and evidence-informed governance and management

Each of the ten strategic initiatives includes a set of proposed actions and guidelines on how they can be implemented. The Health&Care21 strategy identifies five areas of particular importance for realising the objectives:

47 The word *randsoneaktiviteter* refer to the activities and programmes that lie outside the FPs' core programmes. In FP7, these were the activities and programmes beyond the Cooperation, Ideas, People, Capacities and Euratom core programmes.

48 Meld. St. nr. 16 (2010–2011), *Nasjonal helse- og omsorgsplan (2011–2015)*.

49 St. meld. nr. 7 (2014–2015), *Langtidsplan for forskning og høyere utdanning 2015–2024*.

50 "HelseOmsorg21 – Nasjonal forsknings- og innovasjonsstrategi for helse og omsorg", 2014.

- Knowledge mobilisation for the municipalities with substantial, sustainable R&D funding; establishment of a national registry of municipal health and care services; and universities, university colleges and a new research institute sector that specifically aim to meet municipal needs
- Health care as a focus area of industrial policy with sector-specific measures and greater interaction between the public and private sectors
- Easier access to and increased utilisation of health data
- An evidence-informed health and care system based on user involvement and competence, with greater emphasis on developing new interventions and documenting the impact of these, both at the clinical level and at the organisational and system levels
- A strong commitment to internationalisation and increased participation in the competitive European research system

In 2015, the government presented an action plan to follow up the Health&Care21 strategy, which places responsibilities for forty actions within the ten strategic initiatives of the strategy with specific ministries, mainly HOD and the Ministry of Education and Research (MER). The plan describes both opportunities and challenges for Norway, and stresses the need to strengthen basic health research and research infrastructure. Increased H2020 collaboration is described as a means to achieve this (in line with the government's Strategy for research and innovation cooperation with the EU and the Long-term plan for research and higher education). The action plan explains that RCN's and IN's instruments to stimulate the private sector's engagement in R&D in health and welfare are to be strengthened.[51]

The 2016 *Nasjonal strategi for persontilpasset medisin i helsetjenesten* (Norwegian Strategy for personalised medicine in healthcare) advocates a coordinated knowledge-based development, and aims to pave the way for further R&I. Though not actively promoting it, the strategy points to the opportunities and importance of H2020 participation. The strategy provides recommendations within five areas:[52]

- Expertise and information
- Quality and academic and clinical development
- Health registries
- Information and communication technology (ICT)
- Research and innovation

RCN's comprehensive health R&I policy from 2016 aims to create greater cohesion for the Council's funding and other strategic initiatives in the health field, which in part is to be achieved through promotion of internationalisation of Norwegian health research through participation in H2020. The policy is simultaneously RCN's tool to follow up the Health&Care21 strategy. The policy notes that RCN is the source of only 10 percent of national R&I funding in health, but sees two strategic roles for the Council:[53]

- To promote quality through offering competitive research funding
- To encourage and provide funding for interdisciplinary and intersectoral R&I cooperation between higher education institutions (HEIs), research institutes and hospitals, between specialist and primary care, and between the public and the private sector

In November 2016 RCN launched the HelseOmsorg21-monitor (HO21-monitor) website to provide a one-stop compilation of national statistics on health and care research.[54]

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51 "Regjeringa sin handlingsplan for oppfølging av HelseOmsorg21-strategien", 2015.

52 "Nasjonal strategi for persontilpasset medisin i helsetjenesten 2017-2021", Helsedirektoratet, 2016.

53 "Helhetlig helsesatsing i Forskningsrådet", Policy for forskning og innovasjon 2016–2020, RCN, 2016.

54 www.helseomsorg21monitor.no.

One of the activities in the action plan to follow up the Health&Care21 strategy was to map barriers and latitude to cooperation between HEIs and hospital trusts. In 2015, MER and HOD thus appointed a working group with the mission to identify potential barriers and propose how cooperation could be improved. One of the conclusions was that joint administrative support functions need to be developed to provide support for proposals and project implementation.[55] In 2016, RCN also introduced a new funding scheme, HELSE-EU, with the primary objective to encourage Norwegian health researchers to participate in H2020 (see further Section 6.2.1).[56]

The 2017 white paper *Industrien – grønnere, smartere og mer nyskapende* (The industry – greener, smarter and more creative) (which will be further discussed in Section 6.1.1.3 Industry-related priorities) describes a range of health-related business opportunities for industry.[57]

6.1.1.2 ICT-related priorities

The 2006 ICT white paper *Eit informasjonssamfunn for alle* (An information society for all) emphasised that the FPs is Norway's most important arena for international R&D collaboration, and that it provides opportunities for strengthening Norwegian ICT research and for supporting national priorities.[58] A large number of policy papers have since then pointed to the importance of ICT as an enabling technology, including the aforementioned 2014 white paper *Langtidsplan for forskning og høyere utdanning 2015–2024* and the 2017 white paper *Industrien – grønnere, smartere og mer nyskapende*.

Towards the end of its ten-year VERDIKT programme and as foundation for the development of a successor ICT programme, RCN developed a strategy for ICT R&I that identified six societal challenges that were considered as particularly relevant to the ICT field:[59]

- Environment and climate
- Health and welfare:
- Public sector
- Societal security
- Culture and learning
- Strategic industries

The strategy also identified seven knowledge areas:

- Components and systems
- Robotics, automation and smart environments
- Next-generation computer systems
- Communication technology and infrastructure
- Technologies for digital content
- Software and services
- Man, society and technology

The first five of these knowledge areas coincide with the Key Enabling Technologies (KET) of H2020, whereas the sixth is more specific to Norway and the seventh includes issues other than purely technological ones. Based on these analyses, the strategy further identified four research areas at the intersection of social challenges and knowledge areas as candidates for thematic prioritisation by RCN:

55 "Samordning mellom universiteter og helseforetak. Identifikasjon av utfordringsbilder med forslag til løsninger", RCN, 2016.

56 www.forskningsradet.no/en/Funding/HELSEEU/1254020093505?lang=en.

57 St.meld. nr. 27 (2016 – 2017), *Industrien – grønnere, smartere og mer nyskapende*.

58 St.meld. nr. 17 (2006–2007), *Eit informasjonssamfunn for alle*.

59 "Veien videre for IKT-satsing i Forskningsrådet", RCN, 2013.

- Complexity and robustness: This research area is about the complexity and robustness of the interaction between humans and machines, and the interaction between technology and society
- Data and services everywhere: This research area is about the use and availability of data and services everywhere in society
- A safe information society: This research area is about security, vulnerability, preparedness and privacy
- ICT borderline: This research area is about the great potential of the interaction between ICT and other technologies, such as nanotechnology and biotechnology

Later the same year, the government's National strategy for ICT R&D 2013–2022 identified three broad priority areas:[60]

- ICT R&D of high international quality
- Industrial development and valorisation
- Important societal challenges

The strategy identified the following actions to achieve ICT R&D of high international quality:

- Investments in basic ICT R&D relevant across sectors and fields of application
- Strengthening of the integration between basic ICT R&D and sector-specific and thematic R&D
- Ensuring that Norway has sufficient ICT competence at high level
- Increased emphasis on international collaboration

To achieve increased industrial development and valorisation with ICT R&D there was a need for:

- ICT R&D aimed at fields where there is industrial need – from present and future enterprises
- Instruments that stimulate industrial development and valorisation, and that facilitate additional ICT R&D in industry

Three societal challenges were highlighted as depending on ICT R&D and where Norway has specific national needs:

- Information security
- Public sector and infrastructure
- Health and welfare

The 2016 white paper *Digital agenda for Norge* (Digital agenda for Norway) sets five key priorities:[61]

- A user-centric focus
- ICT constitutes a significant input fact for innovation and productivity
- Strengthened digital competence and inclusion
- Effective digitisation of the public sector
- Sound data protection and information security

The white paper emphasises that ICT competence and ICT research constitute fundamental preconditions for the digitisation of Norway, and present opportunities in both the health sector and for industry. The white paper underlines that the government expects both the public and the private sectors to make more of the opportunities offered by H2020.

60 "Strategi 2013–2022. Nasjonal strategi: IKT-forsking og -utvikling", Ministry of Government Administration, Reform and Church Affairs (FAD), 2013.

61 St. Meld. Nr. 27 (2015–2016), *Digital agenda for Norge*.

The R&D strategy 2015–2020 of the Ministry of Local Government and Modernisation (KMD) outlines general knowledge needs within public management policy and digitisation, and ICT as a strategic tool in societal development.[62]

The R&D strategy 2015–2020 of the Ministry of Transport and Communications (SD) emphasises the opportunities offered by and the importance of participating in H2020 and *randsoneaktiviteter*. The strategy further points out the importance of VERDIKT's successor IKTPLUSS that the ministry co-funds.[63]

The 2017 white paper *Industrien – grønnere, smartere og mer nyskapende* also highlights ICT as an enabling technology (though not specifically in connection with H2020).[64]

6.1.1.3 Industry-related priorities

The government's 2014 Strategy for research and innovation cooperation with the EU noted that Norway's industrial structure makes it challenging to achieve high FP participation, since the nation's three largest export industry sectors (oil and gas, suppliers to the oil and gas industries, and fisheries) are not represented in the thematic objectives of H2020. The strategy also noted that business participation is lower in Norway than in the other Nordic countries.[65]

As mentioned above, the 2014 white paper *Langtidsplan for forskning og høyere utdanning 2015–2024* stated that there is potential for all sectors to increase FP participation, and concluded that industry's greatest need in this respect is funding to mobilise companies to take part and to assist them in establishing projects. The white paper also stressed the importance of increased FP participation as a means of enhancing industry's competitiveness.[66]

While advocating internationalisation of research as a means to foster enhancement of Norwegian competitiveness, the government-appointed Productivity Commission's second report criticised the Norwegian focus on financial return since, it argued, the focus on applied research in the FPs, ERC excluded, is detrimental to research quality.[67]

The aforementioned 2017 white paper *Industrien – grønnere, smartere og mer nyskapende* explains that Norway's competitiveness depends on its ability to use and exploit R&D results and technology developed in other countries, and states that FP participation is a means of facilitating this. The white paper argues that there is scope for increasing industry's H2020 participation in order to foster innovation capacity, value creation and sustainable economic development, including for SMEs. It also argues for effective cooperation between RCN and IN, in particular when it comes to SMEs. The strategy reiterates the two percent overall objective for Norwegian participation.[68]

6.1.2 Comparison of FP-related policies

We have studied national FP-related policy documents also for the five comparator countries. In the name of readability, we only compare a few select characteristics of the six nations' policies in this subsection; the findings in full are available in Appendix C. The characteristics selected are:

- Overall emphasis on H2020 participation
- H2020 participation objectives
- Emphasis on H2020 participation by industry

62 "Forskning- og utviklingsstrategi (FoU) 2015-2020", KMD, 2015.

63 "FoU-strategi for Samferdselsdepartementet 2016–2022", SD, 2015.

64 St.meld. nr. 27 (2016 – 2017), *Industrien – grønnere, smartere og mer nyskapende*.

65 "Strategi for forsknings- og innovasjonssamarbeidet med EU. Horisont 2020 og ERA", MER, 2014.

66 St.meld. nr. 7 (2014–2015), *Langtidsplan for forskning og høyere utdanning 2015–2024*.

67 "Ved et vendepunkt: Fra ressursøkonomi til kunnskapsøkonomi", Produktivitetskommisjonens andre rapport, NOU 2016:03.

68 St.meld. nr. 27 (2016 – 2017), *Industrien – grønnere, smartere og mer nyskapende*.

- Emphasis on H2020 participation within health
- Emphasis on H2020 participation within ICT

Table 24 provides a simplistic overview of the six nations' policies. It should be noted that Norway clearly stands out in terms of the number and rigour of FP-related policies and strategies of all kinds, both generic and area-specific.

Except for participation objectives, these qualitative assessments in the table represent our *interpretations* of the sets of policies of each country. This means that the table should be interpreted with some caution. Having said that, we nevertheless conclude that in five of the six countries, the importance of FP participation is clearly or very clearly emphasised, with Norway and the Netherlands appearing to place the strongest emphasis on participation. The outlier is Sweden, where research white papers indeed state that FP participation is important, but compared to the five other countries the emphasis is weak, and the historically successful Swedish FP participation seems taken for granted. Moreover, all countries but Sweden have set quantitative objectives for the nation's participation. Whereas Norwegian and Austrian policies clearly formulate their objectives as a percentage of the competitive funding available in H2020, Danish and Dutch policies refer to total H2020 funding; however, it is quite possible that also the Danish and Dutch policies refer to the competitive funding available, but merely use less precise language.

The extent to which the three topic areas of this study are specifically emphasised in policy documents varies. That all three areas are emphasised in Norwegian policy documents is natural, but only the Netherlands has singled out the same three areas (among several others). In the remaining four countries, health is also specifically emphasised in Denmark, ICT in Austria, and industry in Finland. In Sweden, a bottom-up approach indirectly seems to be preferred, since none of the three areas is specifically singled out.

Table 24 Overview of FP-related policies in Norway and its comparator countries.

	Norway	Sweden	Denmark	Finland	Austria	Netherlands
Overall emphasis on H2020 participation	Very strong emphasis on participation; message is loud, clear and consistent	Weak; participation is considered important, but seems taken for granted	Strong emphasis on increasing participation in relation to previous FPs	Strong emphasis on increasing participation in relation to previous FPs	Strong emphasis on participation; part of overall government R&D strategy	Very strong emphasis on maintaining high level of participation
H2020 participation objectives	2% of competitive funding to Norway	Maintain or increase already high level of participation	2.5% of total funding to Denmark	Increase amount of funding to Finland by 50% compared to FP7	2.5% of competitive funding to Austria	7% of total funding to the Netherlands
Emphasis on H2020 participation within health	Clear national priority; limited focus on participation	None, but participation encouraged	Clear national priority; increased participation encouraged	None, but participation encouraged	None, but participation encouraged	Strong focus on participation through sector-based policy linked to H2020 pillars
Emphasis on H2020 participation within ICT	Clear national priority; some focus on participation	None, but participation encouraged	Increased participation encouraged	None, but participation encouraged	Clear national priority; strong focus on participation	Strong focus on participation through sector-based policy linked to H2020 pillars
Emphasis on H2020 participation by industry	Clear national priority; increased participation encouraged	None, but participation encouraged	Limited focus on participation	Priority, especially SMEs	Industrial R&D strong national priority; participation encouraged	Strong focus on participation through sector-based policy linked to H2020 pillars

6.2 Measures to stimulate FP participation

6.2.1 Norwegian FP-facilitation measures

The main agency tasked with facilitating FP participation is RCN. The Norwegian part of the pan-European network of National Contact Points (NCP) is led by RCN, apart from the SME instrument and Access to risk finance that are the responsibilities of IN, and space-related matters that are handled by the Norwegian Space Centre (NSC). Together these agencies provide elaborate information and advisory services, mainly through NCPs covering all H2020 sub-programmes. IN also hosts the Enterprise Europe Network (EEN) in Norway, which assists SMEs with partnership search, reviews proposal drafts, advices on business-related matters and provides support to innovation. Together, the NCPs and IN's regional EU advisors located throughout Norway provide comprehensive information on FP opportunities and advice regarding FP participation, both in the form of seminars and courses and in individual interaction.

Moreover, RCN's new competence-building initiative for H2020 proposers, the Path to EU Excellence, provides a comprehensive course offering to researchers, EU advisors and administrators, see Figure 109.

Figure 109 Overview of RCN's Path to EU Excellence competence-building initiative.

Source: www.forskningsradet.no/prognett-horisont2020/Courses_and_help_with_proposals/1254022852485, viewed on 30 October 2017.

The objective of Path to EU Excellence is to enable Norwegian proposers to submit more proposals, and proposals of higher quality, through a combination of courses and support in the proposal development phase. RCN thus offers mentoring in developing H2020 proposals, including review of proposals. The

target groups for these services are mainly proposers from industry and the public sector, but also researchers from research institutes and universities with limited internal support capacity.

RCN's financial support measures to increase H2020 participation are structured into four categories, namely:

1. Funding to influence H2020-related processes and calls for proposals:
   - Project establishment support (*Prosjektetableringsstøtte*, PES2020)
   - Several of RCN's R&D programmes, including BIOTEK2021, ENERGIX, Transport 2025 and User-driven Research-based Innovation (*Brukerstyrt innovasjonsarena*, BIA) offer funding for pro-active H2020 activities, and so do the seven Regional Research Funds (*Regionale Forskningsfondene*, RFF)
2. Funding to find H2020 calls and partners:
   - PES2020 funds travel to H2020-relevant events
   - RCN funds a number of national EU networks that aim to increase H2020 participation through increasing competence, improving collaboration between key actors, learning and sharing of good practice and development of alliances
3. Funding to produce H2020 proposals:
   - PES2020 funds H2020 proposal production
   - HELSE-EU funds national collaboration on strategic health topics with the aim of producing H2020 proposals, and also funds proposers who have finished on the Commission's reserve list and that want to submit a revised proposal
   - The FRIPRO R&D programme funds proposers who have made it to ERC stage 2 without being funded and that wish to submit a revised proposal
4. Co-funding to H2020 participants (i.e. organisations that have received H2020 funding):
   - STIM-EU provides research institutes with funding in proportion to H2020 funding already awarded
   - Several of RCN's R&D programmes, including KLIMAFORSK, BIONÆR and BEDREHELSE, provide funding to Norwegian participants for additional activities in selected H2020 sub-programmes, in order to get more impact from the H2020 project

For simplicity, the listing above merely mentions "H2020", but many of these measures are not strictly limited to H2020, but also fund activities to participate in programmes and actions co-funded by H2020, such as Article 185, ERA-NET Cofund and JTIs.

One of the two most important financial support measures is PES2020, which was launched as PES in 2006 and subsequently greatly expanded during FP7. An evaluation concluded that PES had been very effective during FP7.[69] Within category 1 above, PES2020 funds projects with up to NOK1m for up to three years. In category 2, PES2020 reimburses travel costs up to NOK100k. However, the bulk of the annual PES2020 budget (NOK128.5m in 2017) goes to category 3, i.e. funding to produce proposals. PES2020 was modified in May 2017. Until May 2017, companies and research institutes got up to 50 percent of their costs covered. Salary costs were not eligible for public servants, unless replacement staff was hired. Since May 2017, PES2020 support is disbursed as a lump sum and costs need not be reported. Some sample support amounts according the previous and the new rules include:[70,71]

- Coordinators of proposals for Research and Innovation Actions (RIA):

[69] T. Åström, A. Håkansson, G. Melin, P. Stern, P. Boekholt and E. Arnold, "Impact evaluation of the Research Council of Norway's support measures to increase participation in EU-funded research", RCN, 2013.

[70] "Prosjektetableringsstøtte – PES2020, Horisont 2020", RCN, 2016.

[71] "Prosjektetableringsstøtte – PES2020, Horisont 2020", RCN, 2017.

  - Until May 2017: NOK200k, plus NOK50k if the proposal reaches the assessment threshold and another NOK50k if the proposal is funded (maximum amounts)
  - Since May 2017: NOK400k, plus NOK100k if the proposal reaches the threshold (lump sum)
- Proposal participants:
  - Until May 2017: NOK40k, plus NOK10k if the proposal reaches the threshold and another NOK10k if the proposal is funded (maximum amounts)
  - Since May 2017: NOK50k, plus NOK10k if the proposal reaches the threshold (lump sum)
- Work package leaders:
  - Until May 2017: NOK40–60k, plus NOK10k if the proposal reaches the threshold and another NOK10k if the proposal is funded (maximum amounts)
  - Since May 2017: NOK70k, plus NOK10k if the proposal reaches the threshold (lump sum)

All these three categories of PES2020 support require that a proposal is submitted to RCN, and funding in category 3 is contingent on the H2020 proposal being deemed eligible. Frequent H2020 proposers among HEIs, research institutes and hospital trusts may receive an annual PES2020 grant, the size of which depends on the organisation's request and its past FP performance; around 70 percent of the PES budget goes to such annual grants. In 2017, 17 HEIs, 33 research institutes and four hospital trusts have such annual grants that are internally distributed to the organisation's proposers. Since 2016, HEIs may use the annual grant to strengthen their internal EU support functions (also referred to as grants offices, international offices, EU offices etc.; in most cases, these internal support functions have a broader remit than EU programmes, but it seems a fair bet that EU-related funding opportunities take up most of their time).

The other of the two most important financial support measures is STIM-EU, which was established in 2012. Since 2015, STIM-EU provides research institutes with an extra 33 percent in funding in addition to H2020 funding already awarded. There is no requirement that the support should be used to co-fund the H2020 project(s) in question, but most institutes report to RCN that the majority of the STIM-EU funding is indeed used for this purpose. Institutes that are eligible to receive RCN funding are also eligible for STIM-EU funding, in practice meaning those are part of the national research institute base funding system that RCN administers, plus five additional institutes.[72] Support is calculated based on funding received for RIAs, Innovation Actions (IAs), Coordination and Support Actions (CSAs), Marie Skłodowska-Curie Actions (MSCAs) and European Research Council (ERC) grants, as are actions that receive part of their funding from H2020, including JTIs. Institutes do not need to apply for STIM-EU funding, since RCN calculates the eligible amounts based on eCorda data. In addition to the 33 percent, institutes that participate together with Norwegian companies, Norwegian public-sector organisations, or that coordinate projects receive extra funding (partnering with Norwegian companies counts for double as much as partnering with public-sector organisations or coordinating).[73]

In FP7, IN's FP-related support measures were limited to the EEN mentioned above, but since H2020 is more innovation-oriented IN has enlarged its portfolio of support measures targeting companies and in particular SMEs:

- Through the EC's Seal of Excellence scheme, IN provides funding to Norwegian SMEs whose proposals to phase 1 of H2020's SME instrument scored above the quality threshold but did not receive EU funding due to budgetary constraints. (Stage 2 projects are not funded by IN)
- All SMEs that have received EC funding in phase 1 of H2020's SME instrument get a key account service from IN throughout the project and 12 days of external expert advisory services

72 "STIM-EU, forskningsinstitutter som kan benytte ordningen", RCN.

73 "STIM-EU Tiltak for økt deltakelse av forskningsinstitutter i EUs rammeprogram. Retningslinjer for ordningen", RCN, 2016.

- Through a competitive measure, IN co-funds EU advisors within clusters funded through the Norwegian Innovation Clusters programme (that IN leads together with RCN and the Industrial Development Corporation of Norway (Siva))
- IN provides companies with advice on loans through the European Investment Fund (EIF) and the European Investment Bank (EIB)

6.2.2 Comparison of FP-participation support measures

Just as for FP-related policies, we have also studied FP-participation support measures in the five comparator countries; the findings in full are reported in Appendix C. To facilitate comparability, we focus our comparison on five dimensions, namely:

- Advisory services
- Funding for proactive actions to influence calls
- Funding to find calls and partners
- Funding to produce proposals
- Co-funding for FP participants

Table 25 provides a simplistic overview of the six countries' support measures. When it comes to advisory services all six countries pretty much offer the same type of support, which is natural since they are generally built around the EC-initiated NCP and EEN networks. There are of course some national variations in emphasis and support structure, but they generally seem small. However, RCN's new Path to EU Excellence competence-building initiative mentioned above may be setting a new standard in this respect. To an increasing extent, advisory functions are established within frequent FP participants. In all six countries, universities and larger research institutes, and in some cases companies (in Norway also hospital trusts), have long since established internal EU support functions. Since these units have been established organically there is no single model, but we know from previous studies that they generally have become more competent and professional with time. It is quite common that such units collaborate with each other in more or less formal networks, at least nationally, so as to share experiences and best practices. As far as we have been able to ascertain, these units do not receive any earmarked government funding in any of the comparator countries. Instead, they use part of the organisations' base grant since they apparently consider such units to be strategically important. An interesting development is that universities and research institutes in some countries have tried their own financial support measures, albeit offering rather humble grants compared to those offered by government agencies. However, our studies of the comparator countries have only included some sample universities, meaning that we do not know the extent of this development, but if this is a trend it may signal an unsatisfied need.

When it comes to financial support measures from government agencies (or directly from ministries), we see from Table 25 that each of the four categories of financial support is available in at least one of the comparator countries, but in most cases with restrictions. It is an inescapable conclusion that the Norwegian measures in general are more all-encompassing and more generous that in any of the comparator countries. It is also worth noting that there seems to be a trend in the comparator countries to gradually focus, or phase out, financial support measures that existed in previous FPs, whereas the development seems to go in the other direction in Norway. It may be argued that using RCN's own characterisation of financial support measures as a template for the comparison results in a skewed picture, but we have not found any financial support measure in the comparator countries that does not fit this template.

Table 25 Overview of FP-participation support measures in Norway and its comparator countries.

	Norway	Sweden	Denmark	Finland	Austria	Netherlands
Advisory services	Yes, through NCPs and EEN	Yes, through NCPs and EEN, as well as for SMEs through the EUSMESupport2020 support office	Yes, through NCPs and EEN, as well as through the EU-DK Support network	Yes, through NCPs, EEN and EU R&D secretariat	Yes, through NCPs and EEN	Yes, through NCPs and EEN
Funding for proactive actions to influence calls	Yes	Yes	No	No	No	No
Funding to find calls and partners	Yes, travel grants	Yes, travel grants to SMEs	No	No	No	No
Funding to produce proposals	Yes	Yes, in selected sub-programmes	Yes	Yes, for large projects with at least two Finnish participants	No	No
Co-funding for FP participants	Yes, mainly for research institutes, but also for other actors in selected sub-programmes	No	No	Yes, for projects in Societal Challenges	No	Yes, for HEIs and research institutes, and in selected sub-programmes

6.2.3 *Best practices for supporting FP participation*

Our examination of best practice among the comparator countries and other high-performing Member States that is reported in Appendix C, reveals a trend away from generic support towards more targeted support that focuses on specific areas of need. These areas of need variously include: addressing perceived under-performance in H2020 sub-programmes, increasing the internationalisation of the research base, or increasing the participation of existing clusters or certain types of organisations (such as SMEs or Universities of Applied Sciences). Few support measures other than the NCPs appear to be aimed at supporting the participation of government actors in the FPs.

Though the advisory services offered are generally similar, being based largely on the EC's NCP and EEN networks, there are examples of the trend away from generic support in a number of areas. First, there is clear emphasis in the comparator countries and other high-performing Member States on the visibility and connectedness of Member States' NCP networks, particularly with a view to ensuring that the advisory networks are able to reach and help the full range of target stakeholders, from HE institutions and research organisations to businesses. Among other advisory services, we observe a general trend toward more value-added services, such as in-depth advice and training, sometimes targeted at specific groups (e.g. Austria's in-depth training through its FFG Academy in how to write competitive ERC proposals, Sweden's EUSMESupport2020, Ireland's multi-disciplinary industry team). In the case of Austria, advisory support has received increased resource via the reallocation of national budgets away from financial support to applicants.

The trend away from generic support is also evident across the types of financial support offered in the comparator countries and other high-performing Member States.

Funding for proactive actions to influence calls is largely based on investments in specific activities rather than grants. In addition to establishing (or continuing to fund) offices or other functions in Brussels to support the positioning of their research within European policy (e.g. the Netherlands Neth-ER, Finland's FiLi), several Member States have established senior national groups to drive the strategic approach to influencing calls (e.g. Denmark's Strategic Reference Groups) and pursuing opportunities (e.g. Sweden's national coordination committee, Ireland's High-Level Group). Some Member States additionally take a national approach to coordinating involvement in, for example, the ERA-NETS (the Netherlands, Portugal).

There are few variations in the funding for applicants to find calls and partners, though while some Member States offer specific (small) grants for travel and accommodation costs, others integrate this within their targeted funding to support the production of proposals (e.g. Germany).

Funding to support applicants in the preparation of proposals remains the most common form of support among the broader group of Member States examined for this review. Increasing industry participation is a widely-held goal, and in general, funding to produce proposals is available to a broad range of organisations on a differentiated basis (higher education institutions, research organisations and businesses). In some cases, the inclusion of an SME in the consortium is an eligibility criterion for receiving the support. Overall, funding is most commonly made available to support particular types of activity, with "generic" proposal presentation support rather rare. For example, some Member States offer funding to specifically support project coordinators (e.g. Ireland) or the preparation of large proposals (e.g. Finland's Tekes support for the preparation of large projects). Others offer support to foster the participation of existing networks or clusters in H2020 (e.g. Denmark's Horizon 2020-NET, Finland's Tekes support for existing innovation clusters, France's MRSEI) or the participation of particular types of organisation (e.g. Germany's support to the Universities of Applied Science). There are examples of support to foster internationalisation among specific groups or partners (e.g. Germany, Poland's "Grants for Grants"), and for proposals under specific sub-programmes (e.g. Sweden, Ireland's support to ERC applicants).

6.3 Covariance between Norwegian FP participation and national R&I funding

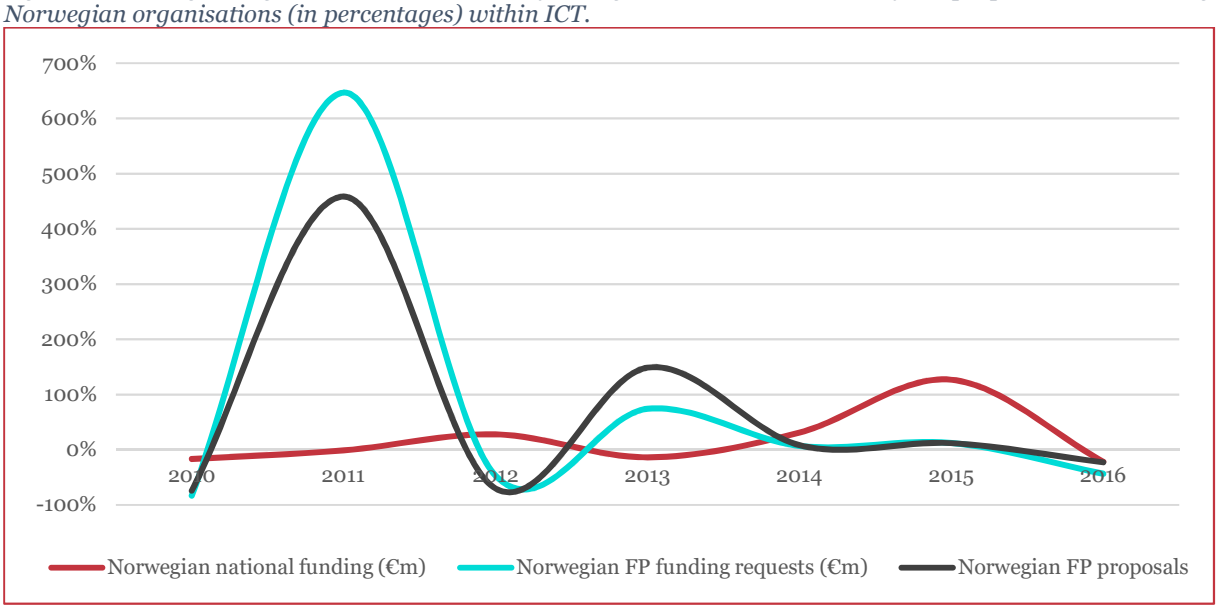
Using data on Norwegian national funding and FP proposal data, we have looked for evidence of changes in national funding having a behavioural effect on Norwegian organisations with respect to their level of

participation in FP7/H2020 proposals. Our analyses are described in full in Appendix E, and in this sub-section we only report on the main findings.

Norwegian ICT-, health- and industry-related research (combined) have seen national funding increase by around 85 percent in the period 2009–2015, with health and industry research in particular receiving significant levels of national funding (€308m and €337m on average each year, respectively). National funding for ICT is much lower (€86m per year on average) and, in contrast with the other two areas, this area has consistently seen demand for EC funding that greatly exceeds national funding. This suggests that Norwegian ICT research is much more dependent on European rather than national funding, in particular when compared with Norwegian health research.

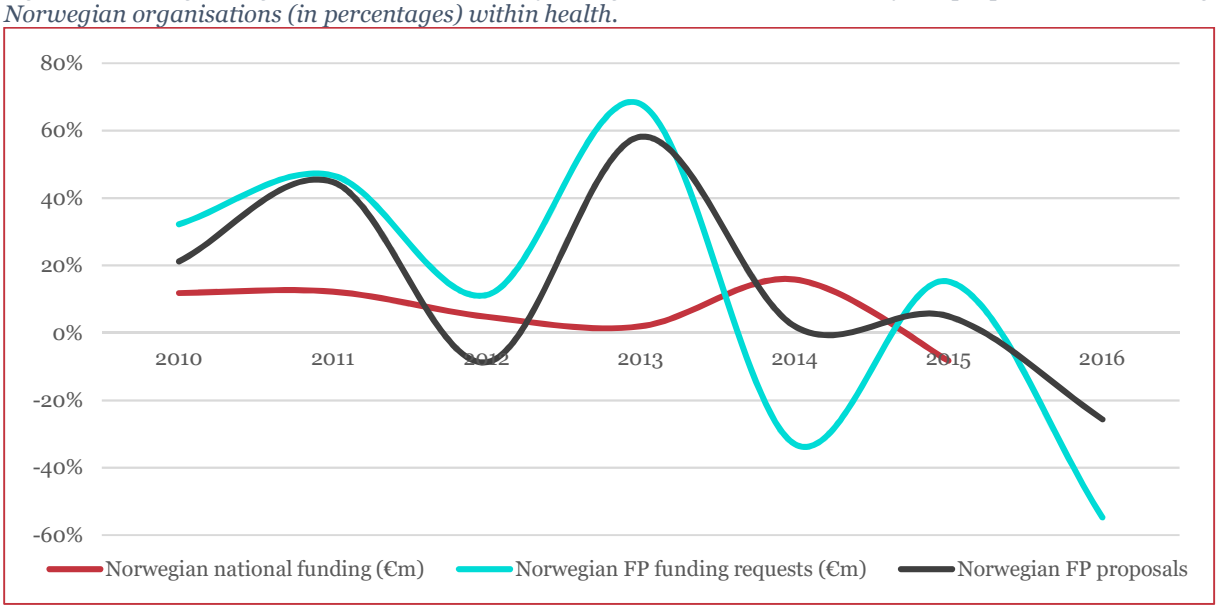
We found that in the one year that there was a decrease in total national funding (from €578m in 2010 to €550m in 2011) there was a spike in both FP proposals and total FP funding requests. By plotting annual changes in national funding against annual changes in either FP proposals or FP funding requests, our evidence suggests that the two often move counter to each other across each of the three areas, see Figure 110–Figure 112. Thus, when national funding in an area increases (or increases more rapidly) in a year, FP proposals and EC contributions in the area tend to decrease (or increase more slowly), and vice versa. This suggests that anticipated changes in national funding levels may have encouraged compensatory changes in FP demand from Norwegian actors. Statistical analysis (pair-wise correlation) confirms this visual assessment of a negative correlation between Norwegian funding and FP demand in each of these areas, although there are not enough values to test the significance of this correlation.

Figure 110 Yearly change in the value national funding and in number/value of FP proposals submitted by Norwegian organisations (in percentages) within ICT.



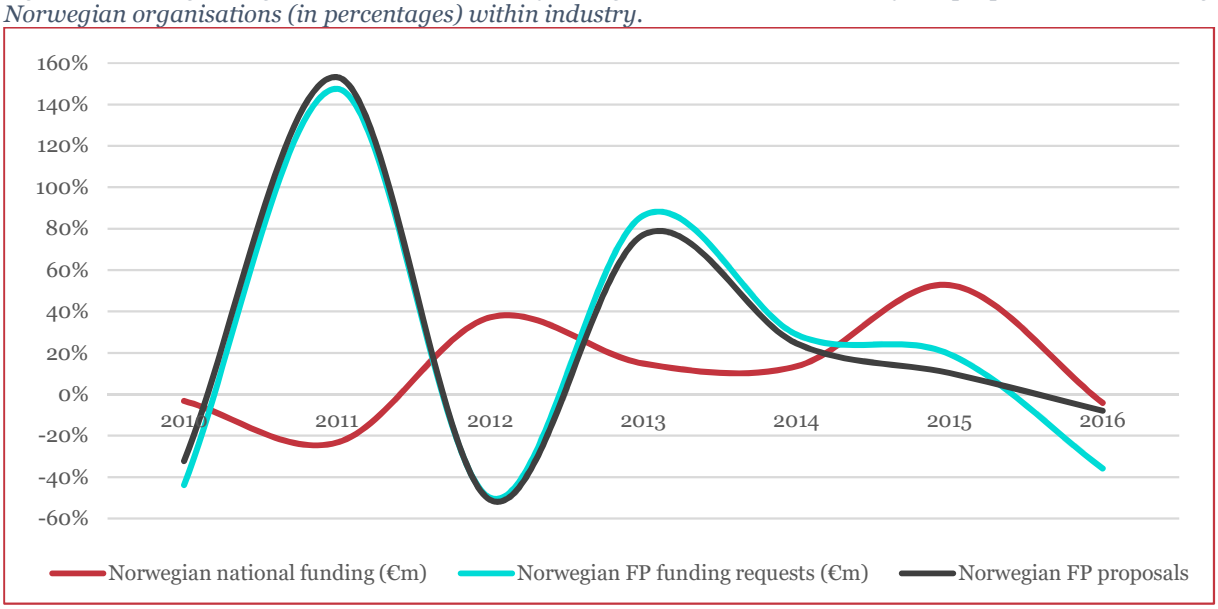
Source: Technopolis analysis of Norwegian funding and eCorda data.

Figure 111 Yearly change in the value national funding and in number/value of FP proposals submitted by Norwegian organisations (in percentages) within health.



Source: Technopolis analysis of Norwegian funding and eCorda data.

Figure 112 Yearly change in the value national funding and in number/value of FP proposals submitted by Norwegian organisations (in percentages) within industry.



Source: Technopolis analysis of Norwegian funding and eCorda data.

7 Participants' and non-participants' views

This chapter presents the main findings from our investigation to identify the most important barriers and deterrents to Norwegian FP participation. The main source of empirical data is a set of web surveys responded to by Norwegian FP participants and non-participants (i.e. RCN beneficiaries within the three topic areas that have not yet participated in a proposal to the FPs). The surveys have been supplemented by pre- and post-survey interviews, which have informed the survey design, as well as the interpretation of the survey results. This chapter also presents FP participants' and potential FP participants' assessments of the effectiveness and user-friendliness of the present national support system, including their suggestions for improvements. A more comprehensive presentation of the survey results is available in Appendix B.

When it comes to barriers to H2020 participation, there is a striking consensus among respondents that the main barriers are lack of time and perceived complex rules for H2020 participation. Among researchers in public R&D organisations, every other believes that the financial incentives for the organisation to participate are weak. Roughly a third of respondents finds that there is a lack of individual incentives, that management discourages participation, and that the organisation lacks EU support function or that the existing one is inadequate. Multi-partner coordinators in general experience barriers to a lesser degree. Participants in health and ICT do not stand out from the overall picture, but by examining responses from hospital trusts separately, we see that respondents perceive barriers to a higher degree than all other actor types. The main barriers experienced by companies (except the top-rated barriers which are shared by all) are lack of internal EU support function and identification of relevant calls.

The most prominent deterrents restricting participation are the perceptions that it is time consuming to produce H2020 proposals and that H2020 success rates are low. H2020 participants in general identify deterrents to a lesser degree and multi-partner coordinators even less so. Project administration is considered burdensome by many, but participants are less discouraged by it compared to non-participants. Low cost coverage is an issue that in general is rated higher by respondents in institutes, who also agree that RCN's more favourable cost coverage discourages institutes from H2020 participation. Participants in health or ICT do not stand out from the overall picture in terms of deterrents, although it is clear that funding conditions within the regional health authorities in Norway have a significant discouraging effect on H2020 participation for researchers in hospital trusts.

FP participants are in general satisfied with the available H2020 support services and measures, but some measures seem to be unknown by many respondents. PES2020/Helse-EU is widely used by all actor types, but most frequently by multi-partner coordinators, the most common criticism is that the level of support is inadequate. PES2020 support to produce proposals along with STIM-EU and RCN's support to proactively influence EU-level processes are all rated as effective by a majority of respondents. However, there seems to be a relation between how well-known a measure is and its perceived effectiveness, for which reason we propose careful interpretation of these results.

7.1 Survey methodology

7.1.1 Selection and categorisation of survey population

In June 2017, there were 8,070 unique Norwegian participants in FP7/H2020 projects and proposals in eCorda (based on e-mail addresses). Of these, we selected 5,061 FP contacts who had been active in one of our three topic areas. These were "tagged" against the following three groups:

- 1,541 involved in ICT (or ICT + industry) proposals/projects
- 936 involved in health (or health + industry) proposals/projects
- 1,568 involved in "pure" industry proposals/projects

In addition, we identified beneficiaries of Norwegian national funding from RCN's and the regional health authorities' project databases, which had received funding relevant to any of the three topic areas,

but that had not participated in a proposal to the FPs. After excluding individuals recorded in eCorda from the lists of national beneficiaries, 2,974 contacts remained, who were tagged against the same three thematic groups:

- 644 involved in ICT (or ICT + industry) projects
- 828 involved in health (or health + industry) projects
- 1,502 involved in "pure" industry projects

Based on information from RCN and eCorda, we categorised these individuals in the following actor types: SMEs, large companies, health trusts, public administration, research institutes, HEIs and other (the last category ended up not being used due to very few responses, but they are accounted for in the overall analyses).

Finally, the population was categorised into five groups (see below) based on FP participation history. These groups received tailored variations of the survey, but all varieties essentially contained the same questions on FP-participation barriers and deterrents. Some questions that were not relevant to the non-participants were excluded from their survey.

Group 1: H2020 project participants (N=378)
Norwegian participants in H2020 projects in (at least) one of the three topic areas. These individuals may also have participated in other areas of H2020.

Group 2: FP7 project participants that have been unsuccessful in H2020 (N=72)
Norwegian participants in FP7 projects in one of the three topic areas, who have then submitted at least one proposal to H2020 in their topic area, but so far have been unsuccessful. These individuals may also have participated in other areas in FP7. They may also have submitted proposals to other areas in H2020, but these must also have been unsuccessful. This group was eventually merged with group 3 due to few responses (a result of a relatively small population and a low response rate).

Group 3: Unsuccessful proposers to FP7/H2020 (N=3,976)
Norwegian individuals that have submitted proposals to FP7 and/or H2020 in one of the three topic areas, but that have never been successful (i.e. never been a participant in a project in their topic area). Individuals who have participated in FP projects in another area were excluded from this group. Out of the 3,976 individuals, 1,000 were randomly selected to be invited to respond to the survey.

Group 4: FP7 project participants that have not submitted a proposal to H2020 (N=459)
Norwegian participants in FP7 projects in (at least) one of the three topic areas, who have not yet submitted an H2020 proposal in their topic area. These individuals may also have participated in FP7 projects in another area, but if they have submitted an H2020 proposal in another area they were excluded from this group.

Group 5: Non-participants, i.e. individuals that have not submitted a proposal to FP7/H2020 (n=2,974)
Norwegian actors that have received national R&D funding of more than NOK0,5m relevant to any of the three topic areas, but not been active in FP7 and/or H2020. Individuals were categorised as non-participants if they existed in the RCN database but not in eCorda. The comparison was made on individuals meaning that another individual in the same organisation may have participated in a FP proposal or project. Out of the 2,974 individuals, 1,000 were randomly selected to be invited to respond to the survey.

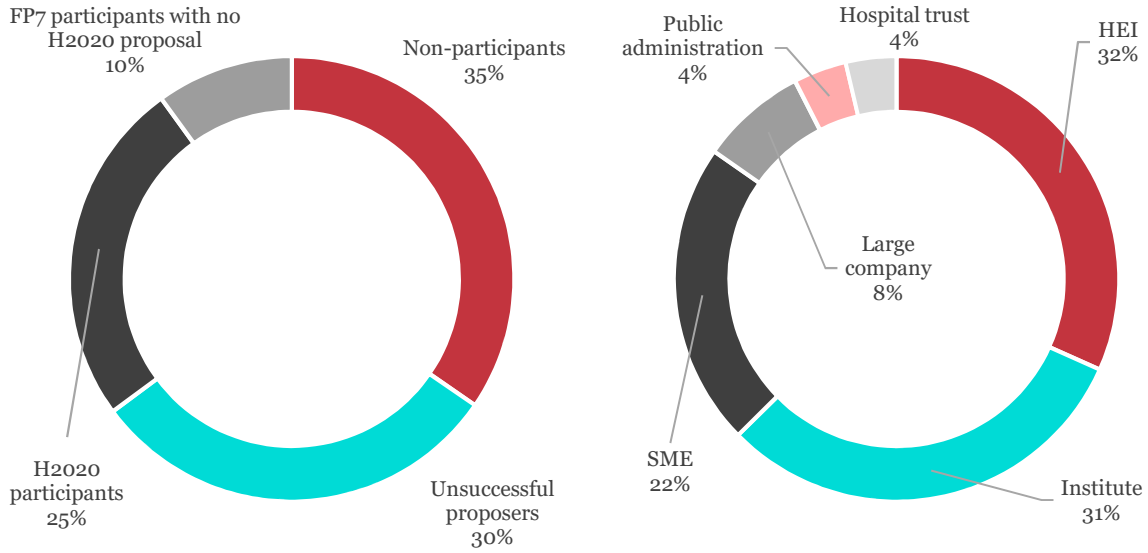
7.1.2 On the respondents

As the respondents had been pre-categorised by us, the first question in the survey was a control question on whether the respondent had been correctly categorised. If the answer was no, the respondent was "disqualified" from the survey. We are aware of that the eCorda database contains inaccuracies and this was our method of quality assuring our categorisation of respondents. However, we were caught by surprise by how many respondents that turned out to be disqualified in several

participation groups. For H2020 project participants the "disqualification rate" was a mere 1 percent, but it was 30 percent among non-participants. Consequently, this process unfortunately rendered a significant loss in possible respondents.

The five surveys were sent to a grand total of 2,909 individuals. The response rate (before disqualification) varied significantly between groups. It was the highest (37%) among H2020 project participants and the lowest (19%) among unsuccessful proposers. In total, the surveys yielded 552 responses, with an average internal drop out of 16 percent per question. Figure 113 illustrates the distribution of respondents in terms of H2020 participation history and by actor type. Respondents with no activity in H2020 make up 45 percent of the total (non-participants and FP7 participants), 30 percent are unsuccessful proposers, and 25 percent are H2020 project participants. The three most common actor types are HEIs, research institutes and SMEs, that together constitute 84 percent of all respondents. All actor types are somewhat evenly distributed over the different participation categories, except for hospital trusts which are only represented by unsuccessful proposers and non-participants.[74] In addition, a majority of respondents find the Societal Challenges pillar most relevant, followed by Excellent Science (31%) and Industrial Leadership (19%). The share of individuals who acted as coordinators of in their most recent multi-partner project or proposal is 28 percent, and an additional 8 percent of respondents led a project involving only one organisation (their own).

Figure 113 Survey respondents by H2020-participation history and actor type.



Source: Web surveys.

7.2 Barriers to H2020 participation

We have queried respondents about both barriers and deterrents to H2020 participation. Barriers are more fundamental and mostly structural, whereas deterrents are subtle and generally pertain to individual preferences and perceptions. However, we acknowledge that there is a degree of overlap between the two categories.

We start this section by reporting on the overall trends in the barriers experienced by respondents, and later turn to specificities by actor type and by topic area.

When it comes to issues acting as barriers to H2020 participation, there is a striking consensus among respondents regardless of actor type, priority area, prior FP experience and coordinator or partner. Figure 114 illustrates that the main barriers are lack of time (both for the researchers themselves and for

74 As shown earlier in this report, there have been few project participations by hospital trusts in H2020, and we therefore received very few responses.

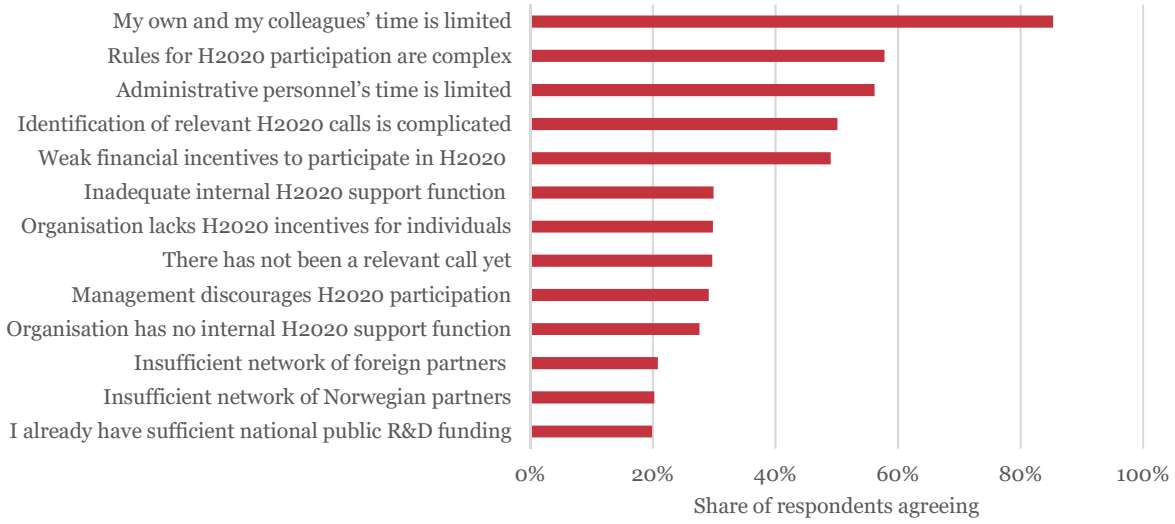
administrative support staff) and that rules for H2020 participation are perceived as being complex. Many respondents also assess identification of relevant calls as a prominent barrier (50% of respondents agree with that statement). Moreover, the survey shows that 30 percent of non-participants and FP7 participants that have not yet participated in an H2020 proposal state that there has not yet been a relevant call. Close to 50 percent of respondents representing public R&D organisations – i.e. HEIs, hospital trusts and research institutes – agree that the financial incentives for participation are weak.

In the "mid-field", we find several organisational issues that act as barriers. Roughly a third of respondents find that there is a lack of individual incentives, that management discourages participation, and that the organisation lacks H2020 support function or that the existing one is inadequate.

One out of five respondents find that lack of networks of potential Norwegian and foreign partners are barriers. One in five respondents from public R&D organisations also find that their national R&D funding covers their needs and thus discourages FP participation, but in the aggregate this was the lowest rated barrier.

The overall pattern remains the same if we compare responses from H2020 project participants, unsuccessful proposers, FP7 participants who have not yet applied in H2020, and non-participants, but there are nevertheless some notable differences. In general, respondents that have participated in FP7 but not yet in H2020 answer almost the same as H2020 project participants. Likewise, responses from non-participants and unsuccessful proposers are also almost identical. The two latter groups experience barriers in terms of complex rules, identification of relevant calls and discouragement from management to a higher degree. The most striking difference between those who are already active in H2020 (either in projects or proposals) and those who are not is the level of national public R&D funding. One third of non-participants and 39 percent of FP7 participants (not active in H2020) state that they already have sufficient national funding. The same figure for H2020 participants is a mere six percent.

Figure 114 Barriers to submitting or contributing to an H2020 proposal.[75] N=422.



Source: Web surveys.

Multi-partner coordinators in general experience the same barriers as participants, but to a lesser degree. There is on average an eight percent lower share of coordinators who agree with the suggested barriers. However, in terms of organisational incentives for individuals and lack of potential Norwegian

[75] Statements were rated on a five-tiered Likert scale from "strongly disagree" to "strongly agree" (as well as a "don't know/not applicable" alternative). This and the subsequent figures showing survey results, present the sum of the "agree" and "strongly agree" responses as share of all responses, excluding "do not know/not applicable".

or foreign partners, there is no difference between coordinators and regular participants, although these factors are all in general rated fairly low.

7.2.1 Barriers related to type of actor

Actor type is the most apparent differentiating trait among respondents. The survey reveals that individuals working in hospital trusts, HEIs or SMEs have, in some respects, quite different views on what factors are important barriers to H2020 participation. They all share the experience that lack of time is the most prominent barrier, but in some other respects the differences are quite substantial.

The second highest rated barrier, limited administrative capacity, is mainly experienced by companies, public administration and hospital trusts, where three-quarters of respondent agree. Among respondents in institutes and HEIs, only half agree. If we consider responses from non-participants in companies, public administration and hospital trusts that lack a dedicated internal support function to assist in applying for H2020 projects, it becomes evident that many individuals in these organisations are held back, not only by lack of time, but also by lack of or limited access to internal administrative support and assistance. This is clearly much less of a barrier for most respondents in institutes and HEIs, likely because almost all of them have internal support functions. SMEs and hospital trusts also stand out in experiencing complex rules and difficulties in identifying relevant calls.

Over 60 percent of institute respondents believe that the financial incentives for their organisation to participate in H2020 are weak. Among HEI and hospital trust respondents the same figure is 40 percent. In other respects, responses are very similar between institutes and HEIs. From the free-text responses, we learn that the STIM-EU instrument is much appreciated, and many respondents witness that it has helped improve institutes' financial situation in FP projects. However, several institute respondents declare that H2020 projects are still a loss-making activity. One of the main issues appears to be the high costs for preparing extensive proposals with a high risk of no financial return.

When it comes to incentives for individuals to take initiatives in H2020, only slightly less than a quarter of institute respondents agree that their organisation lacks such incentives, and the shares of respondents in HEIs and hospital trusts are only slightly higher. However, among respondents in public administration, close to 70 percent agree that their organisation lacks incentives for individuals. From the free-text responses, we find that the most appreciated incentives are to be given the time and the freedom to pursue the opportunities that the individual finds interesting and rewarding. This can mean being temporarily relieved from teaching duties (HEIs), clinical work (hospital trusts) or other projects and tasks. The best-practice example mentioned by respondents is where "kick-back" funding from prior successful FP projects actually increases the individual's research budget instead of disappearing into the overall faculty or unit budget. The latter is in fact experienced as a disincentive.

7.2.2 Barriers related to the health area

The order in which respondents in health rate barriers does not differ from the overall picture. The main barriers are limited time, complex rules and identification of relevant calls. However, if we examine where health respondents stand out, we see that they rate complex rules, identification of relevant calls and insufficient national network as barriers to a higher degree than respondents in the other areas. These results can be understood in light of the fact that health respondents are dominated by individuals who have either been consistently unsuccessful in the FPs or have not participated at all. In relation to the entire respondent population, health respondents claim that management discourages participation to a higher degree (37% in health compared to 29% on average).

From previous studies we know that researchers in hospital trusts often have a dual affiliation with a university. This situation has led to problems in correctly attributing external funding in general and FP funding in particular. Previous studies have established that differences in base funding systems and availability of internal support services have encouraged researchers with dual affiliation to participate in the FPs using their university affiliation. This prompted us to ask researchers in hospital trusts and universities about the effect of their dual affiliation, but we received only 16 responses in total and only a handful agreed that it is more attractive to apply for H2020 funding as university employee. According

to interviews with officials at several EU support functions, measures have been taken in recent years to resolve these issues.

If we analyse the responses from hospital trusts separately, we see that the top four barriers are the same as for all respondents, but hospital trust respondents are more unanimous and consider lack of time, complex rules and identification of calls as barriers to a higher degree than all other actor types.

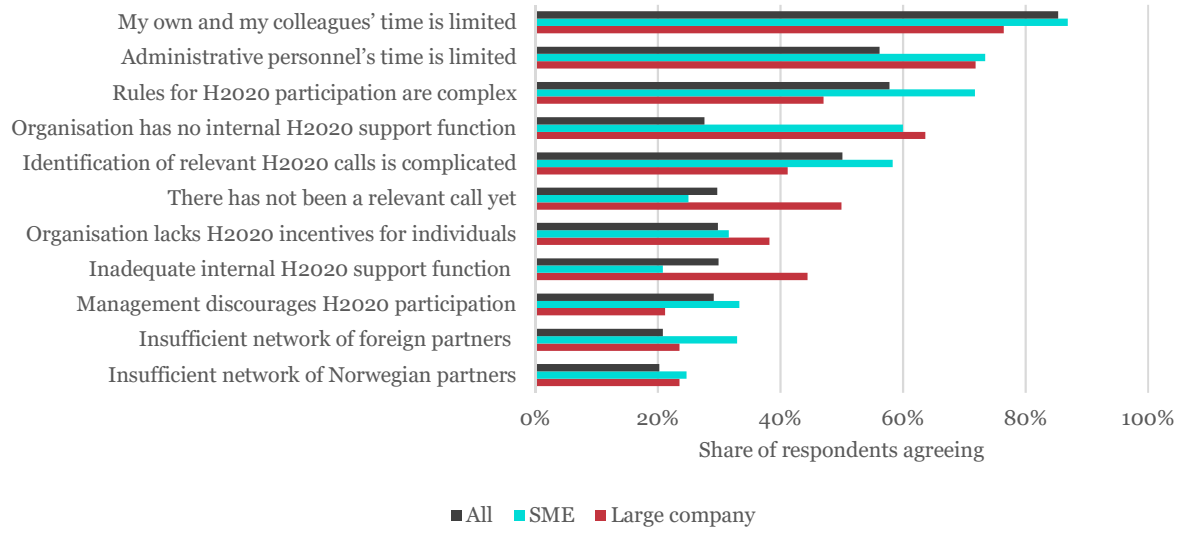
7.2.3 Barriers related to the ICT area

Actors in ICT do not stand out from the overall picture in how they rate barriers. The ICT topic area is dominated by researchers at institutes, HEIs and companies and therefore the aggregate closely resembles the responses from these actor types. ICT respondents stand out in rating lack of internal support function and incentive structure for individuals higher than respondents in other topic areas, which probably reflects the large share of companies in this subset of respondents. Relatively few ICT researchers in public R&D organisations rate sufficient national public R&D funding as a barrier, which suggests that they experience a scarcity in national funding and therefore turn to H2020 for external R&D funding to a greater extent.

7.2.4 Barriers related to industry participation

As already mentioned, there are in general small differences between in responses from the three topic areas. However, if we examine the responses from companies in closer detail, and separate SMEs from large companies, some interesting results emerge, see Figure 115.

Figure 115 Barriers to companies submitting or contributing to an H2020 proposal. N=102.



Source: Web surveys.

Companies (both participants and non-participants) more often than other actor types experience limited administrative capacity as a barrier. The most striking difference between the overall picture and the company responses is that a very large share of companies (who have not yet participated in a H2020 proposal) point to the absence of internal support function as a barrier. The free-text responses further confirm this picture, and many respondents express that writing a competitive proposal is an almost insurmountable task that requires competence that companies often lack, thus requiring them to seek external expertise. The result is not surprising given the fact that few companies likely have access to the kind of internal support functions that most HEIs and institutes have. But it is also worth noting that over 40 percent of respondents from large companies experience that their internal support as inadequate. Many respondents ask for increased support from RCN and IN for hands-on assistance with proposal writing, pre-submission assessment of proposals and one-to-one consultations (some also ask

for administrative assistance for on-going projects), similar to what HEI and institute researchers have access to trough their EU support function.

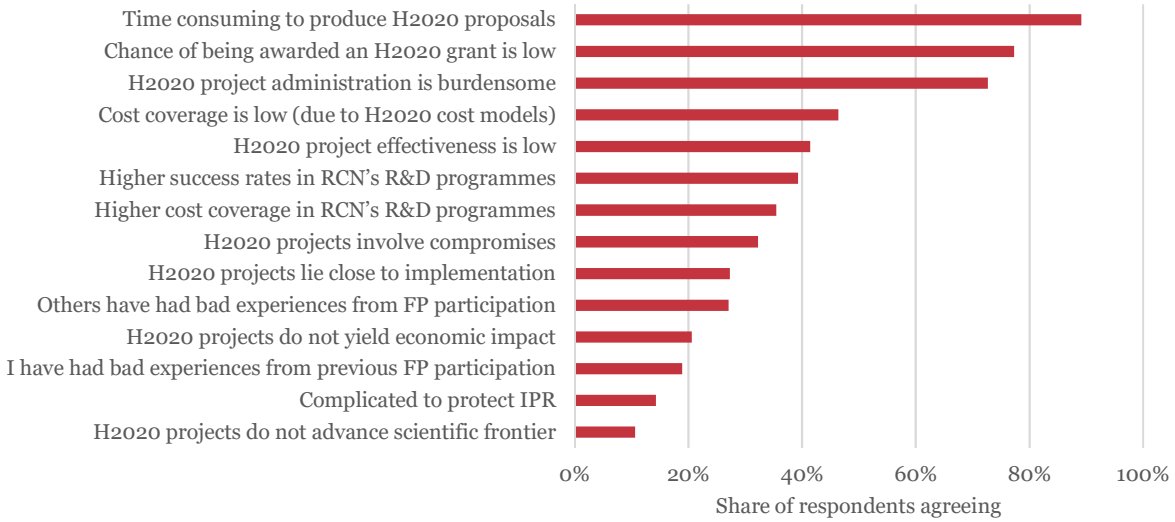
Half of the respondents in large companies that have not participated in a H2020 proposal state that there simply has not been a relevant call yet. For SMEs, the same figure is 30 percent, which is very close to the average among all non-participants. However, this difference is not surprising given that SMEs have a dedicated instrument open for proposals in almost any area. It is nevertheless evident that SMEs struggle more than large companies with the perceived complexity of H2020 rules and identification of relevant calls. Respondents in SMEs are also discouraged by the management burden and lack foreign networks to a higher degree. The free-text responses suggest that respondents are aware of the potential to improve in these respects and seem to have concrete ideas on how the company could increase the likelihood that they will submit or contribute to a H2020 proposal in the future. The most common suggestions are that the company should recruit personnel with relevant skills and experience of FP projects, and identify and actively partake in international networks.

7.3 Deterrents to H2020 participation

7.3.1 Deterrents related to type of actor

As illustrated in Figure 116, the most prominent deterrent restricting Norwegian H2020 participation is the perception that it is time consuming to produce proposals, and a whopping 89 percent of respondents agree that this issue has a discouraging effect. Perceived low success rate is the second highest rated deterrent. These two factors are rated most often by all types of respondents, although H2020 project participants in general identify them as deterrents to a lower degree than others. When aggregating all responses, the third most rated deterrent is that H2020 project administration is considered burdensome. Among H2020 project participants with first-hand knowledge of the issue, 68 percent rate project administration as discouraging deterrent, whereas multi-partner coordinators are less concerned in this respect (60%). However, 80 percent of non-participants believe that project administration is discouraging (77% among unsuccessful proposers).

Figure 116 Deterrents to submitting or contributing to a H2020 proposal. N=422.



Source: Web surveys.

7.3.2 Deterrents related to type of actor

Low cost coverage is an issue that in general is rated higher by respondents in institutes than other actor types. Close to 65 percent of respondents in institutes agree to the statement that low cost coverage discourages them from participation (the third highest ranked factor for institutes). This is linked to an

equal share of institute respondents agreeing that RCN's more favourable cost model is a deterrent for H2020 participation. However, this seems to be less of an issue for other actor types. Only 33 percent of HEI respondents and 15 percent of company respondents believe that cost coverage is higher in RCN's R&D programmes.

Higher success rates in RCN's R&D programmes seem to discourage institutes and companies from H2020 participation more than other actor types. On average, 39 percent agree that this is a deterrent, but the share is higher among respondents in large companies (56%) and in institutes (43%). Perceived low project effectiveness is also an issue that mainly concerns companies and institutes, but also respondents in public administration rate this issue high compared to other deterrents.

Other's testimonies of bad experiences from previous FP participation is a deterrent for many, but non-participants seem to be more affected than H2020 project participants. Close to 40 percent of non-participants agree that other's bad experiences act as a deterrent, compared to only 17 percent among H2020 project participants. The share who say they are discouraged by personal bad experiences from previous FP participation is a mere 12 percent among H2020 participants and 25 percent among both unsuccessful proposers and FP7 participants who have not yet applied in H2020.

Those who are discouraged by H2020 projects being at (too) high Technology Readiness Level (TRL) are mainly researchers who find the Excellent Science pillar most relevant. The perception that it is complicated to protect intellectual property rights (IPR) in H2020 projects is essentially a non-issue for all actors except companies. Also, very few agree with the statement that "H2020 projects do not advance scientific frontier", 11 percent on average, mostly researchers in institutes or HEIs, with no notable difference in responses between pillars.

7.3.3 Deterrents related to the Health area

There are only small differences in how actors in the health area view deterrents, compared to actors in the ICT or industry areas. However, if we specifically examine respondents from hospital trusts, we see that they rate time consuming proposals, low success rates and heavy administration as very strong deterrents, which surely is a result of these respondents all having applied to H2020 and been unsuccessful, or never participated in an FP proposal. Respondents in hospital trusts were specifically asked about how funding opportunities within the regional health authorities (*Regionale helseforetak* (RHF)) affect their willingness to participate in H2020. The survey suggests that funding conditions within the RHFs have a significant discouraging effect on researchers in hospital trusts; 73 percent of respondents agree that higher success rates in R&D calls within the RHF makes them less willing to apply for funding in H2020. RHF R&D projects' higher cost coverage is also a deterrent according to 45 percent of hospital trust respondents.

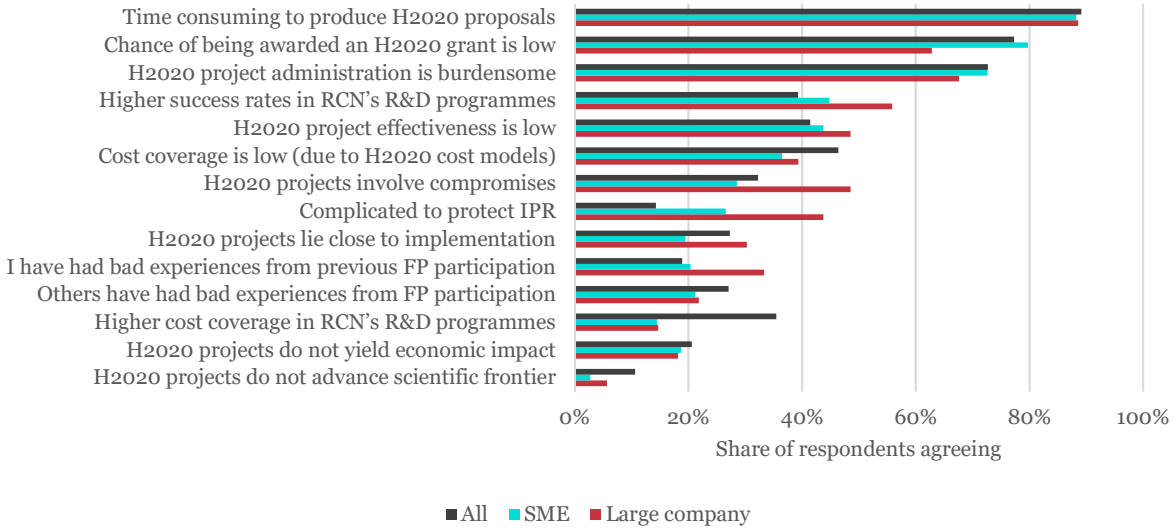
7.3.4 Deterrents related to the ICT area

Respondents in the ICT area do not in any way stand out from the overall picture in terms of deterrents. As mentioned above, these respondents are dominated by researchers in institutes, HEIs and companies. Consequently, this aggregate closely resembles the responses from these actor types.

7.3.5 Deterrents related to industry participation

Figure 117 illustrates that companies for the greater part rate deterrents the same way as other actor types. Among the more notable differences are that a majority of large company respondents experience higher success rates in RCN's programmes, perceive that H2020 projects involve compromises and that it is difficult to protect IPR. This suggests that large companies may experience a greater sense of control or ownership within RCN projects. As previously mentioned, company respondents do not agree to the same extent as others that RCN offers better cost coverage than H2020.

Figure 117 Deterrents to companies submitting or contributing to an H2020 proposal. N=118.



Source: Web surveys.

7.4 Appropriateness of present support system and measures

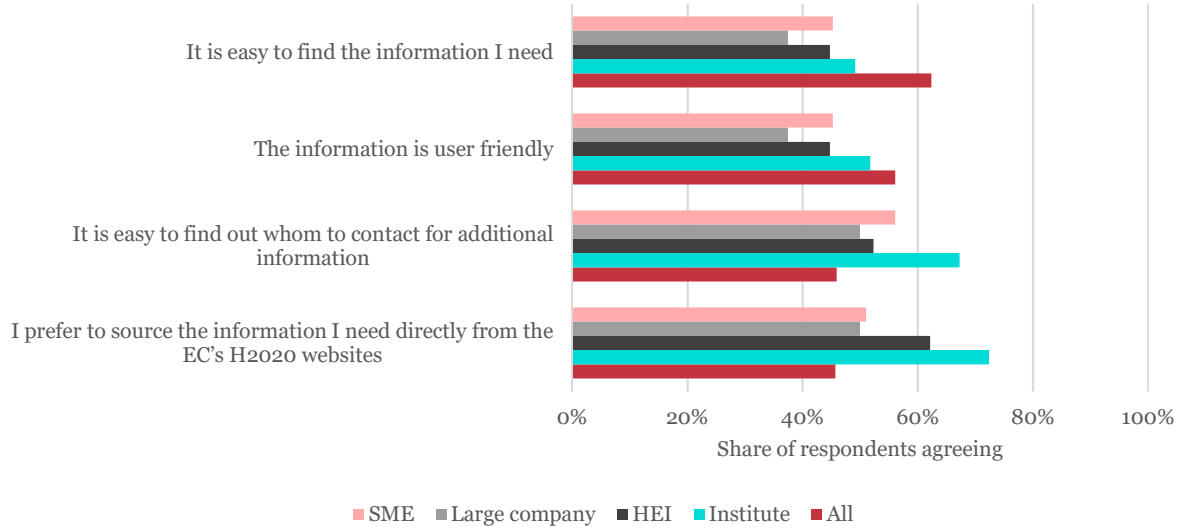
7.4.1 National-level support system and measures

In this section, we investigate how FP participants view and make use of the national support measures to facilitate Norwegian H2020 participation. These questions were only posed to respondents who participate (or have participated) in an H2020 project and/or proposal. Given this subset of respondents and the low rate of participation of certain actor types, there were very few responses from hospital trusts and public administration for which reason we elect not to show any results specifically for these actor types in the following two figures.

We asked respondents to rate their level of satisfaction with RCN's website for support on H2020. In general, 50 percent of respondents agree that it is easy to find the information they need, an equal share agree that the information is user friendly and that it easy to find contacts for further information, see Figure 118. A majority of respondents say that they prefer EC's H2020 websites.

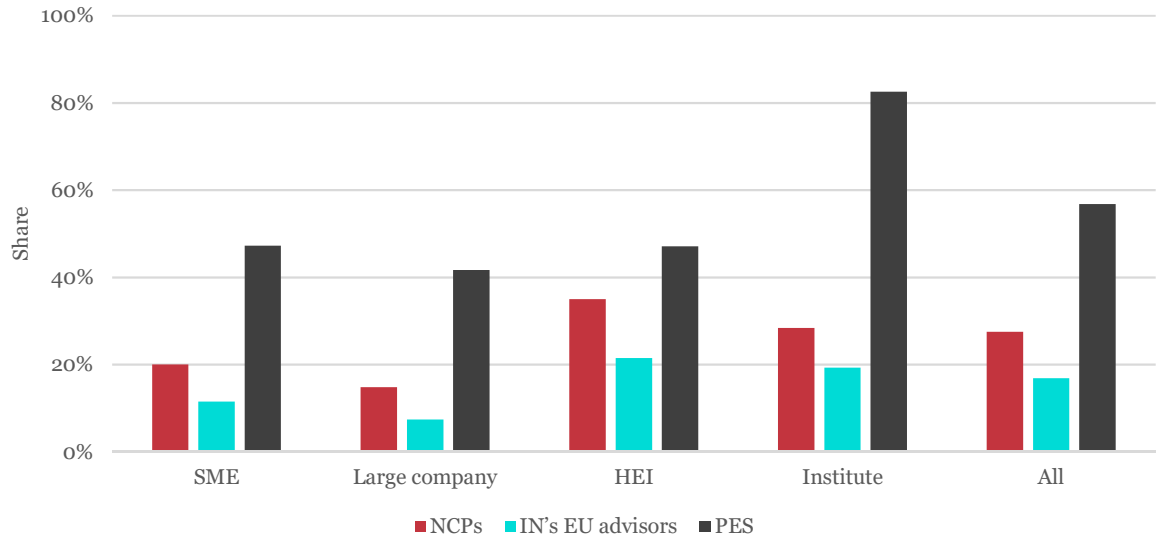
Respondents were asked if they had received advice from Norwegian NCPs and/or IN's regional/local EU advisors when preparing their most recent proposal. On average, 27 percent of H2020 participants had received advice from an NCP and 17 percent from an IN EU advisor. Figure 119 shows that respondents from institutes and HEIs used NCP advice more often than companies. SMEs have also received advice from an IN EU advisor more often than large companies. IN's EU advisors specifically target companies, so it is confusing that the survey results suggest that IN's EU advisors are more often used by researchers in institutes and HEIs than in companies, although more seldom than NCPs. One interpretation may be that researchers in institutes or HEIs refer to partner companies' contacts with IN. Coordinators make use of NCPs significantly more often than regular participants; 43 percent of multi-partner coordinators received NCP advice (50% for coordinators applying for a project with no partners), for regular participants the share is 17 percent. Multi-partner coordinators also used IN's EU advisors more frequently, 22 percent of coordinators compared to 10 percent of regular participants. There is no difference in these respects between successful and unsuccessful proposers.

Figure 118 Respondents' degree of satisfaction with RCN's website for H2020 support. N=269.



Source: Web surveys.

Figure 119 Share of H2020 respondents who consulted an NCP and an IN EU advisor, and who received PES support. N=264.



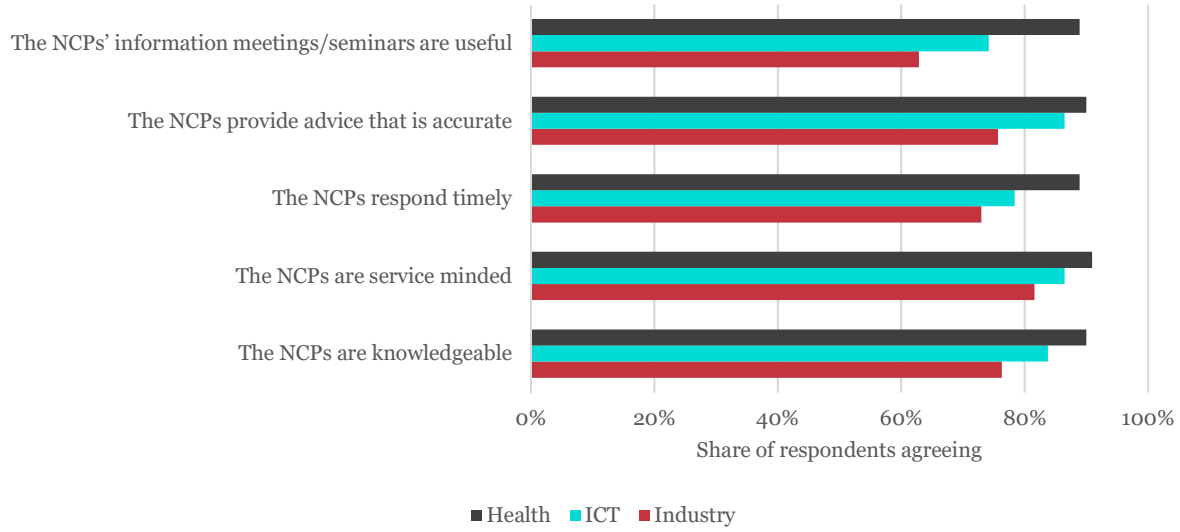
Source: Web surveys.

On average, 57 percent of respondents received PES support when they prepared their latest proposal. The most frequent PES recipients are institute researchers (83%), see Figure 119. Almost every other SME respondent and HEI researcher state that they received PES support. More than three-quarters of multi-partner coordinators say that they received PES support (65% of coordinators of projects with no partners), compared to 45 percent of regular participants. The more extensive use of PES among coordinators probably reflects the coordinator role as a (much) more active form of participation, whereas many regular participants likely have been invited into projects without considering funding opportunities for the application process.

The users of NCPs and IN EU advisors were subsequently asked to rate their degree of satisfaction with their interactions, see Figure 120 and Figure 121, respectively. Since we have now effectively reduced the number of respondents even further, we do not have enough responses to show results by actor type and

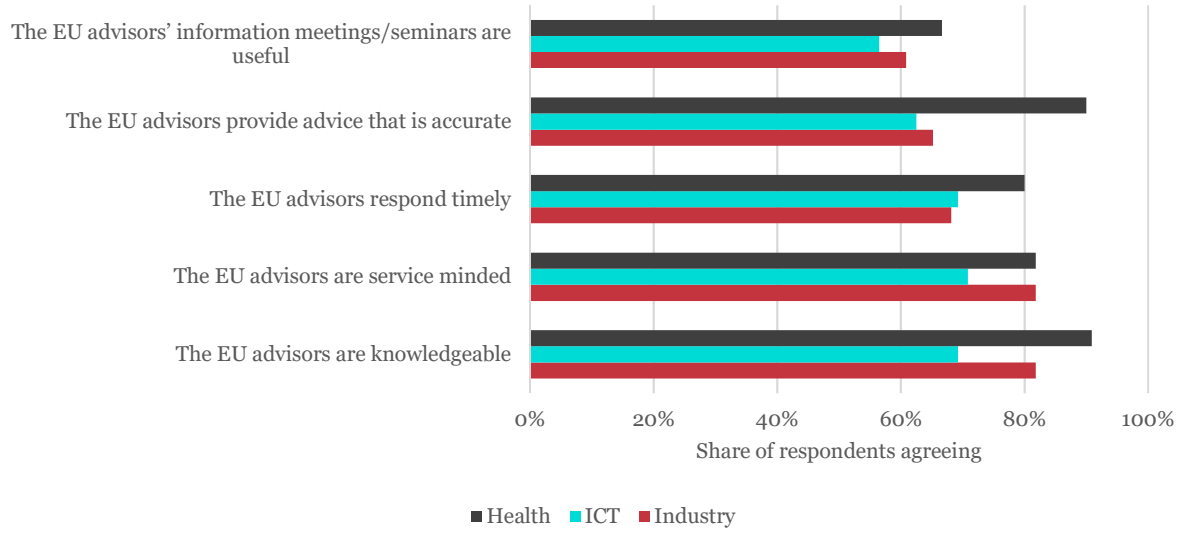
instead present results by topic area. Health respondents are consistently the most satisfied with both categories of advisors, although most respondents appear pleased with their advisor interactions and the quality of their services. Multi-partner coordinators are notably more satisfied with the NCPs than regular participants.

Figure 120 Respondents' degree of satisfaction with the NCPs. N=103.



Source: Web surveys.

Figure 121 Respondents' degree of satisfaction with IN's EU advisors. N=84.

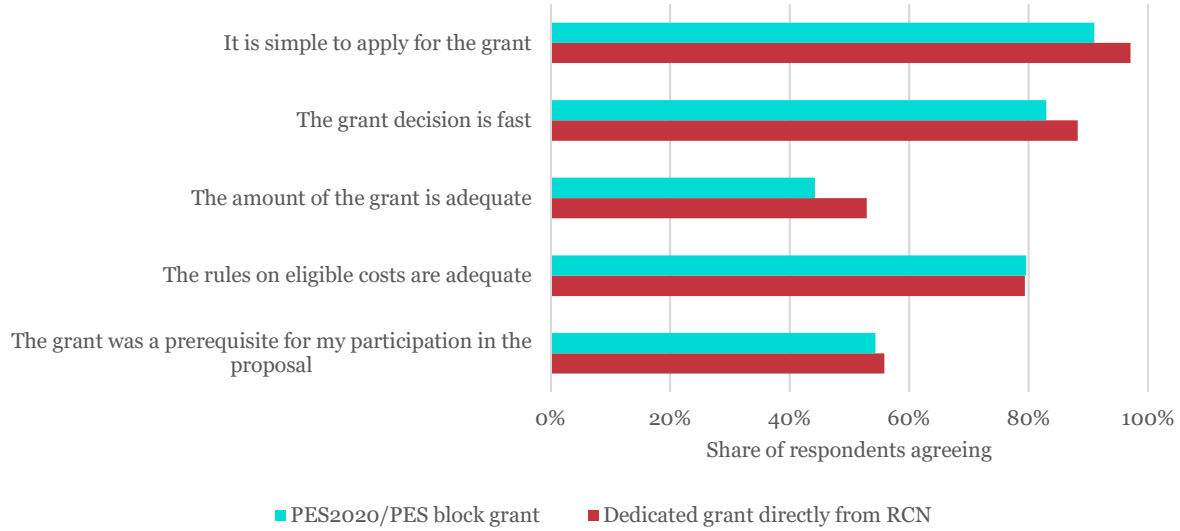


Source: Web surveys.

From the free-text responses we learn that respondents ask for more tailored information from the NCPs, e.g. in form of targeted newsletters. Experienced FP participants express that large information meetings provide little that is new to them, and ask for more specialised or advanced information meetings. There are also several suggestions that NCPs should be more proactive in sending information to groups of recipients that they (based on their knowledge and experience) have reason to believe should be interested.

PES support recipients agree that it is simple to apply for a PES grant and that funding decisions are promptly processed. It is perhaps a bit surprising that the share that agree to these two statements is slightly higher among those that applied to RCN directly, as shown in Figure 122. PES support recipients are less content with the level of support and approximately 50 percent agree that it is inadequate. The slightly lower score from respondents that received PES support through block grants is mainly due to PES recipients in FP7; PES2020 block grant recipients are significantly more satisfied. Institutes respondents are the most dissatisfied, and a mere 20 percent believe that the amount of support is adequate, but it should be noted that most PES recipients in institutes receive the support through block grants. Although users would like to see a higher level of support, most believe that the rules for eligible costs are adequate. The survey results suggest that PES is quite an important measure for SMEs, since 74 percent of SMEs state that the PES grant was a perquisite for the company's participation in the proposal.

Figure 122 Respondents' degree of satisfaction with PES. N=150.



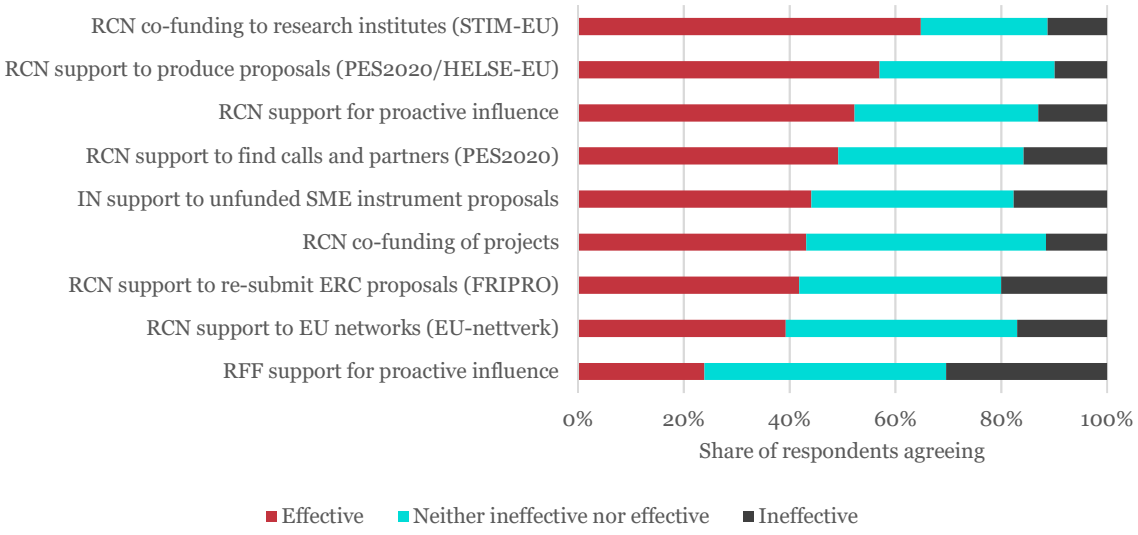
Source: Web surveys.

Survey respondents were also asked to rate the effectiveness of all main national financial support measures in terms of encouraging individuals to submit or contribute to H2020 proposals. However, we want to stress two significant caveats in connection with this question. First, a significant number of respondents did not have an opinion on this subject; on average, almost half of the respondents answered "do not know/not applicable" for each measure. The most obvious reasons are probably that many respondents either do not belong to the measure's target audience or simply lack knowledge of it. Moreover, there seems to be a relation between how well known a measure is and its perceived effectiveness, meaning that the measures that most respondents find effective are also those where most respondents have had an opinion, and the lowest rated measures are in general less well known. We therefore propose some caution when interpreting these results. We have treated most measures as open to all actor types to rate, but only report responses from SMEs when it comes to IN's support to unfunded projects in H2020's SME instrument; responses from HEIs, institutes and hospital trusts when it comes to the FRIPRO measure; and responses from institutes when it comes to the STIM-EU measure (meaning that any responses from other actor types have been filtered out).

With the above-mentioned caveats in mind, Figure 123 illustrates that STIM-EU, PES2020/Helse-EU support to produce proposals and RCN's support to proactively influence EU-level processes are all rated as effective by a majority of respondents. Around a tenth of respondents consider the measures ineffective, but we can only speculate on in which sense. The free-text responses indicate that some believe that the measures are poorly designed to fulfil their purposes and others that the measures are

good in principle but insufficient. Recipients of PES2020 support for their latest proposal are slightly more prone to rate the measure as effective (70%, as opposed to 62% among those who did not receive PES2020 support), an equal seven percent rated PES2020 as ineffective. It is interesting to note that the Regional Research Funds' support for proactive influencing is placed on the other end of the scale of its RCN counterpart and is perceived as the least effective measure. This is however one of the least known measures, which probably influences the outcome.

Figure 123 Respondents' rating of the effectiveness of existing financial support measures to encourage H2020 participation.[76] N=404.



Source: Web surveys.

By far the most requested improvement to the mix of national support measures is increased opportunities for actors to find partners with whom they can build competitive consortiums. For actors that lack sufficient international networks, services like targeted and topic-related matchmaking events and on-line services are requested. Many respondents stress the importance of having a personal international network to be successful in the FPs, and point out that networks do not appear without effort. Developing and maintaining such networks takes a long time and goes on throughout one's career, but this process can be facilitated, e.g. by creating more arenas for experienced participants to inspire and share their knowledge with inexperienced would-be participants. This is already addressed in the "EU networks" measure and through EEN, but the survey indicates that these measures are largely unknown among companies, institutes and HEIs. As previously mentioned, companies request more hands-on services in connection with proposal production to be offered by public actors (e.g. proposal writing guidance and pre-submission evaluations).

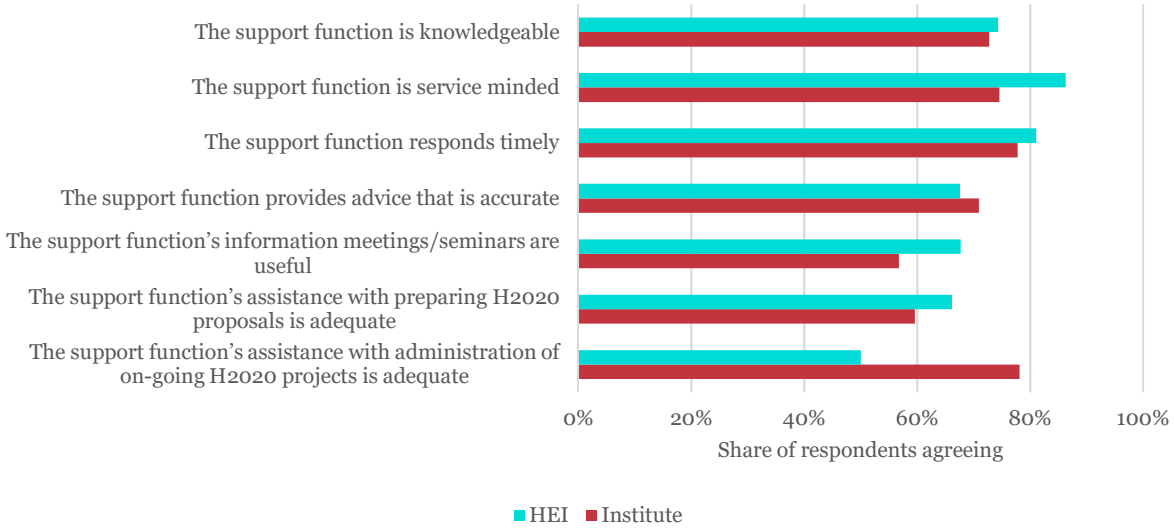
7.4.2 Organisational-level support system and measures

H2020 participants were asked if their organisation has an internal EU support function. Nine in ten HEI respondents and 63 percent of institute respondents state that their organisation has such a support function (as do three out of six respondents from hospital trusts). Figure 124 shows their level of satisfaction with this internal support function. In general, a convincing majority of researchers appear satisfied with the support function when preparing H2020 proposals. The most notable difference in views between institute and HEI respondents concerns assistance with administration of on-going projects. Only half of HEI respondents agree that the internal support function provides adequate

[76] Measures were rated on a scale from "very ineffective" to "very effective". The figure presents the aggregate responses "effective" and "very effective", as well as "ineffective" and "very ineffective", respectively.

assistance in this regard, whereas almost four in five institute respondents agree. This is further confirmed by interviews with officials of university EU support functions. One interviewee representing one of Norway's large universities mentioned this as one of the researchers' greatest concerns, a fear of being "left alone" with a heavy administrative burden if awarded an H2020 project. There are no notable differences in this respect in the views of coordinators and regular participants.

Figure 124 HEI and institute respondents' degree of satisfaction with their organisation's internal FP support function. N=124.



Source: Web surveys.

8 Discussion, conclusions and recommendations

In this chapter, we first summarise the overall context, and go on to summarise the participants' and non-participants' views on what limits or prevents FP participation. These findings are then used as a springboard to address some issues inherent to different stakeholder categories (i.e. largely independent of topic area). We conclude that Norwegian HEIs and hospital trusts enjoy higher R&D base funding and experience less competition than their counterparts in the comparator countries, whereas institutes have very low base funding and secure the majority of their R&D funding in competition. We further conclude that the financial incentives for FP participation at organisational level are quite strong for HEIs and hospital trusts but weak for institutes, whereas individual researchers rarely seem to benefit from these organisational-level incentives. We note that it is not necessarily true that proposal success rates are higher in Norway than in H2020 when it comes to proposals for basic research, whereas it is no doubt correct for proposals for collaborative R&I.

We conclude that there are some recurring weaknesses that if addressed could increase FP participation. These are that many Norwegian proposers appear unaware that they seem to be part of uncompetitive consortia; that the quality of Norwegian R&I, at least in some sub-areas of health and in ICT, may be too low; and that the trends in H2020 towards more application-oriented and interdisciplinary R&I seems to have caught Norwegian actors unprepared. Moreover, while most countries have gradually focused or even phased out their financial support measures as their R&I communities have built up FP experience, Norway has expanded its support measures with time, which together with benign R&D base funding systems and low competition for R&D funding for HEIs and hospital trusts send signals that in the long term may be detrimental to their competitiveness. We believe that not being exposed to international competition is detrimental to long-term competitiveness – both for individual researchers and for their employers.

We then summarise where we believe that there are opportunities to increase Norwegian FP by sub-area of the three topic areas, including where there are area-specific weaknesses for RCN to address. The chapter is rounded off with recommendations that ministries, RCN, IN and stakeholder organisations may want to consider in order to increase Norwegian FP participation.

8.1 The context

Since becoming associated with the FPs in 1994, Norway has shown a strong commitment to make the most of its association, and a succession of research white papers, other policy papers and strategies have reiterated that FP participation is key to the internationalisation and long-term competitiveness of Norwegian R&I. The 2014 Strategy for research and innovation cooperation with the EU, released right after the Norwegian government had decided to associate Norway with H2020, spelled out that Norwegian organisations should bring back two percent of the competitive funds in H2020. The 2014 white paper Long-term plan for research and higher education noted that for the two percent goal to be reached, the scope of Norwegian activities must increase radically. Among the comparator countries, Norway's strategic and strong commitment to FP participation only seems to be matched by the Netherlands', although all countries but Sweden explicitly consider FP participation strategically important. National-level FP policy papers and strategies in Norway have typically singled out the three topic areas of this study as important for FP participation (generally together with other areas), but policy papers specific to any of the three areas seem somewhat less committed to realise their objectives through FP participation (than the FP-specific policy papers). That all three topic areas are emphasised in Norwegian policy documents is expected, but only the Netherlands has singled out the same three areas (together with several others). In the remaining four countries, health is also specifically emphasised in Denmark, ICT in Austria, and industry in Finland.

Though emphasised in Norwegian FP policy papers, we understand that the three topic areas of this study were not necessarily selected because they are considered Norwegian strengths in FP-participation terms, but rather because they are thought to hold potential for increased FP participation. The area-level analyses (which we return to later in this chapter), show that while Norway's participation in industry-relevant R&I is encouraging, participation in health and ICT is generally not. This means that,

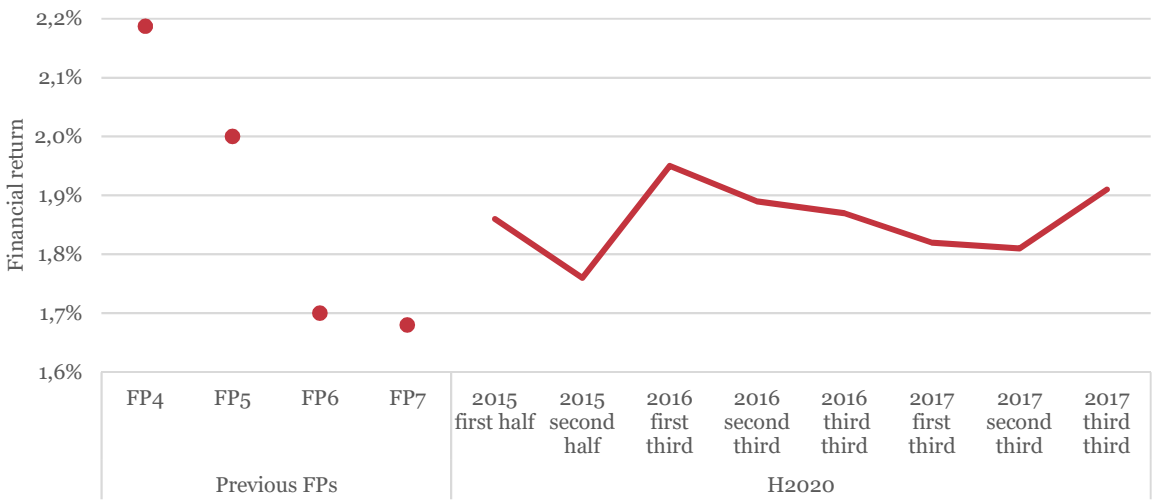
taken together, the topic areas constitute a negative selection, which is something that should be kept in mind while reading and drawing conclusions from this report.

Measures to facilitate FP participation may be implemented at national (in some countries also regional) level or at organisational level. The national advisory services are pretty much the same in the comparator countries as in Norway, with the possible exception of RCN's new and ambitious Path to EU Excellence competence-building initiative. When it comes to financial stimuli, it is obvious that the Norwegian measures are in general more all-encompassing and more generous than in the comparator countries. While there seems to be a trend in both the comparator countries as well as in other countries to gradually focus, or phase out, financial support measures – particularly to produce proposals – the development seems to go in the opposite direction in Norway. It may be argued that the comparison is skewed by us using RCN's support-measure typology, but we have not come across any financial support measure in the comparator countries that does not fit this typology. In terms of organisation-level measures, frequent FP participants in all six countries have long since established internal support functions to facilitate FP participation. Since these EU support functions have been established organically, there is no single model.

In FP7 overall (i.e. in all areas, not only in the three topic areas), Norway compared quite favourably in terms of proposal activity relative to the comparator countries (when normalising with the number of researchers per country), but so far in H2020 Norwegian stakeholders have been less active. However, in both FP7 and H2020, Norwegian actors have coordinated multi-partner proposals more often than their counterparts in the group of comparator countries, and as a result, the number of Norwegian coordinators compares favourably with these countries. In FP7, Norway's proposal success rate was higher than for all comparator countries except Denmark and the Netherlands, but in H2020 it is so far lower than for all comparator countries except Finland, thus indicating a negative trend (in relative terms). Norway's multi-partner coordinator success rate in FP7 was above that of all comparator countries except the Netherlands, and so far in H2020 Norway still outperforms all its Nordic neighbours but not Austria and the Netherlands. This also indicates a (slight) negative trend. The country that in this kind of comparisons (almost) consistently comes out as the most successful in the FPs is the Netherlands, which incidentally is the country that – together with Norway – has the strongest FP emphasis in national policies, but also one that has few financial support measures.

Our analyses show that the Norwegian projects (in all areas) so far awarded in H2020 have yielded a financial return of 1.8 percent of all funding granted. This is the lowest share among the six countries, which is not surprising considering that Norway has the smallest researcher community among the six countries. Normalising FP contributions by GDP (to account for the different size of the countries), Norway compares unfavourably with the other countries. RCN's own monitoring of the financial return illustrates that the (accumulated) development in H2020 nevertheless is an improvement over FP7 (and FP6), see Figure 125. Thus, despite the financial return in H2020 being an improvement over FP7, there is a loss in competitiveness between FP7 and H2020 relative to the comparator countries.

Figure 125 Norway's financial return from FP7 and H2020 as share of all FP funding awarded.[77]



Sources: "Det norske forsknings- og innovasjonssystemet – statistikk og indikatorer", RCN, NIFU and Statistics Norway, 2017 (FP4–FP7 data) and www.forskningsradet.no/prognett-horisont2020/Norske_resultater/1254012243594, viewed on 12 November 2017 (H2020 data).

8.2 Participants' and non-participants' experiences

The participant and non-participant surveys conducted largely confirm the findings of previous studies on barriers and deterrents, both in Norway and elsewhere. The main perceived barriers to H2020 participation are lack of time, limited administrative support, complex rules for participation, and difficulty to identify relevant calls for proposals. The surveys inform us that differences in opinion are small between the three topic areas, but there are some significant differences between multi-partner coordinators and partners, between participants and non-participants, and between stakeholder categories. Thus, multi-partner coordinators experience barriers to a lesser degree, and non-participants to a greater degree, which is to be expected: the more experienced you are, the lower the perceived barriers. Close to half of all survey respondents (i.e. participants and non-participants together) claim that the financial incentives for the organisation to participate in H2020 are weak. This may be a clue to why nearly a third of respondents state that organisation management discourages FP participation, and an almost equal share that there are no incentives (within the organisation) for an individual to take H2020 initiatives. Only one in six participants feels that H2020 participation is limited by its international network, but twice as high a share of non-participants does. The largest difference in terms of barriers is that one in three non-participants state that they already have sufficient national public funding, whereas approximately one in thirty of those who have been (or are) coordinators in H2020 does. Four in five respondents are deterred by H2020 success rates and almost every other by H2020's insufficient cost coverage, where the latter is a particularly pressing issue for institutes. Whereas only one in five participants are deterred by others' "horror stories" about FP participation, twice as many non-participants are.

Just over a quarter of H2020 participants received advice from an NCP when preparing their most recent FP proposal, with higher shares among proposers from institutes, HEIs and hospital trusts. Coordinators used NCPs more than regular participants. Most respondents are content with the advice they received from the NCPs, and coordinators to a higher degree. Well over half of H2020 participants received PES2020 support for their latest proposal, and more than three-quarters of coordinators. However, many PES2020 recipients are dissatisfied with the level of support, predominantly those who

[77] It should be noted that the analyses in this report are based on an eCorda dataset from 28 February 2017, which corresponds to the "2017 first third" point in the figure. Moreover, according to RCN, the sudden improvement by the third third of 2017 may be caused by there not having been any ERC call between the second and the third third, meaning that this may possibly prove to be a temporary improvement.

receive it through block grants. PES2020 seems to be particularly important for SMEs, with almost three-quarters stating that the grant was a prerequisite for their participation in the proposal. STIM-EU and RCN's measures to proactively influence EU-level processes and calls are considered effective as means to motivate H2020 participation, as is RCN's support to find H2020 calls and partners. Respondents that have access to an EU support function within the organisation are in general satisfied with its services, whereas others feel that the support function lacks sufficient competence. Every other HEI respondent feels that the support function does not provide adequate assistance to ongoing projects.

8.3 Stakeholders' perspective

To summarise the two previous sections in broad brushstrokes, Norwegian proposers proved competitive in FP7, but participation seems to have developed unfavourably in H2020. This is despite supportive policies, qualified advisory services and an all-encompassing and generous system of financial support measures. So how can this be? While not exactly original, our surveys suggest that the answer probably lies in **weak financial incentives for stakeholder organisations**, which in turn often seem to lead to **management discouraging FP participation** and – consequently – that **incentives for individuals to take FP initiatives are rare**. Four in five survey respondents say that they are deterred by H2020's **low success rates** and almost every other by the **low cost coverage**, and to compound the problem, a significant share of non-participants state that they already **have sufficient national public R&D funding**.

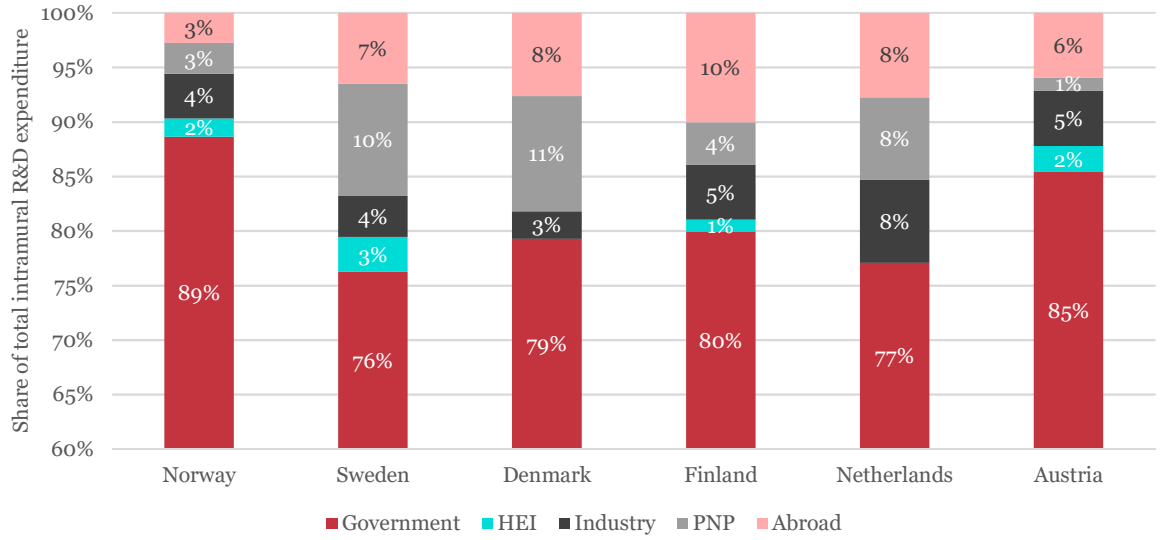
Although there are clearly some features specific to each of the three topic areas – we summarise them in Section 8.5 – the characteristics inherent to stakeholder categories are quite obvious, and these are apparently largely independent of topic area. We therefore commence with the stakeholders' perspective. It may seem mundane to focus on pecuniary aspects, but at least for public-sector stakeholder organisations (i.e. HEIs, institutes and hospital trusts), including the individual researchers they employ, securing funding is crucial. A majority of researchers would probably agree that international collaboration is stimulating most of the time and (possibly grudgingly) that competition in the long term enhances one's competitiveness, but this is in practice secondary to securing funding. Most researchers will go for the "easiest" money given their own specific funding situation. So, what do their funding situations look like? Let us investigate the stakeholders' perspective:

- To what extent do Norwegian stakeholders have sufficient national public funding?
- To what extent are financial incentives for stakeholders weak?
- To what extent are success rates higher in Norway?

8.3.1 To what extent do Norwegian stakeholders have sufficient national public funding?

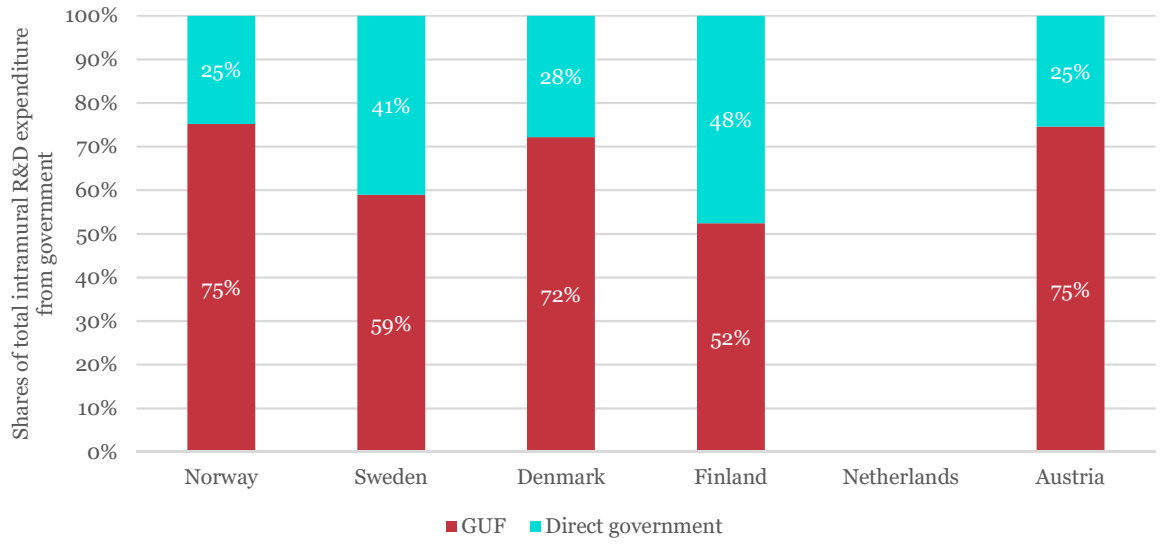
Starting with HEIs, we see from Figure 126 that Norwegian HEIs on average have a significantly larger share of their R&D funding from public sources than most of their counterparts in the other countries. We also see that the share of foreign R&D funding (including the FPs) and the share from the private non-profit (PNP) sector (including domestic charities) – both typically competitive – are comparatively small in Norway. However, part of the government share in Figure 126 is competitive, in Norway largely in the form of funding from RCN. Dissecting government R&D funding further, we find that the general university funds (GUF), which are tantamount to HEIs' base funding for R&D, represent a higher share in Norway than in all comparator countries but Austria, see Figure 127. Direct government R&D funding, which mainly should be competitive, is thus lower in Norway than in all comparator countries but Austria.

Figure 126 Share of total intramural R&D expenditure in the HE sector by source of funding in 2013.[78] Note that the scale has been truncated for readability.



Source: Eurostat.

Figure 127 Share of GUF in total government funding of intramural R&D expenditure in the HE sector in 2013.[79]



Source: Eurostat.

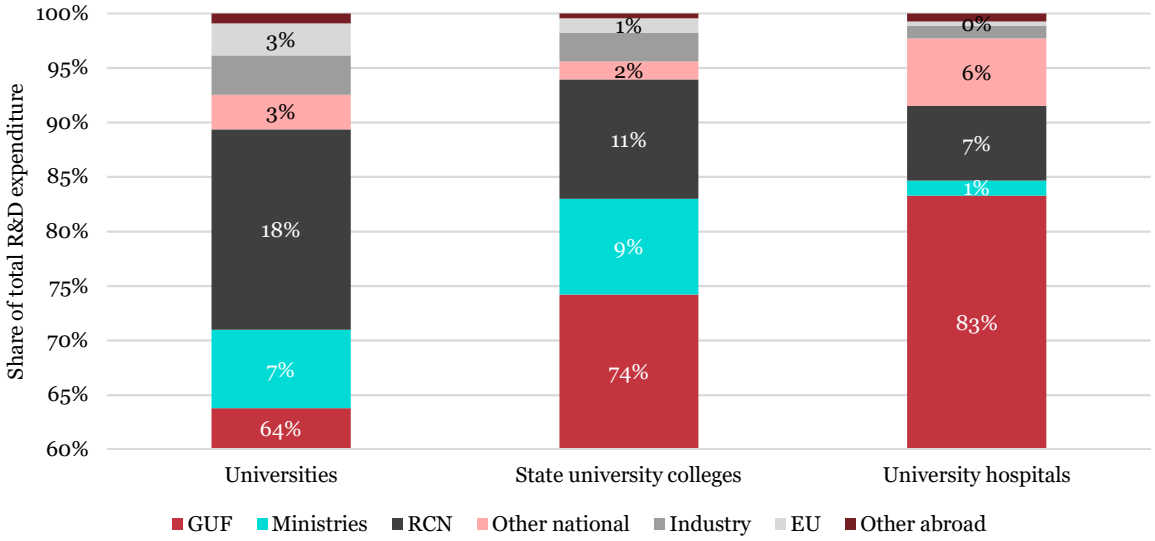
NIFU's national statistics allow us to take this investigation one step further. Figure 128 illustrates that GUF accounted for 64 percent of universities' funding for R&D in 2015, with 10 percent more for university colleges, and almost another 10 percent for university hospitals. The remaining funding categories should mainly be competitive. The figure illustrates the importance of RCN, and the almost negligible role of the EU as source of R&D funding. Thus, Norwegian HEIs, including the university hospitals among the hospital trusts, have a beneficial situation when it comes to national public funding

78 The latest year with (almost) complete data for Norway and its comparator countries is 2013. The HEI category refers to "income from endowments, shareholdings, and property, plus receipts from the sale of non-R&D services such as fees from individual students, subscriptions to journals, and sales of serum or agricultural produce." The PNP category includes "professional or learned societies, charities, relief or indulgencies, trades unions, consumers' associations, etc., plus any funds contributed directly to R&D by households." Source: Eurostat.

79 Data not available for the Netherlands.

for R&D: higher base funding and a smaller share of funding that is competitive, relative to the comparator countries.

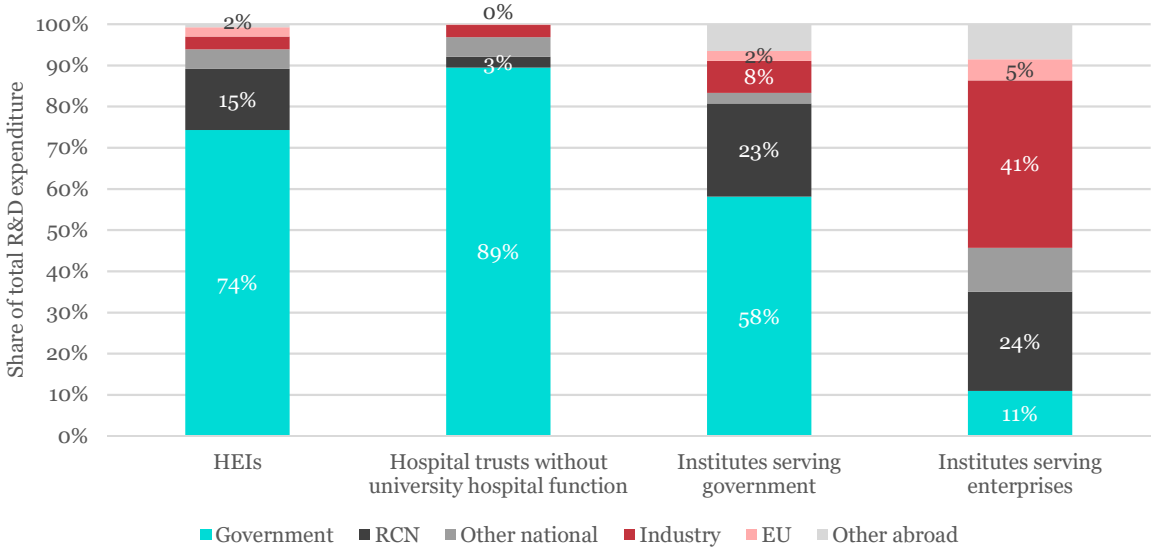
Figure 128 Share of GUF in total government funding of R&D expenditure in the Norwegian HE sector in 2015. Note that the scale has been truncated for readability.



Source: NIFU.

Moving on to the other public-sector stakeholders using HEIs (of all types in the previous figure) as a reference, Figure 129 reveals that for the hospital trusts *without* university hospital function nearly 90 percent of R&D expenditure is funded by the government and next to nothing by the EU (0.12%). (However, hospital trusts without university hospital function only account for around a quarter of all R&D expenditure in the regional health authorities.) These two figures illustrate that hospital trusts only receive a relatively small share of their R&D funding in competition, although we will soon discuss the fact that there is some competition for R&D funding between researchers in a regional health authority.

Figure 129 Total R&D expenditure by source of funds by stakeholder type in 2015.

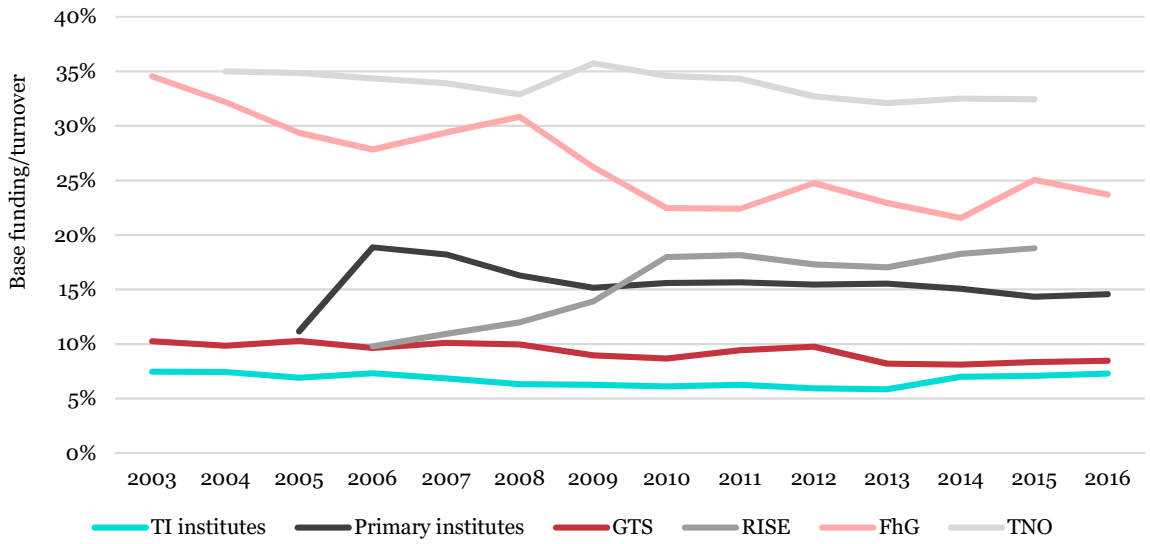


Source: NIFU.

Figure 129 further informs us of the research institutes' R&D funding mix, for statistical purposes classified as institutes serving government and institutes serving enterprises (just as in Figure 7).[80] As expected, the R&D expenditure of the former category is mainly funded by the government, while the EU only funds a minute share. In contrast, the institutes serving enterprises have a large share of their R&D expenditure funded by (Norwegian) industry[81], have much less funding from the government, but more than double as much from the EU (in relative terms). Both categories have nearly a quarter of their R&D expenditure funded by RCN. On average, the institutes receive 10 percent base funding[82], and most of the remainder is won in varying degrees of competition.

Figure 130 illustrates that the TI and Primary institutes receive considerably lower base funding than their counterparts in a selection of other countries (the Danish GTS Group, the Swedish RISE Group, the Dutch TNO, and the German Fraunhofer Society (FhG)). Some of these differences may possibly be attributed to the institute systems having different missions and responsibilities, and being obliged to use parts of their base funding to carry out certain tasks, but it is an unavoidable conclusion that particularly the TI institutes (that dominate the institutes serving enterprises category, as well as the institute stakeholder category in this report) and to lesser extent the Primary institutes are disadvantaged in terms of base funding. An institute's base funding is its main opportunity to develop new knowledge and competences to satisfy tomorrow's client needs, but it is also its main resource to fulfil the co-funding requirement in FP projects.

Figure 130 Base funding as share of turnover for a selection of institute groups.



Source: Technopolis analysis of institute annual reports.

A further piece of evidence to answer the question on whether stakeholders have sufficient national public funding is provided by the covariation analyses that suggest that there may be a compensatory behaviour among stakeholders. A further aspect of this is that stakeholders in the ICT area, which among the three topic areas receive the least national funding (compared to that applied for from the FPs), are the most active in H2020. On the same note, stakeholders in the health area, which receive the most national funding, are the least active in H2020. The covariation analyses are for methodological reasons certainly not conclusive, but taken together with the survey results and anecdotal evidence (both from

80 The institutes serving government include all the environmental, all but one of the social science, all but two of the primary industry institutes, and three of the technical-industrial ones, as well as 36 "other institutions". The institutes serving enterprises thus comprise the remaining technical-industrial, primary industry and social science institutes, as well as seven "other institutions". Source: NIFU.

81 A notable share of "Other abroad" is likely to be foreign industry.

82 "Årsrapport 2016. Forskningsinstituttene", RCN, 2017.

this study and previous ones), it seems clear that ample national funding (base and competitive funding together) is indeed a strong disincentive to FP participation. This is further corroborated by a study where UiO benchmarked itself with the universities of Copenhagen, Uppsala and Helsinki, as well as University College London. The study found that "there seems to be a direct connection between the relation of national funding and proposals to the EU FP [in the sense that] a decline in national funding is an incentive to apply to the FP".[83]

For the sake of completeness, NIFU's national statistics further reveal that industry funds 78 percent of its R&D expenditure itself, while 2 percent is funded by the government, 2 percent by RCN and 0.4 percent by the EU (the remaining is funded by "other" sources, national and foreign).

In summary, we have found that Norwegian HEIs and hospital trusts have quite benign R&D funding situations relative to their counterparts in the comparator countries: higher base funding and less funding won in competition. In contrast, Norwegian research institutes have very low base funding from an international perspective and win the vast majority of their R&D funding in competition. The answer to the question in the sub-section title is thus that HEIs and hospital trusts to a large extent have sufficient national public funding, whereas institutes on average certainly do not. (At the level of individual researchers the funding situation obviously can vary a lot.) Moreover, several different sources indicate that ample national public funding (base and competitive funding together) is a strong disincentive to FP participation. This seems to apply to any area, but our covariation analyses suggest that it also applies to the three topic areas.

8.3.2 To what extent are financial incentives for stakeholders weak?

There are at least two aspects to this question, the level of cost coverage that H2020 offers, and the explicit financial incentives offered by the base funding systems of public-sector stakeholders. Looking first at cost coverage, we note that the EC's ambition in H2020 to simplify participation and financial reporting have had different consequences for different stakeholder types. For HEIs, the revised cost models appear to have had limited impact on the effective level of cost coverage, whereas for institutes the effect has been a reduction from around 70 percent in FP7 to approximately 60 percent in H2020, according to SINTEF. (This reduction is mainly due to indirect costs (overheads) being limited to 25 percent in H2020, and institutes that have lower overheads than SINTEF should consequently have a higher cost coverage.) It is this funding gap that is the rationale for STIM-EU, which we will get back to shortly.

Base funding to public HEIs for education and research on average consists of almost 70 percent long-term strategic funding, plus a results-based funding component (*Resultatbasert omfordeling*, RBO) based on performance in education (25%) and research (6%) (figures for 2015). Until 2016, the research part redistributed a fixed amount of funding for the entire HE sector based on:[84]

- PhD degrees (30%)
- Income from EU (18%)
- Income from RCN and RFF (22%)
- Scientific publications (30%)

From 2017, the following adapted formula is practiced for the 30 percent RBO share:[85]

- An "open-budget" element accounting for 85 percent of the RBO share, where overall funding for the HE system can increase if the HEIs are successful. This element concerns education and is based on:
  - Student performance (completed study credit points) (64% of the RBO funding share)

[83] "EU-Benchmarking: Undersøkelse av faktorer som påvirker deltakelse i Horisont 2020," UiO, 2016. Our translation.

[84] "Finansiering for kvalitet, mangfold og samspill. Nytt finansieringssystem for universiteter og høyskoler", MER, 2015

[85] "OECD Reviews of Innovation Policy: Norway," OECD, 2017.

  - Graduation rate (15%)
  - PhD degrees (5%)
  - Student exchange (1.2%)
- A "fixed-limit budget" element for research accounting for 15 percent of the RBO share, allowing only for reallocation between HEIs. This element is based on four indicators: scientific publishing; income from RCN; income from EU and other public sources; and income from private sources; each valued at between 2.8 and 5 percent

The RBO amounts are calculated based on the performance of the past three years, and the "value" of EU funding has in practice varied considerably between years. In 2015, NOK1 in EU funding resulted in NOK1.04 in additional base funding to the university; in 2017, it is NOK1.374.[86] When HEI survey respondents say that financial incentives are not strong enough, part of the reason is surely that the RBO "bonus" goes to the university, and in most cases the individual that wrote the successful FP proposal and his/her research group sees nothing of it.

The four regional health authorities receive an annual operating allocation (base funding) and a grant earmarked for research, both provided through the government budget. The size of the earmarked grant for research from HOD to each regional health authority has a results-based component that since 2013 is based on income from EU, income from RCN, scientific publishing and PhD degrees. The weightings are set to a level corresponding to those of HEIs, so as to harmonise incentives.[87] Each regional health authority tops up its earmarked grant for research with a portion of its operating allocation for distribution in annual competitive research calls within the region. In the South-Eastern Norway Regional Health Authority, proposals are evaluated by Norwegian researchers from other regions and from abroad in roughly equal proportions.[88] There are many similarities in the announcement and management of these regional research funds, but there are also differences in how the funds are managed. Within a hospital trust, research is funded from its operating budget and through the regional competitive research calls. The hospital trusts' research is required to lead to better patient treatments and improvements to health services, and the regional allocation of research funding shall support their responsibility for research, strengthen health research in the region, and contribute to professional development and development of research expertise. A 2016 inquiry recommended that incentives and framework conditions for research, including cost models, should be made as similar as possible between regional health authorities and HEIs.[89] This and other recommendations of the inquiry are at present being considered.[90]

The national research institute base funding system, which includes the TI, SS, Primary and Environmental institutes (but not the "Other institutes" referred to in Chapters 3–5) also has fixed and results-based parts. The latter is based on four criteria:[91]

- Scientific publishing (30%)
- PhD degrees (5%)
- Income from abroad (including EU and private income) (20%)
- National commission income (45%)

The relative size of the results-based part varies between institute groups. In recent years, it has been 10 percent for the TI, SS and Environmental institutes (in the latter case since 2016 only) and 2.5 percent

86 "Orientering om forslag til statsbudsjettet 2017 for universitet og høgskolar", MER, 2016.

87 E-mail correspondence with HOD, 5 October 2017.

88 "Tildelingsprosess for regionale forskningsmidler i Helse Sør-Øst RHF", South-Eastern Norway Regional Health Authority, 2016.

89 "Samordning mellom universiteter og helseforetak. Identifikasjon av utfordringsbilder med forslag til løsninger", MER and HOD, 2016.

90 E-mail correspondence with HOD, 5 October 2017.

91 "Statlig basisfinansiering av forskningsinstitutter," RCN, 2014.

for the Primary institutes. The results-based part is capped for each institute group, so it is the group's own funding that is redistributed between individual institutes.

The STIM-EU measure provides institutes with additional funding in proportion to H2020 funding already granted. Since 2015, STIM-EU provides 33 percent in additional funding (NOK1 in EU funding results in NOK0.33 in STIM-EU funding), i.e. a much weaker incentive than the RBO bonus to HEIs. Institutes that participate together with Norwegian companies, Norwegian public-sector organisations (such as counties and municipalities, not HEIs and hospital trusts), or that coordinate projects receive funding in addition to the 33 percent, with partnering with companies counting for double as much as partnering with public-sector organisations or coordinating. There is no requirement that the STIM-EU support be used in the H2020 project(s) in question, so it is effectively at the disposal of institute management and is therefore, like the RBO bonus to HEIs an organisational incentive, not an individual. However, according to RCN, most of the STIM-EU funding is used to co-fund H2020 projects, but it is unclear whether this means that the individual who wrote the successful proposal directly benefits. As mentioned above, SINTEF argues that its cost coverage in H2020 is approximately 60 percent, and with another 33 percent from STIM-EU the resulting cost coverage should be around 80 percent (60%*1.33) (which agrees with information from MER). A funding gap thus remains that institutes have to find a way to fill, and with the low base funding of Norwegian institutes this is clearly a challenge.

The private sector's situation is naturally quite different from that of public-sector stakeholders, given that companies on average fund close to four-fifths of their R&D themselves. The SkatteFUNN tax incentive for R&D investments provides companies with a general incentive to engage in R&D. SkatteFUNN was introduced in 2002 and has been expanded several times since then in terms of what companies are eligible, how to value own work and maximum eligible amounts. It is a rights-based measure (no competition) that provides SMEs with a 20 percent tax relief on their R&D expenses, both own and subcontracted work, and large companies with an 18 percent tax relief. In practice, SMEs are the main users, since many large companies make little or no use of SkatteFUNN.

To summarise the answer to the question in the sub-section title, the financial incentives at organisational level seem quite strong for HEIs and hospital trusts (acceptable H2020 cost coverage plus a substantial bonus on H2020 funding granted), but weak for institutes (insufficient cost coverage even with STIM-EU). However, individual researchers rarely seem to directly benefit from these organisational-level incentives (cf. survey results).

8.3.3 To what extent are success rates higher in Norway?

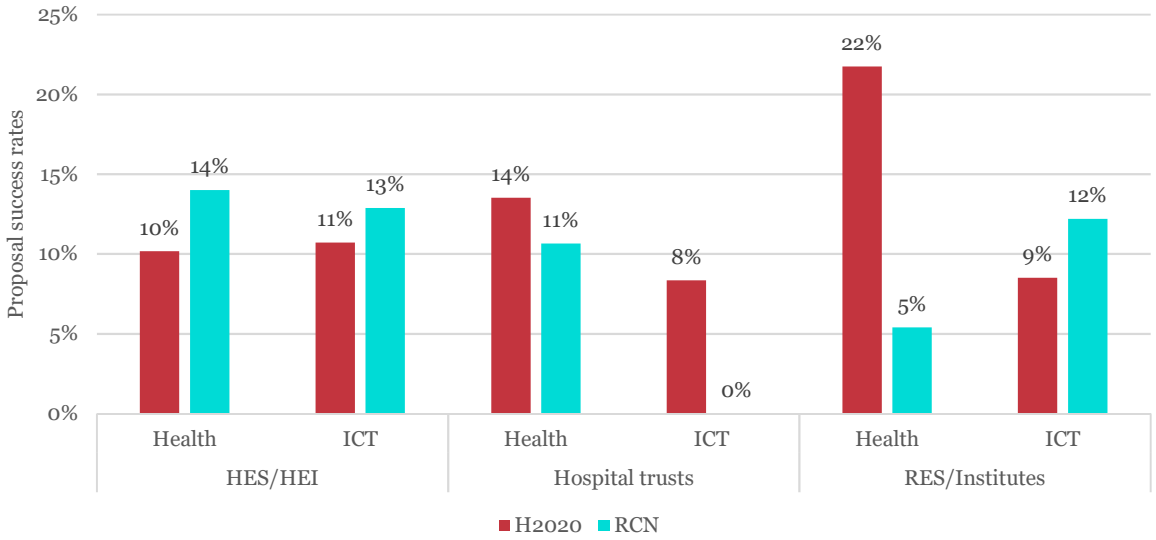
Everybody "knows" that FP success rates are lower than Norwegian ones, but to what extent is this objectively true?

Starting with proposals for basic research, we have compared H2020's pillar 1 Excellent Science[92], with RCN's Independent Projects (FRIPRO) programme, and more specifically in Medicine, Health Sciences and Biology (FRIMEDBIO) for comparison with H2020 health, and in Mathematics, Physical science and Technology (FRINATEK) for comparison with H2020 ICT. Figure 131 shows how H2020 success rates to date compare with RCN success rates by stakeholder category. The figure reveals that in three of the six topic area–stakeholder category combinations, RCN success rates were *lower* than in H2020 and in two cases much lower. In the three area–category combinations where RCN success rates indeed were higher, it was a matter of a mere 2–3 percentage point difference, so not such a major difference as some pundits would have it. Unfortunately, we lack comprehensive data on success rates in the research calls of the regional health authorities, but for 2017 the success rate in the South-Eastern Norway Regional Health Authority (which accounts for nearly two-thirds of all research in the regional health authorities) was 21.3 percent[93], obviously considerably higher than what researchers in hospital trusts have achieved in both RCN and H2020 calls.

92 Including ERC (54%), MSCA (23%), FET (13%) and research infrastructures (10%), where percentages refer to the original indicative budget breakdown.

93 "Sak nr 098-2016. Fordeling av forskningsmidler for 2017", South-Eastern Norway Regional Health Authority, 2016.

Figure 131 H2020 and RCN success rates for proposals for basic research, for health and ICT.[94]



Source: Technopolis analysis of eCorda and RCN data.

Figure 132 shows H2020 success rates for pillar 2 Industrial Leadership (LEIT) and pillar 3 Societal Challenges together, which essentially correspond to the multi-partner projects that we have analysed in Chapters 3–5. In this case, we lack direct RCN comparators for each topic area–stakeholder category combination, but other analyses have estimated success rates in RCN programmes (presumably excluding FRIPRO) to be 21 percent[95] and 26–29 percent[96]. Regardless of RCN comparator, it is obvious that in these cases H2020 success rates are notably lower than RCN's (and that of the South-Eastern Norway Regional Health Authority), so in this case the common perception is correct. Thus, an RCN thematic R&D programme that may have as an objective (among others) to stimulate FP participation, but that has a success rate that is notably higher than its FP cousin, in practice acts as a disincentive to FP participation, whereas one with a similar (or lower) success rate (e.g. NANO2021[97]) actually may act as an incentive.

The answer to the question in the sub-section title is thus that it is not necessarily true that success rates are higher in Norway when it comes to proposals for basic research. For HEIs it is nevertheless true that RCN's FRIPRO calls offer success rates that are higher than H2020's pillar 1, but the differences are not dramatic. In contrast, H2020's pillar 1 offers a better chance for proposals from hospital trusts being funded than FRIPRO does, but success rates in regional health authority calls appear to be considerably higher. For research institutes it depends on topic area; in health H2020's pillar 1 beckons with a four times higher success rate than FRIPRO, whereas in ICT the success rate is lower in H2020. However, for proposals for collaborative R&I it generally seems to be correct that success rates are higher (or much higher) in RCN programmes and in regional health authorities' calls than in H2020.

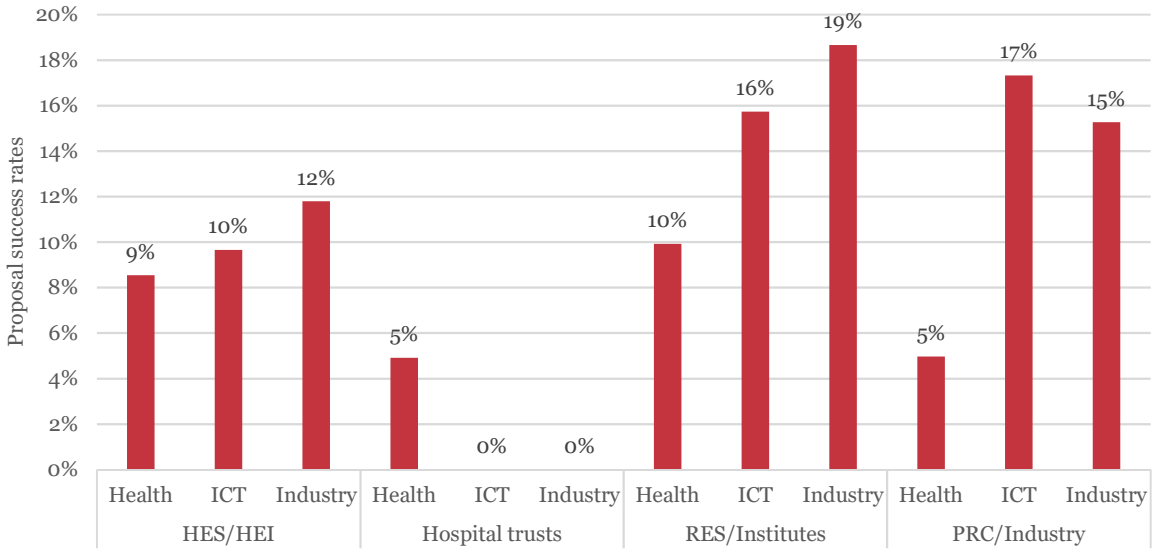
94 *Nota bene*:
- FRIPRO success rates are calculated for RCN grants in excess of NOK1m awarded 2013–2016
- There were only eight FRINATEK proposals from hospital trusts in our sample, all obviously unsuccessful. For all other area–category combinations, there were 240 or more FRIPRO proposals
- While the eCorda HES category corresponds rather well with RCN's HEI category, the eCorda RES category corresponds less well with RCN's institute category
- Since the eCorda proposal database for H2020 includes proposals that have not yet been evaluated, H2020 success rates are likely slight underestimations

95 "Forskningsrådet i tall 2016", RCN.

96 "Områdegjennomgang av Norges forskningsråd", MER, 2017.

97 A. Håkansson, J. Angelis and A.K. Swenning, "Evaluation of the RCN's NANO2021 programme", RCN, 2017.

Figure 132 H2020 success rates for proposals for collaborative R&I by topic area. [98]



Source: Technopolis analysis of eCorda data.

8.4 Addressing generic weaknesses

Looking at success rates in H2020 as a whole, Norway does quite well relative to the overall average, as well as to the average for the comparator countries. In the topic areas, Norway does very well in industry, average in ICT and poorly in health. The overall picture is the same for proposal success rates and participation success rates.[99] Having said that, in a number of sub-areas, particularly in health but also a few in ICT, some stakeholder types do remarkably poorly, and in many cases the success rates to date are zero despite significant numbers of proposals. This suggests that many proposers underestimate the competition they face in H2020, and a disproportionately large share of these proposals has been submitted by SMEs and universities. Moreover, the decreasing success rates of the TI institutes (including Norway's third most active FP proposer SINTEF) in many sub-areas – albeit in many cases from very high levels – are remarkable. In simple terms, these failed proposals may be placed in either of two broad categories: those that should never have been written, let alone submitted, and those that came close and that with enhanced advisory services could have been honed to be successful.

There are of course several possible reasons why a proposal fails. Among them are an uncompetitive consortium, that the R&I idea is not leading edge, that the proposal is poorly presented, and/or that the proposal does not capture the essence of the proposal assessment criteria.

In our surveys, only one in six FP participants stated that their H2020 participation is limited by their **international network**, while twice as high a share of non-participants did. This contradicts with the detailed analyses at the end of Chapters 3–5, which indicate that a large share of Norwegian proposers appears to be part of uncompetitive consortia, or wrong networks if you wish, since their success rates as partners are very low or zero. We find it worrying that a large majority of survey respondents seem unaware that their international networks oftentimes are not good enough.

A 2016 report that studied what constitutes a competitive consortium concluded that the partners' track record in terms of FP success rate is key, as is the centrality of the partners (i.e. their total number of unique partners in FP projects) and the status of university partners (i.e. their size, publication citations

98 For hospital trusts in ICT there were 36 H2020 proposals and for hospital trusts in industry there were 42 proposals. For all other area–category combinations there were more than a hundred proposals.

99 Looking only at multi-partner proposals, Norway's performance in health is average and ICT slightly above average, since we then eliminate the sub-programmes where Norwegian participation is well below average, notably Excellent Science.

and place in university rankings).[100] On the same note, a paper studying Norwegian H2020 participation concluded that the two main factors that increase the likelihood that a research organisation submits a successful proposal are prior FP participation (indicating persistence and learning effects from previous EU projects) and scientific reputation of the organisation.[101] Another paper similarly found that HEI participation is heavily concentrated to large universities with high international reputation. The reason being that FP participations generate new FP participations that build on already established collaborations, and an increase in reputation leads to more FP participations.[102]

National cooperation is also important and there is in several areas an issue with lack of critical mass due to insufficient cooperation between Norwegian stakeholders. Moreover, our analyses show that companies that partner with a Norwegian research institute have a higher overall success rate for multi-partner proposals (cf. Figure 25). This suggests that companies that do so benefit from the international networks and FP expertise of the research institute. (However, we acknowledge that this also may be a result of self-selection in the sense that more competitive companies may be more prone to partner with institutes.)

This study was not tasked with assessing the **quality of Norwegian R&I**, only to look at secondary sources, but bibliometric indicators, previously conducted area-level evaluations, and European Innovation Scoreboard data on innovation performance suggest that there may very well be a quality issue, at least in some sub-areas of health and in ICT. This is further underlined by the new OECD review of Norway's innovation policy, which states that the HE system "produces 'good, but not excellent,' science – at a high price", and goes on to note that:[103]

> *Various indicators show that Norway performs less well in terms of quality measures and lacks world-class environments. Its share of the top 10% most cited publications lags well behind that of the leading countries, including Denmark, Netherlands, Sweden and Switzerland. Other indicators, like Norway's low success rates at the European Research Council (ERC) and in publications in top journals, also indicate that the number of its world-class researchers and environments is still too low.*

The aforementioned UiO study also stressed the need for research quality to succeed in the FPs and conceded that the research quality of three out of the four universities that UiO benchmarked itself with (that had all been more successful in FP7) was somewhat higher.[104] However, given that we are only dealing with secondary sources, we cannot draw any definitive conclusions on quality.

An additional factor that is highlighted in our area-level analyses is that the change in nature and focus of R&I in H2020 (compared to FP7) seem to have had adverse effects on the competitiveness of Norwegian proposers in some sub-areas (e.g. Clinical research and industry-relevant R&I in Energy). In these sub-areas, the **trend in H2020 towards more application-oriented and interdisciplinary R&I** seems to have caught Norwegian actors unprepared, especially in the universities but also in the TI institutes; this suggest a misalignment between their R&I competence and the competence and expertise required to succeed in H2020, or alternatively a failure to fully appreciate the implications of this change.

We had hoped to get access to the assessment scores for Norwegian H2020 proposals by assessment criterion with the intent of identifying more precisely where the weaknesses lie, but this was eventually

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100 F. N. Piro, L. Scordato and D. W. Aksnes, "Choosing the right partners. Norwegian participation in European Framework Programmes," Report 2016:41, NIFU.

101 S. G. Enger and F. Castellacci, "Who gets Horizon 2020 research grants? Propensity to apply and probability to succeed in a two-step analysis," *Scientometrics*, 109:1611–1638, 2016.

102 B. Lepori, V. Veglio, B. Heller-Schuh, T. Scherngell and M. Barber, "Participations to European Framework Programs of higher education institutions and their association with organizational characteristics," *Scientometrics*, 105:2149–2178, 2015.

103 "OECD Reviews of Innovation Policy: Norway," OECD, 2017.

104 "EU-Benchmarking: Undersøkelse av faktorer som påvirker deltakelse i Horisont 2020," UiO, 2016.

not possible. Instead we have conducted a basic analysis of the overall proposal score and ranking that is available in eCorda. Given the "coarseness" of this information, we cannot draw any decisive conclusions on proposal quality, but the analysis suggests that **Norwegian proposals are more likely to be rejected** than proposals from the comparator countries (i.e. not reach the coveted threshold). It also seems as if proposals to the SME, ICT and Health sub-programmes fare worse in this respect than proposals from the comparator countries (and proposals to many other sub-programmes). Appendix D.7 presents the results of this analysis in some detail.

One of the effects of the shift in priorities in H2020 towards innovation and societal challenges is also the reduced budget allocated to the more fundamental areas of research, thus creating particularly high levels of competition, e.g. in the FET programme, where oversubscription has led to funding of only about 9 percent of proposals that scored above the threshold. By comparison, about 27 percent of such proposals received funding in LEIT-ICT, and between 30 percent and 40 percent in most of the Societal Challenges.[105]

The long-term decline in the financial return to Norway from successive FPs, though with an improvement in H2020 (cf. Section 2.2 and Figure 125), occurs in the context of significant growth in FP budgets, which may not be matched by the growth in the Norwegian researcher community. Since Norwegian proposal activity is on par with that of the comparator countries when normalised for the size of their respective researcher communities (cf. e.g. Figure 18 and Figure 19), it would likely be a major challenge to increase proposal activity further without a corresponding increase in the number of researchers. However, an increase in proposal and consortium quality, which should lie within reach, could of course increase the financial return.

Our review of previous Norwegian FP evaluations concluded that Norwegian stakeholders with time have become skilled FP participants that have proved capable of achieving high success rates. Our international comparison of FP support measures, including two country case studies, shows that **most countries gradually have focused their financial support measures** (to stakeholders in greatest need, to specific priority areas, etc.) as their R&D communities have built up FP experience, and some countries, e.g. Austria, have completely phased out such support. In contrast, Norway has made its portfolio of support measures more all-encompassing and more generous with time (as recently as May 2017, the maximum levels of PES grants were raised).

Although we concluded in 2013 that PES had been very effective during FP7,[106] we cannot help but wonder what the generous support system coupled with the benign base funding system does to the mindset and competitiveness of researchers in HEIs and hospital trusts in the longer term. We believe that researchers that manage to fund their research without fighting hard for funding and that, should they want to try the FPs, receive additional funding to do so, risk becoming – in the memorable words of the EC's Director-General for Research and Innovation (and gleefully quoted by UiO's past rector) – "fat cats". As argued earlier in this chapter, from the individual researcher's perspective it is completely rational and utterly human to focus on the lower-hanging fruit (in this case national funding) rather than FP funding. We harbour equivalent concerns for management of HEIs and hospital trusts. We believe that **not being exposed to international competition is detrimental to the long-term competitiveness** of both individual researchers and their employers.

The situations for institutes and SMEs are different. Given their very low base funding and H2020's (for them) challenging cost model, **institutes need and deserve financial compensation** if they are to maintain their presence in the FPs. We understand that STIM-EU is seen as alternative to increasing the base funding, and it is in administrate terms in practice treated as an extension of the base funding. Co-funding to institutes that participate in the FPs is further motivated by institutes being most important for industry's FP participation and long-term access to up-to-date knowledge. **SMEs are worthy of financial support** for different reasons. On the one hand, they are typically the financially most

105 "In-depth Interim Evaluation of Horizon 2020", Commission Staff Working Document, SWD(2017) 220 final.

106 T. Åström, A. Håkansson, G. Melin, P. Stern, P. Boekholt and E. Arnold, "Impact evaluation of the Research Council of Norway's support measures to increase participation in EU-funded research", RCN, 2013.

vulnerable stakeholders, and on the other hand there is a constant supply of newly started SMEs that will always need help (advice and co-funding) to learn how to succeed in the FPs.

In contrast, large companies usually are not motivated by public financial support measures. A large company tends to adhere to its R&I strategy and is not easily lured into deviating from it. On the other hand, if public funding may be used to realise what is already in the R&I strategy, they are not beneath making use of it.[107]

While the title of this study sets the tone with its focus on increasing Norwegian FP participation, we believe that achieving more than a minor increase in the financial return is an uphill battle given the issues touched upon earlier in this chapter – unless policymakers are prepared to take some tough and likely unpopular decisions. If not, then the government's 2 percent objective may not be realistic to achieve given that the Norwegian researcher community cannot realistically be expected to be notably more effective than its counterparts in the comparator countries, which in the short term would be required to keep pace with the growth in the FPs. However, there will still be good opportunities to fulfil the government's qualitative objectives for R&I cooperation with the EU, namely to increase the quality and competitiveness of Norwegian R&I; to contribute to valorisation and economic development; to contribute to sustainable social development and meeting societal challenges; and to develop the Norwegian R&I sector.[108]

8.5 Opportunities and weaknesses highlighted in topic-area analyses

If we then move on to the results of our analyses by topic area, we have in Chapters 3–5 determined some areas of Norwegian strengths that could be used as leverage to increase FP participation. In the following three sub-sections, we summarise where we believe that there are opportunities to increase FP participation, and in the fourth we summarise the area-specific weaknesses and outline how these could possibly be addressed.

8.5.1 Health-related R&I

The **ERC** and **MSCA grants** are largely unexploited instruments for Norwegian health researchers. They have made very little use of these opportunities (a meagre 1% and 3% of all funding in the ERC and MSCA sub-programmes, well below all comparator countries) and have had lower success rates (6% and 12%, respectively) than the comparator countries. Specific actions to identify, encourage and provide advice in the proposal process of these individuals would be beneficial.

Overall, Norwegian health actors have not been able to exploit the real potential of H2020 even in areas where they have strength and capacity. The crux of the matter for Norway's modest performance is in the low success rate: an average of 10 percent, below the H2020 average of 13 percent. Norway's ability to join successful consortia as partner is below that of comparator countries and it achieves low success rates (9%) when it coordinates proposals.

PerMed is the largest opportunity area in health and covers a range of R&I topics where Norway has successfully competed in the international arena. Universities and hospital trusts actively participate in H2020, but success rates have collapsed for both, and their few attempts to coordinate proposals have not led to any funded project. SMEs participate in increasing numbers, but their success rate in H2020 is too low to make the effort worthwhile.

As for **Clinical research**, universities, hospital trusts and the private sector (especially SMEs) were active participants in FP7, but participation has dropped in H2020. In IMI, in particular, hospital trusts have participated in very few proposals and the private sector has not participated at all. The real question is whether hospital trusts and SMEs are in need of additional health R&I funding or whether their needs are more than satisfied by national funding. It would be a critical opportunity for Norwegian

[107] T. Åström, A. Håkansson, M. Bergman, E. M. Johansson, M. Terrell and R. Danell, "Harder, lighter and faster – Impact assessment of a selection of Vinnova's materials-related programmes", Vinnova Analys VA 2017:02.

[108] "Strategi for forsknings- og innovasjonssamarbeidet med EU. Horisont 2020 og ERA" ("Strategy for research and innovation cooperation with the EU. Horizon 2020 and ERA"), MER, 2014.

stakeholders to be part of the bloodstream of European clinical research and learn how international colleagues address challenges that are common across the continent. Clinical research is best done in collaboration across private, clinical and academic organisations, and it would be reasonable to suggest that SMEs could approach potential partners at universities, where extensive FP support functions are available to facilitate in H2020 proposal preparations.

Health ICT represents about one fifth of all opportunities and it a growing area of future health R&I. However, the Norwegian success rate is at 3 percent uncomfortably low. The shift from more basic research in FP7 to challenge-led R&I in H2020 on ageing and integrated care may have caught the Norwegian research community by surprise. Universities have increased their participation, but it has obviously proved difficult to convert these efforts into successful proposals. The TI institutes show a similar picture with a sharp drop of success rate. Hospital trusts, university colleges, and SMEs all pursue these opportunities vigorously, in effect doubling FP7 level activities, but no proposal has been successful to date. These developments clearly show that this subject area requires major attention. It shows that the two disciplines (health and ICT) have not been effectively integrated in Norway to enable the preparation of sufficient quality proposals in this field.

8.5.2 ICT-related R&I

Norwegian participation in ICT R&I is characterised by low proposal activity relative to the comparator countries and average success rates. There are significant differences in the competitiveness of the stakeholders involved, as well as in participation patterns. Institutes and industry show good levels, and universities modest levels, while university colleges have success rates that are well below the FP average. Both SMEs and large companies have increased their involvement, and the latter have a high level of competitiveness. In contrast to health, when Norwegian actors take the lead in multi-partner proposals, they reach higher success rates than their peers in almost all comparator countries. Especially the research institutes have the capacity selectively to invest their efforts where they have the required competence and then set up competitive consortia. This is less so for the universities, and not at all for the private sector, both SMEs and large companies.

The proposal participation pattern in the **ERC and MSCA sub-programmes** is identical to that in health. The success rate of Norwegian ERC proposals is well below that of both comparator countries and the overall average, whereas Norwegian MSCA proposals do slightly better. Actions to identify, encourage and provide advice in the proposal process would be beneficial also in this topic area.

Norway's strength is especially in the field of **Communication technology and infrastructure** (COMM), where the H2020 focus on interdisciplinary R&I clearly is in line with the interest and competence of Norwegian actors. This has spurred an increase in proposal participation by industry (especially SMEs), as well as a rising involvement of the Environmental and Primary institutes, all reaching high success rates – except for the SMEs. Universities and SMEs are the weak links in this area, lacking both the competence to coordinate and an integration in competitive international networks. For the universities, the rather low level of Norwegian R&I in this field of ICT R&I (based on bibliometric data) no doubt plays a role.

There are three areas in the field of ICT where we see a potential for enhancement of Norwegian performance:

- In **Components and systems** (MICRONANO), there are clear signs of crisis in Norwegian competitiveness, possibly due to the more interdisciplinary nature of the R&I funded in the relevant JTI (ECSEL), but not only. The high Norwegian success rates are thanks to the competence of the partner organisations; none of the (very few) proposals led by Norwegian actors has been successful. This is a non-sustainable situation; a more active involvement in ECSEL by Norwegian actors is key for an ongoing competitiveness in this area
- The potential for growth in the field of **Technologies for digital content and information management/systems** (CONT) lies especially in increased participation of other research institutes, e.g. the Environmental ones, exploiting the H2020 trends towards interdisciplinary R&I.

Specifically, increased Norwegian participation is dependent on an increase in competence for application-oriented R&I among universities, more attention to international networking among both universities and TI institutes, and a strengthened participation and integration in international networks for other research institutes

- The sub-field **Next-generation computer systems** (NEXTGEN) is a niche area of interest and competence for Norwegian actors, especially the universities. Universities are key to Norwegian participation, while TI institutes have not proven to be qualified as coordinators and seem to engage in uncompetitive networks. Enhanced university-TI institute collaboration in this area would be beneficial to boost a more wide-spread competence in this field

Sub-fields where we doubt that a substantial increase in participation is possible without a strong RCN intervention are:

- The sub-field **Robotics, automation and smart environments** (ROBOTICS), another niche area for Norwegian actors, has seen an increase in interest, especially among SMEs and with some success. Universities and TI institutes, instead, seem unqualified as coordinators and all stakeholder types seem to be in the wrong networks. More attention from RCN to fund R&I in this field could be useful, seeing the rising importance of robotics R&I in H2020 – provided there is a minimal critical mass to build on
- In the **Software and services (SW)** area, there is a strong increase in SME participation, but both SMEs and universities – the key actors in this area – have rather low success rates. Universities are clearly not integrated in competitive networks. The TI institutes were key actors in FP7, but the pronounced application-orientation in H2020 seems to be an issue for these actors. An intervention by RCN to strengthen the competitiveness of the key actors in this field seems to be the only possible way to change the situation

8.5.3 Industry-relevant R&I

Overall, Norway is quite active in proposals for industry-relevant R&I and its proposal success rates are higher than in all comparator countries. For the specific stakeholder groups, the success rates are nevertheless only average compared to the comparator countries, due to significant differences between countries in the degree of joint proposal participations. The share of multi-partner proposals is for Norway at an average level, but Norwegian actors more often take the lead than their peers in the comparator countries. The high success rates of the proposals, no matter if led by Norwegians or not, indicate a very good integration in competitive international networks, as well as Norwegian competence.

Overall, in H2020, companies have taken over the leading position in industry-relevant proposals from the institutes. Also in this case, the performance is significantly different per type of stakeholder. SMEs are very active, but have seen their success rates drop below the FP average, while large companies have success rates above the Norwegian and the overall FP averages. Universities are moderately competitive, while university colleges continue having low success rates. Among the research institutes, we note that the TI institutes have decreased their participation and have experienced a significant decrease in success rates. In contrast, all other institute groups have increased participation and are now more competitive than the TI institutes.

Norwegian SMEs have among the highest participation rates in phase 1 of the **SME instrument**, but among the lowest in phase 2. However, they have the highest success rate for their phase 2 proposals, which suggests a high level of selectivity and capacity to self-assess competitiveness.

Bioeconomy and **Ocean** are the two areas where Norwegian competitiveness is highest. In both areas, it builds upon the strength of the research institutes (in the former, the Environmental institutes; in the latter also the Primary and TI institutes) and a good involvement of competitive large companies, in the case of Bioeconomy sustained by the BBI JU. In both areas, the SMEs are the weak link, which see their high interest and efforts very poorly rewarded. A stronger integration of SMEs in the Norwegian research communities would be beneficial here. In addition:

- In the case of Bioeconomy, a more active involvement in the BBI JU by TI institutes and universities would strengthen Norwegian performance in this area. There is room also for strengthening the international integration of the Norwegian community in this field
- In the case of Ocean, the high joint proposal rate shows a strong potential for knowledge exchange among Norwegian stakeholders and future growth in competence. The Norwegian critical mass for competitive R&I is high in this field, where also universities show a very good performance

Potential areas of strength are the industry-relevant **Manufacturing** and **ICT** areas. There is an increasing interest from industry, but while large companies enjoy good success rates, SMEs do not. The TI institutes keep up their strong position in Manufacturing, but are losing competitiveness in ICT, while universities are losing competitiveness in both areas. The dynamics in H2020 allow for a stronger involvement of the Environmental institutes, and with high success. In both areas, but especially in Manufacturing, the required level of competitiveness is there; the key weakness lies in the integration in competitive international networks.

The two industry-relevant areas where the potential for growth in Norwegian participation is most questionable are **Energy** and **Transport**. For both areas, the picture emerging from our analysis is one of Norwegian stakeholders having high levels of competitiveness, but that struggle to keep up their positions due to the shift in focus and/or nature of R&I in H2020. These stakeholders are strongly integrated in competitive international networks, but in both areas and for nearly all actors, the weakness lies in lack of required competence, or capacity to produce "H2020-adequate" proposals.

8.5.4 Addressing area-specific weaknesses

When considering the weaknesses in the specific health, ICT and industry-relevant research areas, common patterns emerge that can be categorised under the headings of weak networks and weak capabilities.

Weak networks relate to a lack in **national cooperation** among the different actors in the field, hindering the creation of critical mass in H2020-relevant fields and/or multidisciplinary R&I, and an insufficient integration and active involvement in **international competitive networks**. An example is the potential benefit that could derive from a stronger collaboration between the TI institutes and universities in the NEXTGEN area (an area in the FPs where the Norwegian joint proposal rate is among the lowest).

Measures to address weak networks at the national level and fostering the integration of the R&I communities could include the development of specific action lines in RCN programmes to **foster H2020-relevant collaboration among the actors in the specific area** by adopting a value-chain perspective. A prime measure to address weak networks at the international level is to support and **foster active involvement of Norwegian stakeholders in JTIs and cPPPs**, i.e. not only as participants in projects, but as active members of boards and working groups (such as is already done though some of RCN's thematic programmes). Another measure is to further incentivise Norwegian researchers to make more of the opportunities offered by the MSCA sub-programme, where Norwegian participation as outgoing fellows is particularly low (in addition to the top-up co-funding measure that RCN already has in place). Yet another measure could be to **open specific action lines in RCN programmes to multinational R&I teams**, thus fostering stronger international relationships and international knowledge transfer beyond the FP structure. Such multinational action lines might also act as drivers for future FP participation by stakeholders that are not yet involved. Finally, financial measures could also be defined to **encourage higher joint FP proposal rates** (i.e. national partnering in FP proposals; in addition to the "bonus" that already exists in STIM-EU), thus exploiting the strong positions in international networks of large companies, research institutes or universities, depending on the field.

Weak capabilities relate to a lack of **competence** among stakeholders effectively to compete in H2020 in terms of for example applied or multidisciplinary R&I. An example is the clear difficulty encountered by the stakeholders in the ENERGY area in keeping pace with the changes in FP priorities and requirements between FP7 and H2020. Measures addressing such shortcomings can include

specific action lines in RCN programmes to foster applied or multidisciplinary R&I, the **creation of learning opportunities** such as subsidies for international conferences on specific themes, **discussion arenas**, **working groups** etc. (There are also weak capabilities in terms of stakeholders not appearing to fully appreciate the implications of the change in nature and focus of R&I in H2020 (compared to FP7), but this generic weakness has already been discussed above.)

We refer to the conclusive sections of Chapters 3–5 for concrete examples of weaknesses and considerations on relevant specific measures, and in Table 26 we summarise the main weaknesses and the principal stakeholder types concerned.

Table 26 Main area-specific weaknesses and stakeholder types concerned.

	Weak networks		Weak capabilities
	National cooperation between … – …	**International competitive networks of …**	**Competitiveness**
Health			
Clinical research	Universities – SMEs	Universities, SMEs	
Health ICT	Hospital trusts – universities/ TI institutes/SMEs	Hospital trusts, TI institutes, SMEs	Hospital trusts, university colleges, SMEs
PerMed	Hospital trusts – universities/ SMEs	Hospital trusts, SMEs	Hospital trusts, SMEs
ICT			
COMM		Other research institutes	Application-oriented research (universities)
CONT	Universities – TI/ Environmental institutes	Universities, TI institutes	Application-oriented research (universities)
MICRONANO	Industry – TI institutes	Large companies, TI institutes, SMEs	Universities, TI institutes (electronics)
NEXTGEN	Universities –TI institutes	TI institutes	TI institutes
ROBOTICS	Industry – universities/institutes	Universities, TI institutes	All stakeholders
SW		Universities	Application-oriented research (TI institutes)
Industry			
BIOECONOMY	Primary institutes – TI institutes/universities	TI institutes, universities, SMEs	TI institutes, universities
OCEAN	SMEs – universities/institutes		Primary institutes, large companies
Industry-relevant ICT	TI/Environment institutes – universities		Universities, TI institutes (electronics)
MFCT	TI /Environment institutes – universities		Universities
ENERGY		TI institutes, universities, SMEs	All stakeholders
TRANSPORT		TI institutes, universities, SMEs	Large companies, universities

8.6 Recommendations

Based on the analyses presented in this report, and in particular the previous sections of this chapter, we have outlined a set of more or less challenging recommendations that ministries, RCN, IN and stakeholder organisations may want to consider in order to increase Norwegian FP participation. These recommendations are in addition to the area-specific micro-level suggestions summarised in the previous section.

Several of our recommendations refer to PES2020 and STIM-EU, but since both these measures will be evaluated in 2018, we propose that implementation of any of the more fundamental recommendations be put on hold until this evaluation is concluded in autumn of 2018.

8.6.1 To ministries

- Reconsider, or relax, the 2 percent objective:
  - It may not be completely realistic to achieve given the significant increase in competition for FP funding caused by lower national funding in many EU Member States
  - The financial return is not the most relevant indicator of success in FP participation. Though we realise the difficulty in defining and monitoring output-level indicators based on the government's qualitative objectives, a focus on such long-term impact (rather than on short-term input) may be more conducive to making the most of the FP association
  - Proposers and non-proposers appear fed up with being encouraged to increase participation or to participate at all. "Why should we bother?", many seem to wonder. A message focusing on the inherent values of international collaboration and competition would likely be more effective than a focus on the financial return and increased participation come what may
- Increase financial incentives for HEIs and regional health authorities/hospital trusts to participate in the FPs. By this we do *not* mean to increase their base funding, but to tie a significantly larger share of it to foreign funding secured, and possibly also to national partnering in such projects. Stronger financial incentives ought to make management more positively inclined to encourage FP participation, which nearly a third of survey respondents say management currently does not
- Increase the competitive element for researchers in hospital trusts by raising competition from regional to national level. Low competition is not conducive to building competitiveness
- Increase resources for STIM-EU to allow for increasing the co-funding percentage to make it realistic for institutes to increase their FP participation without having to sacrifice other important competence-development activities. This should also contribute to making management more positively inclined to encourage FP participation
- Decrease resources for PES2020 within a few years to account for the changes in PES2020 proposed for RCN below. Most countries have gradually focused or even phased out their financial support measures as their R&D communities have built up FP experience. Providing funding to apply for funding sends the wrong message to organisations and individuals that have R&D as a core activity (i.e. HEIs, institutes and hospital trusts); most important proposals likely will be produced without PES2020 funding
- Increase funding for R&I in ICT, which is seriously disadvantaged at national level, to increase national capacity. ICT is not only an enabling technology, it is also a field of R&I where Norwegian stakeholders have potential for increased FP participation

8.6.2 To RCN

<u>International Unit/NCPs:</u>

- Continue communicating to stakeholders that:
  - H2020 is more focused towards application-oriented and interdisciplinary R&I (than previous FPs), which requires a different mindset when defining a project and writing a proposal. Our analyses indicate that this change has not been fully understood by many proposers
  - FP competition is fierce, so submitting half-hearted proposals is a waste of time and energy. Our analyses show that a large share of Norwegian proposals do not reach the threshold, and in this respect they fare worse than proposals from most comparator countries
  - It is crucial to choose the very best partners possible. Communicate what previous studies and scientific papers have found. Most survey respondents seem to believe that they have good enough international networks, but our analyses suggest that many stakeholder organisations are engaged in uncompetitive networks

  - In Excellent Science, H2020 success rates are not bad, and in some cases higher than in FRIPRO. There seems to be a misconception that success rates in RCN programmes are always higher, which our analyses show is not correct
  - H2020's questionable reputation among non-participants is exaggerated. FP participants – who know what they are talking about – see significantly fewer deterrents and lower barriers than non-participants
  - RCN and IN have a range of advisory services and financial support measures for companies. A notable share of survey respondents asks for support services that already exist
  - A company partnering with a Norwegian research institute in a multi-partner proposal is more likely to see the proposal funded (than if the company were the only Norwegian participant). Doing so means that the company may benefit from the networks and expertise of the institute

<u>Department for Research-driven Innovation/PES2020 administration:</u>

- Keep PES2020 for:
  - Further scaling up and professionalising EU support functions in the larger public-sector stakeholders for another few years before discontinuing this support (parts of the PES2020 block grants already fund such activities) – with the exceptions listed in the following sub-bullets. Supporting proposal production and administering ongoing projects are surely core activities of HEIs (including university hospitals) and larger institutes. This probably means leaving behind, among others, smaller university colleges, hospital trusts and institutes, which is in line with recommendations of a 2016 report to RCN[109]
  - Influencing processes and calls. A previous evaluation concluded that similar measures in RCN's thematic programmes probably were a good long-term investment[110], and this PES2020 measure is judged effective by the present survey respondents
  - Coordinators to produce multi-partner proposals. Proposal coordination is most challenging and Norwegian-coordinated projects have a better chance of contributing to fulfilment of the government's qualitative objectives for R&I cooperation with the EU than regular participation
  - SMEs to produce proposals, both as coordinators and partners. Many SMEs are financially vulnerable and inexperienced in FP participation, and support for proposal production is likely a prerequisite for a large share of SMEs
- Phase out PES2020 for:
  - Finding calls and partners. These are tasks that surely will be carried our also without explicit funding if they are important enough for the individual and/or the organisation
  - Regular participation. Contributing to a proposal as partner is not such an arduous task, and surely will be carried our also without explicit funding if the proposed project is important enough for the individual and/or the organisation
  - "Single-partner coordinators" to produce proposals (excluding SMEs). Such proposers are dominated by HEI researchers that in other countries are quite capable of producing such proposals without dedicated funding, despite typically having less benign funding situations
- Devise a system to identify high-quality Norwegian-coordinated multi-partner proposals that just missed being funded, and supply these coordinators with professional one-on-one assistance to hone their proposals ahead of resubmission (in approximate analogy with FRIPRO's support to proposers who made it to ERC stage 2 without being funded, which should be kept). It is true that in many cases there will not be another identical call, but it is still quite common that almost successful proposals are "recycled" and adapted to fit a related call. Assisting proposers that just

109 F. N. Piro, L. Scordato and D. W. Aksnes, "Choosing the right partners. Norwegian participation in European Framework Programmes," Report 2016:41, NIFU.

110 T. Åström, A. Håkansson, G. Melin, P. Stern, P. Boekholt and E. Arnold, "Impact evaluation of the Research Council of Norway's support measures to increase participation in EU-funded research", RCN, 2013.

about made it ought to be well-invested funding – and should hopefully only be needed once per individual researcher

Department for Research Institute Policy:

- Increase the existing weighting in STIM-EU for participation together with Norwegian companies. Partnering with a company already yields a "double bonus", but an even stronger incentive in this respect ought to result in increased company participation
- Investigate the causes behind the notable drop in the TI institutes' success rates and support them in addressing it. Given the TI institutes' dominating role in Norwegian FP participation, addressing this problem ought to be a key priority also for RCN

Programme managers:

- Increase competition in (RCN's) thematic programmes. Norwegian proposers experience less competition for funding than their peers in most other countries, which risks making them less competitive in the FPs
- Keep, or expand, (RCN's) programme-level funding for influencing processes and calls, which has been found effective (see PES2020 recommendation above), as well as selective co-funding to compensate public-sector stakeholders for low cost coverage in JTIs and JUs. Providing some level of co-funding to SMEs also may be warranted. Participation in JTIs and JUs is crucial to address the weaknesses of many stakeholders' international networks

Chief Executive's staff:

- Gain access to the proposal assessment scores for Norwegian H2020 proposals by criterion to get a more detailed understanding for why proposals fail. Communicate the conclusions to stakeholders and consider adapting support measures to the findings
- Try to understand why the Netherlands is so successful in the FPs despite having phased out most financial FP support measures. Do the Dutch financial measures that have broader objectives than to facilitate FP participation offer some useful lessons?

8.6.3 To IN

- Continue communicating to companies that:
  - H2020 is more focused towards application-oriented and interdisciplinary R&I (than previous FPs), which requires a different mindset when defining a project and writing a proposal. Our analyses indicate that this change has not been fully understood by many proposers
  - FP competition is fierce and that there is no point in submitting half-hearted proposals. Our analyses show that many SMEs are engaged in multi-partner proposals of particularly low quality, both as coordinators and partners
  - It is crucial to choose the very best partners possible. Communicate what previous studies and scientific papers have found. Our analyses suggest that many SMEs are engaged in uncompetitive networks
  - H2020's questionable reputation among non-participants is exaggerated. FP participants – who know what they are talking about – see significantly fewer deterrents and lower barriers than non-participants
  - IN and RCN have a range of advisory services and financial support measures for companies. A notable share of survey respondents asks for support services that already exist
  - A company partnering with a Norwegian research institute in a multi-partner proposal is more likely to see the proposal funded (than if the company were the only Norwegian participant). Doing so means that the company may benefit from the networks and expertise of the institute
- Continue providing SMEs with professional one-on-one assistance with proposals, including discouraging submittal of half-hearted proposals

8.6.4 To stakeholder organisations

There is hopefully no doubting that competition and internationalisation enhances an organisation's competitiveness in the longer term, so FP participation is important. Therefore:

- Develop and implement an internal strategy – including an action list – to increase FP participation. Management commitment is a prerequisite for success, and many proposers and non-proposers feel that their management discourages FP participation
- Allocate significant resources to expand and professionalise the organisations' internal EU support functions (or establish one from scratch) – both to increase proposal competitiveness and to help administer projects, with emphasis on support to coordinators
- Focus on quality of proposals, not quantity. Establish internal system for pre-screening of proposals to support promising proposal ideas (and kill the rest), such as for example SINTEF has. The evidence is undisputable: submitting a half-hearted proposal is a waste of time and energy
- It is crucial to choose the very best partners possible. Any foreign partner is not good enough:
  - Understand what previous studies and scientific papers have found when it comes to successful FP partnering
  - Critically assess whether current partners really are sufficiently competitive
  - Companies should team up with a Norwegian institute to increase the chance of success for multi-partner proposals
- Devise internal system to incentivise employees to take FP initiatives (e.g. promotion, salary increase, one-time bonus payment, one-time extra resources to research group, reduced teaching duties for HEI researchers, dedicated competence development (external course, conference attendance) etc.). The individual's initiative and enthusiasm are key
- Regional health authorities should incentivise hospital trusts and SMEs to join European clinical research networks and participate in pan-EU clinical trials supported by H2020
- Encourage employees to volunteer as proposal reviewers for the EC. This the very best way to understand what it takes to write a successful proposal. Such work is certainly poorly paid for a Norwegian, but there is nothing preventing an employer from allowing the work to be done during regular office hours

Appendix A Interviewees and project meeting participants

A.1 Interviewees

Kristin Andersen	RCN
Linda Bell	Vinnova
Marleen van den Berg	Netherlands Enterprise Agency
Melanie Buscher	Ministry of Higher Education and Science, Denmark
Eva Camerer	IN
Kim Davis	RCN
Wilfried Diekmann	German Aerospace Center
Maiken Engelstad	HOD
Hilde Erlandsen	RCN
Torsten Fischer	KoWi
Stefan Gundersen	RCN
Geir Ove Hansen	IN
Valentina Cabral Iversen	St. Olavs University Hospital
Per M. Koch	IN
Ernst H. Kristiansen	Forskningsinstituttenes fellesarena (FFA)/SINTEF
Øystein Kruger	South-Eastern Norway Regional Health Authority
Jonna Lehtinen-Salo	Ministry of Economic Affairs and Employment, Finland
Tore Li	Confederation of Norwegian Enterprise
Helle Margrete Meltzer	Norwegian Institute of Public Health
Kai Mjøsund	RCN
Kristine Naterstad	UiO
Berit Nygaard	RCN
Hjørdis Møller Sandborg	HOD
Nina Sindre	NTNU
Evelyn Smith	Enterprise Ireland
Vetle Nordli Syverud	Haukeland universitetssjukehus
Mette Topnes	UiO
Paul Vigmostad	Smart Care Cluster
John Vigrestad	RCN

A.2 Participation in Advisory Committee meetings

Advisory Committee		*Kick-off meeting 10 March*	*Interim meeting 31 May*	*Validation workshop 15 September*
Kristin Andersen	RCN	x	x	x
Bente Bakos	RCN	x	x	x
Eva Camerer	IN			x
Kim Davis	RCN	x	x	x
Hilde Erlandsen	RCN	x		
Pål Gretland	NFD	x	x	x
Stefan Gundersen	RCN	x	x	
Per Kock	IN	x		
Jannicke Ludt	RCN	x		
Kai Mjøsund	RCN	x		
Tom-Espen Møller	RCN	x	x	x
Marthe Nordtug	MER	x	x	x
Hjørdis Sandborg	HOD	x		
Rune Rambæk Schjølberg	RCN	x	x	x
Rolf Egil Tønnessen	NFD		x	
Others				
Simen Gangnæs	MER		x	
Ingerid Gauden	MER		x	
Erik Yssen	MER		x	
Technopolis Group				
Erik Arnold	Technopolis UK			x
Martin Bergman	Technopolis Sweden	x		
Neil Brown	Technopolis UK		x	x
Anders Håkansson	Technopolis Sweden		x	
Peter Varnai	Technopolis UK			x
Tomas Åström	Technopolis Sweden	x	x	x

Appendix B Web surveys

B.1 Methodology

B.1.1 Selection and categorisation of survey population

In June 2017, there were 8,070 unique Norwegian participants in FP7/H2020 projects and proposals in eCorda (based on e-mail addresses). Of these, we selected 5,061 FP contacts who had been active in one of our three topic areas. These were "tagged" against the following three groups:

- 1,541 involved in ICT (or ICT + industry) proposals/projects
- 936 involved in health (or health + industry) proposals/projects
- 1,568 involved in "pure" industry proposals/projects

In addition, we identified beneficiaries of Norwegian national funding from RCN's and the Regional Health Authorities' project databases, which had received funding relevant to any of the three topic areas, but that had not participated in a proposal to the FPs. After excluding individuals recorded in eCorda from the lists of national beneficiaries, 2,974 contacts remained, who were "tagged" against the same three thematic groups:

- 644 involved in ICT (or ICT + industry) projects
- 828 involved in health (or health + industry) projects
- 1,502 involved in "pure" industry projects

Based on information from RCN and eCorda, we categorised these individuals in the following actor types: SMEs, large companies, health trusts, public administration, research institutes, HEIs and other (the last category ended up not being used due to very few responses, but they are accounted for in the overall analyses).

Finally, the population was categorised into five groups (see below) based on FP participation history. These groups received tailored variations of the survey, but all varieties essentially contained the same questions on FP-participation barriers and deterrents. Some questions that were not relevant to the non-participants were excluded from their survey.

Group 1: H2020 project participants (N=378)

Norwegian participants in H2020 projects in (at least) one of the three topic areas. These individuals may also have participated in other areas of H2020.

Group 2: FP7 project participants that have been unsuccessful in H2020 (N=72)

Norwegian participants in FP7 projects in one of the three topic areas, who have then submitted at least one proposal to H2020 in their topic area, but so far have been unsuccessful. These individuals may also have participated in other areas in FP7. They may also have submitted proposals to other areas in H2020, but these must also have been unsuccessful. This group was eventually merged with group 3 due to few responses (an effect of a relatively small population and low response rate).

Group 3: Unsuccessful proposers to FP7/H2020 (N=3,976)

Norwegian individuals that have submitted proposals to FP7 and/or H2020 in one of the three topic areas, but that have never been successful (i.e. never been a participant in a project in their topic area). Individuals who have participated in FP projects in another area were excluded from this group. Out of the 3,976 individuals, 1,000 were randomly selected to be invited to respond to the survey.

Group 4: FP7 project participants that have not submitted a proposal to H2020 (N=459)

Norwegian participants in FP7 projects in (at least) one of the three topic areas, who have not yet submitted an H2020 proposal in their topic area. These individuals may also have participated in FP7

projects in another area, but if they have submitted an H2020 proposal in another area they were excluded from this group.

Group 5: Non-participants, i.e. individuals that have not submitted a proposal to FP7/H2020 (n=2,974)

Norwegian actors that have received national R&D funding of more than NOK0,5m relevant to any of the three topic areas, but not been active in FP7 and/or H2020. Individuals were categorised as non-participants if they existed in the RCN database but not in eCorda. The comparison was made on individuals meaning that another individual in the same organisation may have participated in a FP proposal or project. Out of the 2,974 individuals, 1,000 were randomly selected to be invited to respond to the survey.

B.1.2 On the respondents

As the respondents had been pre-categorised by us, the first question in the survey was a control question on whether the respondent had been correctly categorised. If the answer was no, the respondent was "disqualified" from the survey. We are aware of that the eCorda database contains inaccuracies and this was our method of quality assuring our categorisation of respondents. However, we were caught by surprise by how many respondents that turned out to be disqualified in several participation groups. For H2020 project participants the "disqualification rate" was a mere 1 percent, but it was 30 percent among non-participants. Consequently, this process unfortunately rendered a significant loss in possible respondents.

The five surveys were sent to a grand total of 2,909 individuals. The response rate (before disqualification) varied significantly between groups. It was the highest (37%) among H2020 project participants and the lowest (19%) among unsuccessful proposers. In total, the surveys yielded 552 responses, with an average internal drop out of 16 percent per question.

Respondents with no activity in H2020 make up 45 percent of the total (non-participants and FP7 participants), 30 percent are unsuccessful proposers, and 25 percent are H2020 project participants. The three most common actor types are HEIs, research institutes and SMEs, that together constitute 84 percent of all respondents.

Table 27 Survey respondents by H2020-participation history and actor type.

	Health trust	Large company	Other	Public admin.	Institute	SME	HEI
H2020 participants		17	5	8	52	34	23
Unsuccessful proposers	9	10		2	39	31	76
FP7 participants not yet active in H2020		2		3	17	19	14
Non-participants	11	13	4	8	60	36	59

Source: Technopolis web survey.

As shown in Table 27, all actor types are somewhat evenly distributed over the different participation categories, except for hospital trusts (and the unused "other" category) which are only represented by unsuccessful proposers and non-participants.[111] In addition, a majority of respondents find the Societal Challenges pillar most relevant, followed by Excellent Science (31%) and Industrial Leadership (19%). The share of individuals who acted as coordinators of in their most recent multi-partner project or

[111] As shown previously in this study, there is only a few number of project participations from Norwegian hospital trusts in H2020, from which we did not receive any survey responses.

proposal is 28 percent, and an additional 8 percent of respondents led a project involving only one organisation (their own).

B.2 Results

	Hospital trust	Large company	Public administration	Institute	SME	HEI	H2020 participants	Unsuccessful proposers	FP7 participants not yet active in H2020	Non-participants
Population	N/A	N/A	N/A	N/A	N/A	N/A	378	1072	459	1000
Number of responses	N/A	N/A	N/A	N/A	N/A	N/A	141	211	76	272
Response rate	N/A	N/A	N/A	N/A	N/A	N/A	37%	20%	17%	27%
Disqualification rate	N/A	N/A	N/A	N/A	N/A	N/A	1%	21%	28%	30%
Survey responses	20	42	21	168	120	172	139	167	55	191

Were you the coordinator of your most recent proposal?										
Yes	17%	14%	25%	13%	39%	23%	27%	29%	N/A	N/A
Yes, but the project only involves/involved my own organisation	0%	3%	25%	0%	4%	12%	5%	10%	N/A	N/A
No	83%	83%	50%	88%	57%	65%	68%	60%	N/A	N/A

Which of the three H2020 pillars is in general most relevant to you?										
Excellent Science	38%	41%	20%	20%	21%	48%	19%	39%	30%	35%
Industrial Leadership	0%	24%	7%	11%	46%	7%	31%	13%	13%	11%
Societal Challenges	63%	35%	73%	68%	33%	46%	50%	48%	58%	53%

What is your degree of satisfaction with RCN's website when it comes to FP support? (share of respondents agreeing)										
It is easy to find the information I need	20%	38%	57%	49%	45%	45%	38%	52%	N/A	N/A
The information is user friendly	20%	38%	43%	52%	45%	45%	44%	48%	N/A	N/A
It is easy to find out whom to contact for additional information	20%	50%	38%	67%	56%	52%	55%	57%	N/A	N/A
I prefer to source the information I need directly from the EC's H2020 websites	50%	50%	63%	72%	51%	62%	69%	56%	N/A	N/A

Did you receive advice from any of NCPs of RCN, IN or the Norwegian Space Centre when you were preparing the proposal?										
Yes	67%	15%	11%	28%	20%	35%	28%	26%	N/A	N/A
No	33%	85%	89%	72%	80%	65%	72%	74%	N/A	N/A
What is your degree of satisfaction with the NCPs? (share of respondents agreeing)										
The NCPs are knowledgeable	-	100%	-	77%	74%	85%	54%	55%	N/A	N/A
The NCPs are service minded	-	88%	-	92%	78%	86%	30%	45%	N/A	N/A
The NCPs respond timely	-	88%	-	77%	74%	74%	40%	53%	N/A	N/A
The NCPs provide advice that is accurate	-	100%	-	85%	74%	80%	55%	55%	N/A	N/A
The NCPs' information meetings/seminars are useful	-	100%	-	57%	68%	75%	44%	49%	N/A	N/A

Did you receive advice from any of IN's regional/local EU advisors when you were preparing the proposal?										
Yes	17%	7%	11%	19%	12%	22%	14%	19%	N/A	N/A
No	83%	93%	89%	81%	88%	78%	86%	81%	N/A	N/A
What is your degree of satisfaction with IN's regional/local EU advisors? (share of respondents agreeing)										
The NCPs are knowledgeable	-	-	-	81%	67%	81%	76%	78%	N/A	N/A
The NCPs are service minded	-	-	-	80%	71%	76%	79%	77%	N/A	N/A
The NCPs respond timely	-	-	-	75%	73%	70%	68%	68%	N/A	N/A
The NCPs provide advice that is accurate	-	-	-	86%	67%	67%	72%	71%	N/A	N/A
The NCPs' information meetings/seminars are useful	-	-	-	71%	57%	60%	64%	60%	N/A	N/A

Does your organisation have an internal FP support function ("EU office", "Grants office")?										
Yes	50%	8%	0%	63%	4%	90%	44%	60%	N/A	N/A
No	50%	92%	100%	37%	96%	10%	56%	40%	N/A	N/A
What is your degree of satisfaction with your organisation's internal FP support function? (share of respondents agreeing)										
The support function is knowledgeable	-	-	-	73%	-	74%	75%	73%	N/A	N/A
The support function is service minded	-	-	-	75%	-	86%	79%	81%	N/A	N/A
The support function responds timely	-	-	-	78%	-	81%	79%	79%	N/A	N/A
The support function provides advice that is accurate	-	-	-	71%	-	68%	73%	68%	N/A	N/A
The support function's information meetings/seminars are useful	-	-	-	57%	-	68%	67%	63%	N/A	N/A
The support function's assistance with preparing H2020 proposals is adequate	-	-	-	60%	-	66%	63%	63%	N/A	N/A
The support function's assistance with administration of on-going H2020 projects is adequate	-	-	-	78%	-	50%	67%	69%	N/A	N/A

Did you receive Project Establishment Support when you prepared the proposal?										
Yes, through the annual PES block grant administered by my organisation's internal FP support function	17%	-	-	77%	-	46%	46%	40%	N/A	N/A
Yes, as a dedicated grant directly from RCN	0%	42%	25%	6%	47%	1%	15%	9%	N/A	N/A
No	83%	58%	75%	17%	53%	53%	40%	50%	N/A	N/A
What is your degree of satisfaction with the PES grant? (share of respondents agreeing)										
It is simple to apply for the grant	-	100%	-	93%	96%	84%	97%	85%	N/A	N/A
The grant decision is fast	-	78%	-	80%	89%	84%	84%	81%	N/A	N/A
The amount of the grant is adequate	-	56%	-	22%	52%	70%	37%	54%	N/A	N/A
The rules on eligible costs are adequate	-	100%	-	76%	74%	80%	79%	77%	N/A	N/A
The grant was a prerequisite for my participation in the proposal	-	30%	-	47%	74%	57%	49%	56%	N/A	N/A

Which of the following issues act as barriers to you submitting (or contributing to) another H2020 proposal? (share of respondents agreeing)										
Identification of relevant H2020 calls is complicated	75%	41%	20%	46%	58%	53%	42%	52%	43%	58%
There has not been a relevant call yet	20%	50%	17%	24%	25%	38%	N/A	N/A	41%	27%
Rules for H2020 participation are complex	81%	47%	40%	51%	72%	59%	44%	62%	49%	70%
Organisation management discourages H2020 participation	31%	21%	29%	26%	33%	33%	23%	33%	20%	34%
Organisation has no incentives for individuals to take H2020 initiatives	25%	38%	69%	23%	32%	31%	24%	39%	34%	25%
Organisation has no internal H2020 support function to assist participants	33%	64%	40%	15%	60%	15%	N/A	N/A	28%	28%
Organisation has internal H2020 support function, but it is inadequate	22%	44%	75%	34%	21%	26%	N/A	N/A	13%	34%
My own and my colleagues' time is limited	100%	76%	93%	82%	87%	88%	83%	86%	86%	86%
Our administrative personnel's time is limited	73%	72%	77%	43%	73%	50%	53%	58%	53%	59%
Our network of potential Norwegian partners is insufficient	19%	24%	7%	14%	25%	26%	17%	21%	27%	21%
Our network of potential foreign partners is insufficient	20%	24%	20%	18%	33%	17%	11%	20%	23%	30%
For public R&D organisations only: Financial incentives for organisation to participate in H2020 are weak	40%	N/A	50%	60%	N/A	38%	41%	50%	61%	51%
For public R&D organisations only: I already have sufficient Norwegian public R&D funding	50%	N/A	14%	19%	N/A	22%	6%	9%	39%	33%
For health trusts only: My dual affiliation makes it more attractive to participate in H2020 as university employee; please explain why in text box	29%	N/A	N/A	N/A	N/A	22%	-	25%	-	17%

Which of the following issues act as deterrents to you submitting (or contributing to) another H2020 proposal? (share of respondents agreeing)										
Time consuming to produce H2020 proposals	100%	89%	86%	89%	88%	90%	85%	90%	92%	92%
Chance of being awarded an H2020 grant is low (low success rate)	94%	63%	86%	73%	80%	83%	64%	83%	82%	83%
Cost coverage is low (due to H2020 cost models)	33%	39%	29%	64%	36%	41%	45%	45%	49%	49%
Complicated to protect intellectual property rights (IPR)	7%	44%	8%	6%	27%	9%	14%	11%	24%	15%
H2020 projects do not advance scientific frontier	7%	6%	0%	15%	3%	13%	7%	12%	14%	11%
H2020 projects involve compromises	20%	49%	21%	36%	29%	28%	32%	29%	41%	33%
H2020 projects lie close to implementation (high technology readiness level (TRL))	31%	30%	36%	26%	19%	33%	23%	31%	34%	26%
H2020 projects do not yield economic impact for participants	19%	18%	21%	26%	19%	18%	16%	25%	38%	17%
H2020 project administration is burdensome	81%	68%	93%	71%	73%	75%	68%	69%	74%	80%
H2020 project effectiveness is low (high transaction costs)	19%	49%	38%	43%	44%	41%	38%	48%	46%	38%
I have had bad experiences from previous FP proposals/projects	17%	33%	18%	15%	20%	18%	12%	26%	19%	N/A
Others have had bad experiences from FP proposals/projects	33%	22%	9%	27%	21%	31%	17%	24%	25%	39%
Success rates in RCN's R&D programmes are higher than in H2020	27%	56%	33%	43%	45%	31%	32%	39%	33%	48%
Cost coverage in RCN's R&D programmes is higher than in H2020	14%	15%	31%	64%	14%	27%	37%	35%	36%	35%
For health trusts only: Success rates within R&D calls of the regional health authority (RHF) are higher than in H2020	73%	N/A	N/A	N/A	N/A	11%	-	50%	-	33%
For health trusts only: Cost coverage in RHF R&D projects is higher than in H2020	45%	N/A	N/A	N/A	N/A	13%	-	45%	-	17%

How do you rate the effectiveness of existing Norwegian financial support measures to encourage you to submit (or contribute to) additional H2020 proposals? (share of respondents stating "effective" or "very effective")										
Regional Research Fund support to proactively influence EU-level processes and calls for proposals	11%	25%	33%	12%	35%	24%	30%	22%	33%	17%
IN support to approved but unfunded proposals in H2020 SME instrument (Seal of Excellence)	N/A	N/A	N/A	N/A	44%	N/A	42%	80%	-	-
RCN support to re-submit ERC proposals (FRIPRO)	43%	N/A	N/A	20%	N/A	59%	19%	46%	56%	44%
RCN support to EU networks (EU-nettverk)	43%	29%	50%	38%	30%	46%	39%	33%	40%	45%
RCN co-funding of H2020 projects	50%	33%	67%	51%	21%	50%	41%	42%	47%	45%
RCN support to find H2020 calls and partners (PES2020)	33%	39%	25%	52%	51%	53%	50%	55%	44%	45%
RCN co-funding of research institutes' H2020 projects (STIM-EU)	N/A	N/A	N/A	65%	N/A	N/A	79%	67%	-	41%
RCN support to proactively influence EU-level processes and calls for proposals	43%	60%	33%	60%	48%	49%	59%	55%	56%	41%
RCN support to produce H2020 proposals (PES2020 and HELSE-EU)	29%	39%	22%	66%	54%	60%	69%	66%	32%	43%

B.3 Sample survey

Survey to participants in H2020

The Research Council of Norway (RCN) has commissioned Technopolis Group to conduct a study on how Norwegian participation in Horizon 2020 (H2020) possibly could be increased. The study is to be used as a foundation for measures to further increase Norwegian participation in the remainder of H2020 and to lay the foundation for Norwegian participation in the next framework programme (FP9).

As part of this study, we are investigating the effectiveness of the present Norwegian H2020 support system and what barriers and deterrents that stand in the way of increased Norwegian H2020 participation. You receive this survey since you have been active in FP7 and/or H2020, according to the database of the European Commission (EC).

Introduction

1. According to the EC database, you participate (or have participated) in at least one H2020 project. Is this correct?

   It is well known that the EC database contains some inaccuracies. If our information is incorrect then we apologise for bothering you, but would very much appreciate if you would nevertheless answer "No" to this question so that we know for sure that this is the case.

- Yes
- No [end of survey]

Your own H2020 experiences

If you have participated in more than one H2020 project, please respond to this survey based on your most recent project.

2. Are you the coordinator of this most recent project?

- Yes
- Yes, but the project only involves my own organisation (no partners)
- No

3. Which of the three H2020 pillars is in general most relevant to you?*

- Excellent Science

  (including European Research Council (ERC), Marie Skłodowska-Curie Actions, Future and emerging technologies (FET) and European research infrastructures)

- Industrial Leadership (LEIT)

  (including LEIT-ICT, LEIT-Space, LEIT-NMP, innovation in SMEs and Access to risk finance)

- Societal Challenges

  (including Health, demographic change and wellbeing; Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bioeconomy; Secure, clean and efficient energy; Smart, green and integrated transport; Climate action, environment, resource efficiency and raw materials; Inclusive, innovative and reflective societies; Secure & innovative societies)

4. What is your degree of satisfaction with RCN's website when it comes to H2020 support:

[Strongly disagree; Disagree; Neither agree nor disagree; Agree; Strongly agree; Don't know]

- It is easy to find the information I need
- The information is user friendly
- It is easy to find out whom to contact for additional information
- I prefer to source the information I need directly from the EC's H2020 websites

5. Did you receive advice from any of the National Contact Points (NCPs) of RCN, Innovation Norway (IN) or the Norwegian Space Centre when you were preparing the proposal for the project?

- Yes
- No [go to question 7.

6. What is your degree of satisfaction with the NCPs:

[Strongly disagree; Disagree; Neither agree nor disagree; Agree; Strongly agree; Don't know]

- The NCPs are knowledgeable
- The NCPs are service minded
- The NCPs respond timely
- The NCPs provide advice that is accurate
- The NCPs' information meetings/seminars are useful

7. Did you receive advice from any of IN's regional/local EU advisors when you were preparing the proposal for the project?

- Yes
- No [go to question 9]

8. What is your degree of satisfaction with IN's regional/local EU advisors:

[Strongly disagree; Disagree; Neither agree nor disagree; Agree; Strongly agree; Don't know]

- The EU advisors are knowledgeable
- The EU advisors are service minded
- The EU advisors respond timely
- The EU advisors provide advice that is accurate
- The EU advisors' information meetings/seminars are useful

9. Does your organisation have an internal H2020 support function ("EU office", "Grants office")?

- Yes
- No [go to question 11]

10. What is your degree of satisfaction with your organisation's internal H2020 support function?

[Strongly disagree; Disagree; Neither agree nor disagree; Agree; Strongly agree; Don't know]

- The support function is knowledgeable

- The support function is service minded
- The support function responds timely
- The support function provides advice that is accurate
- The support function's information meetings/seminars are useful
- The support function's assistance with preparing H2020 proposals is adequate
- The support function's assistances with administration of on-going H2020 projects is adequate

11. Did you receive Project Establishment Support (Prosjektetableringsstøtte, PES2020) when you prepared the proposal for the most recent project?

- Yes, through the annual PES2020 block grant administered by my organisation's internal H2020 support function
- Yes, as a dedicated grant directly from RCN
- No [go to question 13 on next page]

12. What is your degree of satisfaction with the PES2020 grant:

[Strongly disagree; Disagree; Neither agree nor disagree; Agree; Strongly agree; Don't know]

- It is simple to apply for the grant
- The grant decision is fast
- The amount of the grant is adequate
- The rules on eligible costs are adequate
- The grant was a prerequisite for my participation in the proposal

Barriers, deterrents and incentives

13. Which of the following issues act as barriers to you submitting (or contributing to) another H2020 proposal?

[Strongly disagree; Disagree; Neither agree nor disagree; Agree; Strongly agree; Not applicable]

- Identification of relevant H2020 calls is complicated
- Rules for H2020 participation are complex
- Organisation management discourages H2020 participation
- Organisation has no incentives for individuals to take H2020 initiatives
- Organisation has no internal H2020 support function to assist participants
- Organisation has internal H2020 support function, but its support is inadequate
- My own and my colleagues' time is limited
- Our administrative personnel's time is limited
- Our network of potential Norwegian partners is insufficient
- Our network of potential foreign partners is insufficient
- For public R&D organisations only: Financial incentives for organisation to participate in H2020 are weak
- For public R&D organisations only: I already have sufficient Norwegian public R&D funding

- For health trusts only: My dual affiliation makes it more attractive to participate in H2020 as university employee; please explain why in text box
- Other, please specify:

Free text

14. Which of the following issues act as deterrents to you submitting (or contributing to) another H2020 proposal?

[Strongly disagree; Disagree; Neither agree nor disagree; Agree; Strongly agree; Not applicable]

- Time consuming to produce H2020 proposals
- Chance of being awarded an H2020 grant is low (low success rate)
- Cost coverage is low (due to H2020 cost models)
- Complicated to protect intellectual property rights (IPR)
- H2020 projects do not advance scientific frontier
- H2020 projects involve compromises
- H2020 projects lie close to implementation (high technology readiness level (TRL))
- H2020 projects do not yield economic impact for participants
- H2020 project administration is burdensome
- H2020 project effectiveness is low (high transaction costs)
- I have had bad experiences from previous FP proposals/projects
- Others have had bad experiences from FP proposals/projects
- Success rates in RCN's R&D programmes are higher than in H2020
- Cost coverage in RCN's R&D programmes is higher than in H2020
- For health trusts only: Success rates within R&D calls of the regional health authority (RHF) are higher than in H2020
- For health trusts only: Cost coverage in RHF R&D projects is higher than in H2020
- Other, please specify:

Free text

15. What could your own organisation do to increase the likelihood that you will submit (or contribute to) another H2020 proposal?

Free text

16. Does your organisation have an effective incentive system that encourages individuals to submit (or contribute to) H2020 proposals? Please tip us off and give us contact details to someone who can tell us more about it!

Free text

Effectiveness of Norwegian H2020 support measures

17. How do you rate the effectiveness of existing Norwegian financial support measures to encourage you to submit (or contribute to) additional H2020 proposals?

[Very ineffective; Ineffective; Neither ineffective nor effective; Effective; Very effective; Don't know/not applicable]

- RCN support to proactively influence EU-level processes and calls for proposals (PES2020 and selected R&D programmes, e.g. BIOTEK2021, ENERGIX, Transport 2025 and BIA)
- Regional Research Fund support to proactively influence EU-level processes and calls for proposals (Regionale Forskningsfondene, RFF)
- RCN support to find H2020 calls and partners (PES2020)
- RCN support to EU networks (EU-nettverk)
- RCN support to produce H2020 proposals (PES2020 and HELSE-EU)
- RCN support to re-submit ERC proposals (FRIPRO)
- IN support to approved but unfunded phase 1 proposals in H2020 SME instrument (Seal of Excellence)
- RCN co-funding of research institutes' H2020 projects (STIM-EU)
- RCN co-funding of H2020 projects (selected R&D programmes, e.g. KLIMAFORSK, ENERGIX, BIONÆR and BEDREHELSE)

18. How could Norwegian support measures, both advisory services and financial support, be improved to make it more likely that you will submit (or contribute to) additional H2020 proposals?

Free text

Appendix C International comparisons

C.1 FP-related policies in comparator countries

C.1.1 Sweden

Swedish research and innovation policy is set in research white papers that are published once every four years, with the Ministry of Education and Research as the responsible ministry. Sweden has no dedicated H2020 strategy, instead the Swedish approach towards H2020 is rooted in the 2012 research and innovation white paper and it was updated in the 2016 research white paper (with a change of governments in between).

The 2012 white paper expected the new FP to become an important factor for Swedish R&D both financially and strategically, and considered the programme an opportunity to further establish Swedish participation in the FPs. The white paper also warned about the consequences of a low level of participation, which would have negative impact on both quality and competitiveness of Swedish R&D, since inadequate participation would lead to Sweden missing out on the substantial funding the programme provided. Consequently, a high level of Swedish participation was regarded as being most important. The white paper decided that an EU Coordination Function should be set up "to facilitate the prioritisation of participation in the partnership programmes, to coordinate and strengthen the strategic and proactive work within the European research and innovation partnership, and to promote synergies between EU initiatives and national initiatives in research and innovation." The Swedish Governmental Agency for Innovation Systems (Vinnova) was tasked with coordinating the EU Coordination Function, which was to include the Swedish Research Council (VR), the Swedish Energy Agency, the Swedish Research Council for Health, Working Life and Welfare (Forte), the Swedish Research Council Formas and the Swedish National Space Board (SNSB). The white paper also earmarked funding to secure Swedish participation in the partnership programmes, ramped up to SEK200m per year from 2016 onwards. The funds are jointly prioritized and allocated among the six funding agencies of the EU Coordination function.[112]

The 2016 research white paper highlighted that Sweden was still among the ten most successful countries in the FP, but called for stronger efforts from Swedish organisations to improve their strategies for receiving FP funding.[113]. Thus, the white papers merely contain loosely stated and qualitative ambitions, meaning that Sweden has no quantified targets for H2020 participation (including for financial return). Moreover, the white papers do not place any specific emphasis on participation by industry or in health or ICT.

C.1.2 Denmark

The Ministry of Higher Education and Science (previously Ministry of Technology and Innovation) is the ministry responsible for coordinating H2020 activities and policy. The Danish Council for Research and Innovation Policy (DFiR) provides the Ministry and the Parliament with independent and expert advice on research, technological development and innovation. The objective of the Council is to further the development of research, technology and innovation for the benefit of society, which includes participation in H2020. The Danish Agency for Science and Higher Education, an agency in the Ministry, is responsible for all tasks that require particular expertise within research and education across all institutions, including participation in H2020 and other internationalisation interaction. Moreover, DANRO, the Danish EU office in Brussels, aims to promote and increase Danish H2020 participation. DANRO acts as mediator between the EC and the Ministry.

The Danish research and innovation policy is set in the Danish innovation strategy *Denmark – A nation of solutions* published in 2012, in which the Danish participation in H2020 is briefly touched upon, pointing to the new FP providing good opportunities for increasing Danish participation and thus return

[112] *Forskning och innovation*, proposition 2012/13:30.

[113] *Kunskap i samverkan - för samhällets utmaningar och stärkt konkurrenskraft*, proposition 2016/17:50.

of European research funds.[114] This innovation strategy is the first of its kind in Denmark, and it has so far not been updated. In 2011, the Ministry released a Position Paper on the upcoming FP in which it made specific recommendations on how the FP ought to be structured and in which areas investments ought to be made.[115] In 2012, the Ministry presented a national strategy for Danish H2020 participation. The Ministry had developed the strategy together with other ministries, interest and industry organisations, the Danish reference group for H2020, universities and research institutes. The overall objective of the strategy was to strengthen Danish participation, i.e. to increase the number of successful proposals and the overall financial return. For each sub-programme of H2020, the strategy contained suggestions on where Danish participants were the most likely to succeed. These include somewhat loosely stated strategies for eight specific areas, including health, ICT and industry.[116]

Health is the biggest research area in Denmark. The vision of the strategy was to make Denmark one of the most attractive countries in the World for development, testing and production of health and welfare solutions based on strong research capabilities and innovative technologies. The strategy stressed the importance of participation in H2020 in general and in the European and the Developing Countries' Clinical Trials Initiative (EDCTP) in specific. The strategy further emphasised the ICT opportunities in H2020, and argued for the creation of a high-technology society by focusing on ICT as an enabling technology in strategic growth technologies, digital solutions and new production systems to increase Danish productivity. The strategy also pointed out that H2020 participation is important for Danish industry in order stay abreast with international developments, but the emphasis on industry participation was lower than that on the health and ICT areas.[117]

In 2016, the Ministry published a strategy for Danish participation in the remainder of H2020. The target for Denmark's financial return for the period 2016–2020 was set to a minimum of 2.5 percent of the programme's total funding. Danish participation for the period was anticipated to increase. Moreover, the strategy focused on the impact of participating in H2020, stressing the importance of close collaboration between research institutions and industry in order to reap synergies between research areas.[118]

In 2016, the Ministry also published a Position Paper on the Interim Evaluation of H2020. The purpose of the Paper was to contribute to the evaluation by outlining essential points based on Danish experiences in H2020. Recommendations were made in order facilitate for H2020 to deliver according to expectations during its remaining years, as well as to establish a bridge to the next FP. These Position Papers illustrate the Danish dual focus on both the ongoing FP and the next one. Moreover, analyses to identify strengths and weaknesses of Danish participation in H2020 are ongoing and are expected to be presented in autumn of 2017; these will constitute the foundation for a Position Paper on the next FP.[119]

C.1.3 Finland

Finnish research and innovation policy is outlined by the Research and Innovation Council, chaired by the Prime Minister, once every four years. As governments in Finland typically sit for the full four-year term, this means that policy is outlined once for each government. Ministries responsible for the implementation of the policy are the Ministry of Education and Culture (research) and the Ministry for Employment and the Economy (MEE; innovation). Besides these two main ministries, also other ministries are involved in policy implementation through their sectoral research organisations and their related policies (e.g. Ministry of Health and Social Affairs with respect to health-related research and

114 "Danmark Løsningernes land – Styrket samarbejde og bedre rammer for innovation i virksomhederne", Ministry of Higher Education and Science, 2012.

115 "Danish position paper on the next EU framework programme for research and innovation", Ministry of Technology and Innovation, 2011.

116 "Dansk deltagelse i Horizon 2020's samfinansierede partnerskaber – kortlægning og strategi", Ministry of Higher Education and Science, 2012.

117 "Dansk deltagelse i Horizon 2020's samfinansierede partnerskaber – kortlægning og strategi", Ministry of Higher Education and Science, 2012.

118 "Dansk køreplan for Det Europæiske Forskningsrum 2016-2020", Ministry of Higher Education and Science, 2016.

119 "Danish Position Paper on the Interim Evaluation of Horizon 2020", Ministry of Higher Education and Science, 2016.

innovation, Ministry of Transport and Communication with respect to telecommunication, etc.). The wider approach across ministries is also reflected in the composition of the Research and Innovation Council, which also includes representation from industry, academia and the main research funding organisations. The Council has been recently reformed and is in the process of preparing the next policy review.

Finland has no dedicated H2020 strategy. The approach towards H2020 is outlined in Research and Innovation Council documents. In the *Research and Innovation Policy Guidelines for 2011–2015*, the Council outlined the following points for EU research:[120]

- Finland is a proactive and influential partner in the EU and in the initiatives of the European research and innovation policy, such as in deepening cooperation within national R&D programmes and promoting top-level European research. In this way, we can exploit the opportunities within the EU to strengthen our expertise in selected fields and promote a knowledge-based economy in Europe.
- Finland is a high-profile actor in promoting new instruments (such as public procurement, lead markets, demand and user-driven approaches, and IPR practices).
- Each organisation must set quantitative objectives for foreign funding. The share of EU funding of the entire R&D funding for universities and research institutes needs to be doubled in the 2010s (5.8% in 2009).
- The SME sector must increase its own participation in international cooperation.
- It is important to be able to link domestic programmes to EU-level research and development programmes.

The only thematic references in the guidelines were to generic technologies, including ICT, nano- and biotechnologies.

The latest Council review, *Reformative Finland: Research and innovation policy review 2015–2020*, outlines a six-point reform programme for 2015-2020:[121]

- a radical reform of the higher education system
- promoting the exploitation and impact of R&I results
- strengthening new sources of growth, intellectual capital and entrepreneurship
- improvement of the overall knowledge-base of the population and selective support for cutting-edge skills
- reform of the public sector and closer cross-administrative cooperation
- adequacy and targeting of R&D funding

The main emphasis over the years in terms of national objectives for FP participation has been on the financial return. The main objective has been to reach levels which exceed the share of Finnish funding to the FPs. More recently the objectives have been formulated differently – doubling the share of EU funding to universities and research institutes, 50% increase in the funding from H2020 compared to FP7 – but the focus has remained on the return. The objective of the 50% increase compared to FP7 was formulated in *Reformative Finland: Research and innovation policy review 2015–2020*. In view of this, the review called for stronger support structures, increased focus, interaction and joint efforts among research organisations, companies and funding organisations, enhanced impact of EU funded research, and organisation of national counterpart funding in collaboration between the two key ministries and funding organisations (Tekes and the Academy of Finland). The review also called for support for the preparation of major EU research consortia with centralised national funding.

120 "Research and Innovation Policy Guidelines for 2011–2015", Research and Innovation Council, 2010.

121 "Reformative Finland: Research and innovation policy review 2015–2020", Research and Innovation Council, 2014.

The national-level objectives for FP participation have not included any thematic prioritisations, and the preliminary national Position Papers regarding FP9 continue this tradition. However, thematic priorities have been prepared in collaboration between the funding organisations and stakeholders. This has taken place in a network organised and coordinated by the Ministry of Employment and the Economy and Tekes. The same network has been used to formulate national opinions for the annual work programmes. The network consists of NCPs, committee members, funding organisations, responsible ministries, and a large network of key stakeholders.

Previously missing thematic prioritisations at national level have nevertheless started to emerge in research and innovation and related policies. The latest growth policy agenda from 2017 listed the three most important thematic areas for future economic growth:[122]

- Health and Wellbeing
- Bioeconomy and Cleantech
- Digitalisation

Sectoral growth policies have also been outlined. The most recent one is *Innovating together. Health sector growth strategy for research and innovation activities roadmap for 2016-2018*.[123] This sectoral strategy clearly identifies the relevance of the European dimension and lists the following actions for 2016–2018:

1. Identifying key EU projects of the next few years that have major significance for the preconditions of health sector growth in Finland. Agreeing upon cooperation and division of responsibilities between the branches of administration, using the resources of the relevant sections of the government, and engaging in dialogue with business life and other stakeholders.
2. Striving for a bigger impact on EU work programmes and health-related themes. Supporting participation in application processes.
3. Raising awareness of health sector EU programmes and the possibilities of utilising them; activating Finnish companies and research organisations to take advantage of them. Continuing the consultation work related to the Innovative Medicines Initiative and applications.

The strategy also indicates that Academy of Finland and Tekes are to promote the possibilities of Finnish health sector research in the EU by influencing at various levels such as with national EU actors, the EC and EU policy-makers. Similar sectoral national level strategies have been developed also for other areas, such as bioeconomy[124] and energy and climate[125].

However, the role of thematic prioritisation at the official national research and innovation policy level remains rather weak, as the positioning of thematic priorities in the Council review indicates. A more detailed description of one of the six points in *Reformative Finland: Research and innovation policy review 2015–2020*, the new sources of growth, includes the following thematic priorities:

- ICT skills, and in particular, expertise in mobile solutions and programming
- Clean solutions: energy efficient, environmentally friendly and material efficient technologies (cleantech), biotechnology and nanotechnology
- Health and wellbeing
- Arctic expertise

More detailed objectives set by Tekes have included company and especially SME participation, coordination of EU funded projects, etc. Participation in public-to-public (P2P) and public-private (PPP)

122 "Kasvun agenda. Yritysten menestyksestä työtä ja toimeentuloa", MEE 11/2017.

123 "Innovating together. Health Sector Growth Strategy for Research and Innovation Activities. Roadmap for 2016–2018", MEE 6/2016.

124 "Sustainable growth from bioeconomy. The Finnish bioeconomy strategy", MEE, 2014.

125 "Government report on the National Energy and Climate Strategy for 2030", MEE 12/2017.

partnerships has been selective and strategic, and mostly supported and/or organised through Tekes. Tekes programmes encourage international collaboration, including participation in H2020. For example, *5th Gear programme* in the ICT sector collaborates and actively promotes participation in the *EUREKA Celtic-plus cluster* and the *5G Infrastructure Public-Private Partnership*.[126] Similarly, *Bits of Health programme* promotes collaboration with the *EUREKA cluster ITEA3* and *ECSEL Joint Undertaking*.[127]

C.1.4 Austria

Austria became an EU member in 1995 and its participation in the FPs started with FP4. This coincides with R&D emerging as an increasingly important topic in the Austrian policy agenda. Since then, there has been strong awareness that Austrian participation in the FPs needs to be supported so that it can also be financially rewarding.

Traditionally, Austrian R&D-related policymaking has been characterised by a small number of overarching and comprehensive policies and strategies at a relatively high level of aggregation, complemented by a large number of "practical strategies", mainly competitive funding programmes with a variety of thematic or structural priorities, and the governance of publicly funded research institutions. Both types of strategies typically also include the participation of Austrian players (or some aspect of it) in the FPs. Therefore, although there are no policy papers dedicated to a national policy for any of the FPs, this topic is well-covered by a wealth of reports on R&D and the practical experience developed in the Austrian research system. The main trajectory has basically remained unchanged since FP4: To increase the participation and success rate of Austrian players in the FPs, to achieve a substantial *juste retour* – and to provide support to participants in order to achieve these targets.

Several Austrian governmental organisations are involved in development of policies, implementation of strategies, and provision of support for a successful participation of Austrian institutions in the FPs. At a policy level, different ministries are responsible for implementing the FPs in Austria:[128] the Federal Ministries of Science, Research and Economy (BMWFW), of Transport, Innovation and Technology (BMVIT), and of Agriculture, Forestry, Environment and Water Management (BMLFUW). These Ministries send programme delegates and the BMWFW co-ordinates Austrian players vis-à-vis European R&D policies. Other sectoral Ministries involved in R&D play smaller roles, both at the national and at the European level.

In 2011, the Federal Chancellery together with five ministries published the first Austrian RTI Strategy which elaborates on Austria's action plan to meet Europe 2020 policies, and states the goal for Austria to position itself as an innovation leader in 2020.[129,130] In this document RTI is regarded as the means to ensure future competitiveness and prosperity for coming generations. Consequently, the strengthening of research, development and innovation is expected to lead to the creation of quality employment, as well as to economic and employment growth. The strategy stated the goal of increasing the GDP share of gross domestic expenditure on R&D (GERD) by one percent point in 2020 (from 2.76 to 3.76%), which reflects related European policy objectives. For the FPs, the strategy states the following objective:

126 www.tekes.fi/en/programmes-and-services/tekes-programmes/5thgear, viewed 17 May 2017.

127 www.tekes.fi/en/programmes-and-services/tekes-programmes/bits-of-health, viewed 17 May 2017.

128 The ministries are listed with their current names. The lists of ministries involved in the cited official reports may not reflect the ministerial structure of the current administration. However, the units involved have remained largely unchanged during several government terms.

129 "Becoming an Innovation Leader. Strategy for research, technology and innovation of the Austrian Federal Government", Republik Österreich, 2011.

130 "International positioning" is an important criterion for Austrian politicians and policy makers, as it is reflected in the title of the first Austrian RTI Strategy "Becoming an Innovation Leader".

> *In addition, we should strive for even more Austrian participation in European funding programmes, for example in the Research Framework Programmes, or the European Structural Funds, with the goal of further increasing the return ratio.*

Five years later, the mid-term report for the Austrian RTI Strategy confirmed the importance of positioning Austria in the ERA and in H2020. This mid-term report was conceived to reflect on what had been achieved within five years, what needed to be implemented and what would not be achieved due to changing objectives or prerequisites. With respect to FPs, the report concludes that "Austria's performance [...] can be assessed as positive, since an above-average level of funding was achieved in relation to the budget in place, and the same is true in relation to the number of researchers."[131]

An official, "hard number" for Austria's *juste retour* target has been defined in the context of the new system of governmental performance budgeting, which was introduced at the federal level in 2013. According to the latest report on impact targets for 2017 published by the Federal Chancellery, by 2015 Austrian participants had achieved a share of 2.64% of the funding disbursed from the budget of H2020 to date; the target is 2.50% for 2017. Other quantitative targets related to H2020 are the number of ERC grants received and the share of Austrian universities and public research organisations (PROs) among all universities and PROs participating in H2020. In addition, the Austrian ERA Roadmap of 2016 stated the main objectives for an effective national research system in the context of the European ERA Roadmap. Among them is the goal to increase the amount of funding from H2020 to Austrian participants to €1.5 billion by 2020. This goal is to be achieved through a leverage of information, advice and support to Austrian RTI players for H2020 and ERA (see further Section C.2.4).

Given the high attention to performance and *juste retour*, it is not surprising that a detailed and close monitoring of Austria's performance in FPs became a priority as soon as Austria started full participation in the FPs. The ministries in charge implemented a support system for the previous FPs called PROVISO. This was a monitoring programme and information infrastructure especially for the programme delegates. PROVISO analyses were used as a basis to develop national positions concerning the EU FPs as a whole, as well as at sub-programme level.[132] With the establishment of H2020 and the ERA, a new monitoring project called *EU Performance Monitoring for RTI* was implemented with the ambition to provide quantitative information not only for the delegates but also for other interested Austrian stakeholders in support of their institutional strategies and decision making.[133] Austria's performance in Horizon 2020, according to the performance monitoring report of the Austrian Research Promotion Agency (FFG) in 2016, is above average.[134]

Finally, another cornerstone of Austrian R&D policymaking is the identification of national thematic priorities and their support. Already in 1999, a national strategy on research stated that national research programmes should be developed with regard to the action lines of international programmes, and in particular the FPs.[135] Therefore, Austria's national thematic priorities have a long tradition of linking to the FPs. The same national strategy also stated the importance of bottom-up approaches for identifying new topics, methodologies and problems. The establishment of thematic priorities depends very much on the initiative of the responsible people in the administration; such national thematic priorities are rarely discontinued, and instead they continuously evolve together with state-of-the-art of national research and, partly, European priorities. To facilitate the development of national priorities, Austria places a strong focus on competitive research funding (thematic and general programmes), and this is often explicitly regarded as a means of helping researchers to become internationally competitive. Having said that, research programmes are not the only nor the main investment in R&D. Public research institutions receive most of the national R&D budget. In recent years, their institutional strategies have increasingly taken up internationalisation issues, especially with respect to H2020 and,

131 "Austrian Research and Technology Report", BMWFW, BMVIT, 2016.

132 wissenschaft.bmwfw.gv.at/home/research/european/the-proviso-fp7-project-2007-2014, viewed 18 May 2017.

133 wissenschaft.bmwfw.gv.at/home/research/european/eu-performance-monitoring/, viewed 18 May 2017.

134 "Österreich in Horizon 2020. Cockpitbericht zum Datenstand 30.9.2016", FFG, 2016.

135 "Bericht des Bundesministers für Wissenschaft und Verkehr an den Nationalrat", BMWV, 1999.

partly, ERA. Consequently, this is now also dealt with in the institutional governance between the institutions and their responsible ministries (e.g. in performance contracts).

National funding priorities of Austrian R&D policy with explicit links to the FPs and to H2020 include industry, ICT, transport, energy, materials and production, and security. Vis-à-vis the FPs, the "integrated" approach outlined above is applied: The national priorities typically link with the related FP priorities and ERA activities.

Industrial research has been a priority of Austrian R&D policy for decades and it has had, and still has, a strong focus on funding research performed by companies and on science-industry links. Proof of that are the series of interventions that Austria has implemented in the last 20 years to promote industrial research and co-operation between science and research, such as tax incentives for research and development[136], different types of centres of competence (e.g., COMET programme, the *Christian-Doppler Research Association*), promotional banks (e.g., *aws*) and a large number of funding programmes with (e.g., *Bridge*, *COIN*, *Innovationscheck*, *FIT-IT*) – in addition to a nearly 50-year-old tradition of funding bottom-up industrial research. The strong focus on funding as a key instrument in R&D policy becomes evident also in this field: In Austria, no less than 12% of R&D performed in the business sector is funded by the state.[137]

FFG is the main national funding agency for industrial research and innovation, with the mission of strengthening Austrian companies' competitiveness, as well as Austria as a business location. It funds research on new products, processes and services with the possibility of cooperating with scientific partners and also hosts the NCPs (see Section C.2.4).

The Austrian *RTI Strategy* published in 2011 stated that in order not to jeopardise the success achieved by measures implemented thus far, they needed to be adapted and optimised to the changing knowledge and entrepreneurial landscape. The strategy aimed, on the one hand, at increasing co-operation between companies and research institutions with a focus on excellence and sustainability, and on the other hand at reducing barriers for enterprises to cooperate with scientific partners. Consequently, the goal was to encourage companies, especially those facing higher barriers (i.e. SMEs) to expand their technological leadership and move towards innovation leadership. The strategy in detail includes internationalisation, but there is no strong link to FP participation beyond the general ambition.[138]

Health-related research in Austria is mainly supported through institutional funding to the medical universities and a number of research institutes, and through bottom-up competitive research funding. Unlike in the ICT-field, there is no tradition of a specific funding programme, although health research accounts for large shares in competitive as well as in institutional funding. Regarding policy, BMWFW recently published a national strategy on life sciences which specifically addresses health-related life sciences. This strategy focuses on research, development, production and application in the fields of medical and molecular biology, biotechnology, (bio-)medicine, pharmacy and medical pharmacy.[139] The selection of such topics aims at strengthening the already established research initiatives, as well as the growing health-related industrial sector; at the same time it aligns with key themes in the FP. However, H2020 is no big priority in the context of this strategy.

At the operational level, Austria is rather active in international cooperation and participates in a series of health-related research initiatives, such as two bio-medical ESFRI infrastructures (Euro-Bioimaging and BBMRI-ERIC), SHARE (Survey on Health, Ageing and Retirement in Europe), joint programmes such as the Active and Assisted Living (AAL JP), and the Innovative Medicines Initiative (IMI), among others.

136 G. Hutschenreiter, "Tax incentives for research and development", *Austrian Economic Quarterly*, 2, 2002.

137 "Austrian Research and Technology Report", BMWFW, BMVIT, 2016.

138 "Becoming an Innovation Leader. Strategy for research, technology and innovation of the Austrian Federal Government", Republik Österreich, 2011.

139 "Zukunftsstrategie Life Sciences und Pharmastandort Österreich", BMWFW, 2016.

ICT research has long been a thematic priority in research and innovation funding in Austria with a strong link to international priorities, and therefore, it is covered in almost all Austrian strategy reports and action plans. It is listed as one of the national thematic priorities in the strategic framework for RTI of BMVIT, which concentrates in the following core areas which reflect priorities of the FPs:

- Semantic systems
- Embedded systems
- Visual computing, the visualization of data and applications
- Systems-on-chips
- Trust in IT systems
- ICT and demographic change.

BMVIT has implemented two large initiatives to support ICT research. *ICT of the Future* is a funding programme for ambitious Austrian innovation and technology developments, where participation in transnational programmes is also possible.

The policy level and the key research performing players in industry and academia actively participate in European initiatives, both in the FPs as well as in the ERA, Moreover, key stakeholders in ICT have also established their own intiatives to support their participation in FPs and bring together different players from universities, research institutes and industry in Austria. Examples of such initiatives are the associations ARTEMIS and ENIAC, both of which were implemented during FP7 and merged into ECSEL-Austria in 2013. BMVIT provides financial support for the association's activities, which not only aim to generate benefits for industry and the academic institutions involved, but also to contribute to innovation in Austria, thus increasing knowledge and employment.

C.1.5 Netherlands

The FPs are considered very important in the Netherlands. The share of funds coming from the EU in the overall public spending on R&D has increased steadily over the FPs, starting at 5.5% in FP5 increasing to 14% at the start of H2020. Policy-wise the financial aspect of the FPs is acknowledged, but it is also emphasised that the opportunities that H2020 provides in accessing partners, knowledge and technology beyond the borders of the nation, sector and disciple are immense. It provides researchers with the opportunity to take on challenges that go beyond the scope of a single country.[140]

The Netherlands has always been a strong performer in the FPs. Both the absolute participation and success rate of Dutch stakeholders have been higher than European averages, and since FP4 the Netherlands has received more than it contributes to the FPs.[141] The Dutch FP contribution has decreased from 6.3% in FP4 to 4.8% in H2020, and while the received amount followed this downward trend in earlier FPs (FP4–6) it strongly picked up to 7.4% in FP7 and so far 8.1% in H2020.[142] The Netherlands has obviously had a very good start in H2020, and the main priority has been to maintain this position. The return target of the Ministry of Economic Affairs for 2015 was set to 7%.

At the end of 2013, just before the start of H2020, the role of the government was defined primarily as providing support to researchers in HEIs and research institutes and companies in their efforts to write successful proposals.[143] The Ministry of Economic Affairs stated by that Dutch researchers should remain among the preferred collaboration partners in Europe and beyond. Key steps in providing this supportive role were to make sure that the national science and innovation policy matched H2020 well, to ensure that Dutch participants were supported by the national policy environment, and to provide co-funding when necessary.

140 "Kansen voor Nederland in eerste calls Horizon 2020", Rijksoverheid, 2013.

141 "De positie van Nederland in de EU Kaderprogramma's", Rathenau Instituut, 2016.

142 "Positieve ontwikkelingen in deelname van Nederlands midden- en kleinbedrijf in Horizon 2020", DGBI-I&K/15059654, Ministry of Economic Affairs, 2015.

143 "Nederland en Horizon 2020", Ministry of Economic Affairs, 2013.

The national science and innovation policy is a combination of a set of generic support instruments and a strong set of industry-related priorities. The generic financial support instruments directly support HEIs and research institutes, and provide funding for a selection of specific research projects and programmes.[144] Next to that, a set of tax-reduction instruments was introduced that benefit all companies that actively perform R&D activities.[145]

The Dutch industry-related policy is called the *Topsectoren* policy, which defines nine sectors in which Dutch companies, HEIs and research institutes are of world class. These sectors are:

- Agriculture & Food
- Chemical industry
- Creative industry
- Energy
- High-tech Systems & Materials, including the cross-cutting theme ICT
- Life Sciences & Health
- Logistics
- Horticulture & starting materials
- Water

For each of these sectors, one or more TKIs *(Top consortia for Knowledge and Innovation)* have been set up, which entail collaboration between a large set of stakeholders, including government representatives, large and small companies, as well as knowledge institutions. For each *Topsector*, an "innovation contract" is set up defining the sector's research agenda, priorities and objectives. Based on this, the TKIs work on collaborative innovation and research contracts. Although the government requires private parties to make large (financial) contributions, it provides additional funding based on the private commitments. Furthermore, the TKIs provide opportunities for networking, such as hiring researchers for research projects or finding collaboration partners.[146]

The *Topsectoren* policy is carefully linked to the H2020 themes and objectives. At the end of 2013, the Ministries of Economic Affairs and of Education, Culture and Science drafted a strategic document called *Dutch solutions for worldwide challenges*.[147] This document first introduced a matrix laying out the connections between the *Topsectoren* and the societal challenges of H2020, as illustrated by Figure 133. The document went on to detail the opportunities resulting from each connection, starting from the perspective of the priorities and strategies set out in national sector plans.

Recently the effectiveness of the specialisation on the *Topsectoren* has been questioned. Some important stakeholders, like the Dutch Advisory Council for Science, Technology and Innovation (AWTI), has raised concerns, primarily regarding the ratio between generic financial support instruments and industry-related priorities. The financial support instruments have a generic set-up while the priorities are heavily industry-related. An AWTI report notes that in order to realise financial commitment from ministries other than the Ministry of Economic Affairs, a stronger focus on societal challenges is required.[148] The same argument is made for Dutch participation in H2020 and its strong focus on societal challenges. The *Topsector* policy is currently being evaluated.

144 "Het wetenschapsbeleid en innovatiebeleid", Rathenau Instituut, 2016.

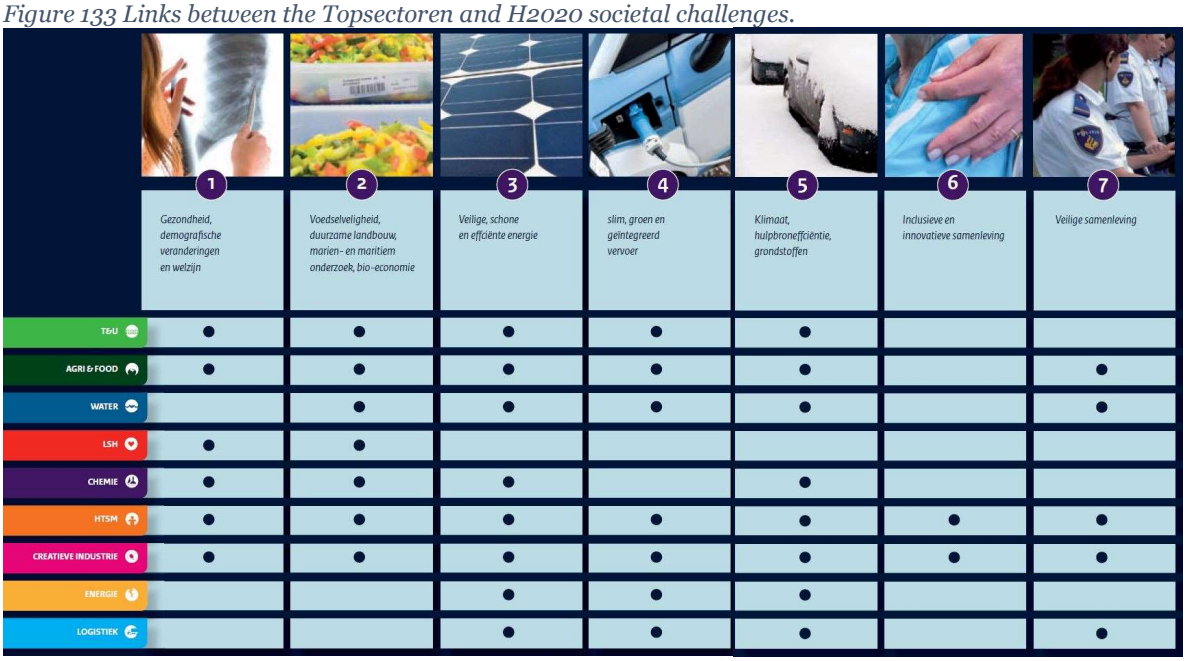
145 "Bouwstenen van Bedrijvenbeleid – hoofdstuk: Innovatie", Nederlands Enterprise Agency, 2016.

146 "Topsectoren", Nederlands Enterprise Agency, 2016.

147 "Nederlandse oplossingen voor wereldwijde uitdagingen", Ministry of Economic Affairs and Ministry of Education, 2013.

148 "Flexibiliseren, differeniëren, scherper kiezen – Balans van de Topsectoren 2016", AWTI, 2016.

Figure 133 Links between the Topsectoren and H2020 societal challenges.



In health, the first *Topsector* addressed in the national strategic document is Life Science and Health. The central theme for this *Topsector* is "Increasing the health and prosperity of society and the economy by changing the biggest challenges into the greatest opportunities". Five thematic priorities were selected for the TKI to focus on as they resonate strongly with the focus of H2020, in particular though the "Health, demographic change and wellbeing" societal challenge:

1. Healthy ageing
2. Medical instruments
3. Personalised nutrition
4. E-health
5. Personalised medicines

In the plan dedicated to the Life Science and Health *Topsector*, more detailed plans are presented and often updated setting out even more detailed strategies within the TKI. In the High-tech Systems & Materials *Topsector*, a dedicated "Healthcare roadmap" was set up.[149] In this document, as well as in the national strategy document, four priority areas were identified:

1. Diagnostics
2. Interventions and therapy
3. Home and community care
4. Enabling technologies

In addition to these, also many other roadmaps of the High-tech Systems & Materials *Topsector* show links with health-related priorities of H2020.[150] Moreover, there are also links from the perspectives of the Chemical industry, Agriculture & food, Horticulture & starting materials and Creative industry *Topsectors*.

Although seen as part of the High-tech Systems & Materials *Topsector*, ICT is acknowledged as an enabler of innovation in most sectors, meaning that ICT is present in almost any corner of the

149 "Topsector HTSM Healthcare 2015 Roadmap", TKI HTSM, 2015.

150 Roadmaps for "Space", "Embedded systems", "Lighting", "Photonics", "Printing", and "Nanotechnology"

Topsectoren policy.[151] This also means that the matching between the *Topsectoren* and all societal challenges is complete, as illustrated by Figure 133.

[151] "Roadmap ICT for the TOP sectors", TKI HTSM, 2012.

C.2 Measures to stimulate FP participation

In this appendix, the first five sections focus on measures to facilitate FP participation in each of the comparator countries. Following these narratives are two case studies that focus on measures to facilitate FP participation in two additional countries, namely Ireland and Germany.

C.2.1 Sweden

Swedish support for FP participation focuses on information and advice, rather than on financial support, and Sweden has an NCP for each H2020 sub-programme. Most NCPs come from Vinnova and the Swedish Research Council (VR), but additional NCPs come from agencies within the national EU coordination function (cf. Appendix C.1.1), as well as from other government agencies, including the Swedish Civil Contingencies Agency, the Swedish Environmental Protection Agency and the Swedish Agency for Economic and Regional Growth. The latter also hosts EEN in Sweden. Vinnova and the Swedish Agency for Economic and Regional Growth together fund the EUSMESupport2020 support office for SMEs, which is run by three research institutes, two university Technology Transfer Offices (TTOs) and an industry organisation. Vinnova also offers small travel grants to SMEs seeking to participate in H2020 or EUREKA projects. The maximum amount is SEK15k for travel within Europe and SEK25k outside Europe.

The main Swedish financial support measure is the EU Advocacy Platforms initiative, which aims to enhance the conditions for Swedish organisations to participate in H2020 by forwarding a relevant and convincing Swedish point of view within a given topic. The objective is to influence future H2020 calls for proposals. The initiative, which is administered by Vinnova on behalf of the national EU Coordination Function has through two calls for proposals awarded around SEK30m to 32 Advocacy Platforms, most of which coordinated by universities and research institutes. According to a Vinnova representative, the Platforms have been quite successful in fostering Swedish participation in H2020. Some sector-oriented agencies also offer financial support to produce H2020 proposals within their respective sectoral remits:

- The Swedish Energy Agency grants up to SEK150k for prospective coordinators, SEK75k for partners and SEK50k if the proposal only concerns one organisation. The grant is not limited to H2020 proposals, meaning that also proposals to other EU-initiated programmes and actions are eligible. All types of organisations may apply, including companies
- The Swedish Civil Contingencies Agency also grants up to SEK150k for prospective coordinators and SEK75k for partners within civil contingencies. The grant is limited to proposals H2020 pillar 3 (Societal Challenges), and only HEIs and research institutes may apply
- The Swedish National Space Board (SNSB) grants up to SEK150k for space-related H2020 proposals. Only HEIs, research institutes and other non-profit organisations may apply
- The Swedish Research Council for Health, Working Life and Welfare (Forte) granted prospective coordinators within its remit up to SEK50k (H2020 pillar 1) or SEK150k (pillars 2 and 3). The support, which was limited to HEIs and research institutes, was discontinued in May 2016

Moreover, some Swedish universities provide financial support to their in-house H2020 participants. For example, Uppsala University grants prospective coordinators up to SEK20k, with an additional SEK25k if the proposal is successful (ERC, Marie Curie Individual Fellowship and other individual grants are not eligible). Lund University also offers grants to coordinators. The Work and Employment Research Centre co-hosted by University of Gothenburg and Chalmers University of Technology has offered H2020 proposers grants of up to SEK125k.

C.2.2 Denmark

Danish support for the FP participation largely relies on information and advice, rather than on financial support. Like the other countries, Denmark has an NCP for each H2020 sub-programme, all employed by the Ministry of Higher Education and Science. The Danish support measures for H2020 are structured into three parts: EuroCenter, EU-DK Support and EUopSTART. Advice for SMEs is also available through the Danish part of EEN.

EuroCenter, which is organised by the Danish Agency for Science and Higher Education in the Ministry, was established to fulfil the ambitions set in the 2012 H2020 participation strategy.[152] EuroCenter coordinates the Danish H2020 support measures, and it hosts the Danish NCPs. The Danish members of programme committees, reference groups and advisory groups are also part of EuroCenter, but their work mainly revolves around strategical advice to the Ministry rather than to H2020 participants. However, according to a Ministry representative, the benefits of having the programme committee members and the NCPs in the same organisation are substantial, especially in terms of knowledge sharing. EuroCenter also hosts two ERFA groups. The EU ERFA group aims to increase the knowledge of H2020 among administrative staff of public research institutions to enable them to better support their H2020 proposers. The ERC ERFA group similarly disseminates experiences of ERC participation.

The main H2020 support function is EU-DK Support, which is coordinated by EuroCenter in collaboration with the Danish Business Authority. It was launched as a result of the 2012 innovation strategy with the objective of increasing Danish H2020 participation through advisory services.[153] EU-DK Support is a network of around 350 persons in 45 national, regional and local universities, research institutes and private companies that provide advice on FP participation. Being a network means that EU-DK Support's advisors can exchange information quickly, thus creating a knowledge bank of benefit to Danish participants. Potential proposers get support with identifying relevant calls for proposals and on whom to contact for further and more specific information, and are provided with tools to assist in writing successful proposals.

A third support measure is EUopSTART, which is an instrument of the Danish Agency for Science and Higher Education. EUopSTART offers grants to produce proposals within all H2020 pillars, as well as, among others, Article 185 initiatives and Joint Undertakings. Eligible applicants are all kinds of Danish companies, universities and public-sector research institutions. EUopSTART accepts proposals three times a year and may grant partners in proposals up to DKK50k and would-be coordinators up to DKK75k, in both cases up to 50% of eligible actual costs. For 2017, DKK17.6m is available.[154]

C.2.3 Finland

Information and advisory support is coordinated nationally through the EU R&D secretariat at Tekes, which coordinates promotion, training and other information and advice activities. It organises events and maintains a website with H2020 information relevant for potential and existing participants, including upcoming and future calls. One of the aims is to support research organisations in developing their own competences in delivering information and advice. The secretariat also collects and publishes information regarding Finnish participation in EU research and innovation activities, including H2020.

Information, advice and partnering support is also offered by EEN, which in Finland is coordinated by Finpro (a public organisation consisting of Export Finland, Visit Finland and Invest in Finland). At Finpro, EEN is part of Export Finland's services supporting the internationalisation of Finnish companies, especially SMEs. Other organisations in the EEN network in Finland are the Helsinki Region Chamber of Commerce and the Turku Science Park.

Tekes offers funding to prepare H2020 proposals. Funding is limited to proposal for large projects (budget ≥ €3m) with at least two Finnish participants and a potential for significant impact on Finland, or if Finnish participants have a substantial role as coordinator and/or work-package leaders. Eligible costs for proposal preparation are limited to 5% of the Finnish partners' budget in the proposed project; Tekes funds 50% of eligible costs for companies and 60% of eligible costs for research organisations. Cluster organisations can also apply for Tekes funding for H2020 proposal preparation to promote Finnish companies' H2020 participation and, for instance, to cultivate the potential for Finnish actors

[152] "Dansk deltagelse i Horizon 2020's samfinansierede partnerskaber – kortlægning og strategi", Ministry of Higher Education and Science, 2012.

[153] "Danmark Løsningernes land – Styrket samarbejde og bedre rammer for innovation i virksomhederne", Ministry of Higher Education and Science, 2012.

[154] "Call for applications for EUopSTART", Danish Agency for Science and Higher Education, March 2017.

to take part in upcoming KIC calls of the EIT. Eligible costs are funded up to 50% up to a maximum of €1m.[155]

The Strategic Research Council (SRC) at the Academy of Finland grants national matching funding to research organisations (mainly HEIs and research institutes) participating in projects that have received funding under the Societal Challenges priority of H2020. SRC matching funding is intended to compensate for funding shortfalls, referring to any difference between the overhead percentage calculated using the Finnish full cost model and the indirect costs reimbursement calculated using the H2020 model. The SRC will fund no more than 75% of this funding shortfall.[156]

Future H2020 calls are influenced using NCPs, ministry, funding agency and stakeholder networks. The points identified by the networks, as well as all preparation of national positions with regards to EU R&I policy and FPs, are discussed by the EU Research and Innovation committee (EU20). This advisory committee has the role of ensuring coordination across policies and ministries.

Just as in Sweden, some Finnish universities have their own internal grant schemes for preparation of EU project proposals. An example is the University of Jyväskylä that offers a travel grant of up to €3k for prospective coordinators and up to €1k for partners.

C.2.4 Austria

Austria has developed a multi-layered FP support structure that covers (i) policy making, (ii) information and advice, and (iii) monitoring of participation. In policy making, programme delegates are responsible for the Austrian contributions to programme design and decision making at programme level; their activities are complemented by the EU coordination unit of the BMWFW for issues to be dealt with at national level. NCPs are responsible for transferring information and providing advice to potential participants, and a team tasked with "EU performance monitoring" informs delegates, NCPs and any other stakeholders about the development of Austrian participation (see Appendix C.1.4). The NCPs and monitoring activities have been evaluated and adapted over time to accommodate for the changes in European R&D policy and the institutional landscape in Austria (e.g. the growing competence of frequent participants, the establishment of in-house support services).[157] In developing Austrian positions, the delegates as well as the EU coordination unit work closely together with the NCPs and the EU Performance Monitoring and they network extensively with the Austrian stakeholders, especially key participants.

The Austrian NCPs are hosted by the Austrian Research Promotion Agency (FFG), where the European and International Programmes (EIP) unit is responsible for supporting Austrian participants in European and international research and technology cooperation, especially through the FPs, but also through ERA initiatives and multilateral programmes. In addition, FFG-EIP hosts EEN and the EUREKA secretariat in Austria. FFG-EIP offers the following services:[158]

- Consulting: This service ranges from project consulting (e.g. finding calls, preparation of proposals) to support for entire organisations (e.g. strategic positioning within the EU research and innovation landscape), including legal and financial issues
- European partner search service: Assistance for finding suitable project partners
- FFG Academy: This service provides know-how on project preparation, cost calculations, reporting and project management through training and webinars
- Technology transfer: EEN supports companies and research institutions in entering European markets

155 www.tekes.fi/en/funding/horizon-2020-project-preparation, viewed 17 May 2017.

156 www.aka.fi/en/funding/our-funding-opportunities/academy-calls/src-matching-funds-for-horizon-2020, viewed 17 May 2017.

157 All evaluation reports have been published on era.gv.at/directory/133.

158 www.ffg.at/en/content/our-services, viewed 19 May 2017

- Career opportunities in Europe: Information for developing an international career in the European research landscape
- Background information and analysis: This is a service for decision-makers from science, business and politics established at the beginning of H2020. It provides information and analyses to assist in setting Austrian strategies and positioning in the ERA

Since the start of H2020, no financial support is provided for preparation of proposals and there is no national co-funding for projects already funded through H2020. However, there is a new funding instrument for supporting the creation of national networking platforms in research areas of the major societal challenges in H2020. Such funding aims to encourage research specialisation and excellence of all key stakeholders by facilitating comprehensive, sustained and intersectoral networking, thus also increasing the capacities for participation in related initiatives at the European and international level, especially in H2020 and ERA initiatives (e.g. Joint Programming).[159]

Furthermore, Austria considers offering additional support to the best possible networking of Austrian innovation actors in Brussels for future FPs through the establishment of an *Austrian Research, Technology and Innovation Hub* (ARTIH) in Brussels. This hub is not only expected to strengthen information and communication, but also to facilitate active contribution of Austrian RTI players to the EU agenda. Currently, a feasibility study on ARTIH is being conducted that will provide the basis for decision making on its implementation.

In addition to these state actors and measures, advisory and support services within (large) research institutions and companies have been established. This development has been triggered by the experience gathered within large institutions through their participation in previous FPs. Over time, these institutions have started to "bundle" expertise and capacities to support their research staff to participate in the FPs and they have established internal information/support units. Such units normally work in close collaboration and coordination with the NCPs of FFG-EIP. Researchers are therefore increasingly informed and supported by in-house services that act as first contact points for information and advice. Since the development of this support layer is the result of an organic process, the division of labour between FFG-EIP and the in-house services varies between research institutions. However, these internal support units have formed a network, Arge FoFoe, where personnel of the units take part in interregional networking and regular exchanges that support the development of in-house support services in cooperation with funding organisations.

C.2.5 Netherlands

The main Dutch support measures for FP participation are financial support to deal with the co-funding required for H2020 participation and a wide range of other advisory services. As introduced in Appendix C.1.5, the strong link between the national policy and the H2020 pillars at policy level is not as clearly visible in the financial support measures. In fact, except for the case of JTIs discussed below, many financial support measures are general ones that can be used by researchers and companies to engage in any research or innovation activity. In other words, these financial measures have broader objectives than to facilitate FP participation, but they may support FP participation (albeit indirectly).

The financial instruments set up by the national government that specifically aim to facilitate FP participation are:

- Co-funding for JTIs: In the Netherlands, the Netherlands Enterprise Agency (*Rijksdienst voor Ondernemend Nederland (RVO)*) is responsible for the implementation of JTIs. Participation has to be by a company, but the co-funding targets HEIs and research institutes
- The Stimulation European Research support instrument (*SEO-regeling*) is specifically aimed at publicly funded HEIs and research institutes that have received funding from H2020 that comes with a co-funding requirement. The measure provides co-funding of up to 9% of the granted EU

[159] "Strategische Vernetzung im Kontext der großen gesellschaftlichen Herausforderungen", BMWFW, 2016.

funding. It is not possible to apply for funding from the SEO-instrument, it is awarded by the Netherlands Organisation for Scientific Research[160]

RVO and the Chambers of Commerce (*Kamer van Koophandel (KvK)*) also provide non-financial support. These organisations are also the main players when it comes to the NCPs and the EEN. Support services are provided partly through their dedicated team for International Research and Innovation Cooperation team (Team IRIS), which has dedicated contact points for a large number of sectors, as well as for specific issues, such as access to finance, legal/financial aspects and SMEs matters. The main support activities are orientation and information days, trainings, advice and partner search. Moreover, the IRIS team acts as an intermediary between stakeholders in the Netherlands and in Brussels. One part of this is an advocacy side for more experienced FP participants. Another liaison initiative is Neth-ER (Netherlands house for Education and Research). This organisation does not provide direct support or services to potential H2020 proposers, but plays a role in policy development. It provides information about European policy developments in R&D, but also deals with advocacy on the European arena.

160 "*Stimulering Europees Onderzoek",* Netherlands Organisation for Scientific Research (NOW), 2016.

C.2.6 Case study: Ireland

This case study presents an overview of Ireland's support measures for participation in H2020. It outlines the suite of support available at the national level across five main categories: advisory services, funding for proactive actions to influence calls, funding to find calls and partners, funding to produce proposals, and co-funding for FP participants. In describing the support available, the document also sets out the "target audience" for the support, whether government, academia, research performing organisations, businesses, or a combination thereof. In addition to setting out the financial and non-financial support for participation in H2020, the document briefly sets out structural support. The case study then mobilises previous evaluations and interviews with key individuals in-country to discuss the effectiveness of the support available, before concluding with a set of "lessons learned".

Ireland's participation in H2020

Ireland has experienced success in H2020, performing in the top 15 of each of three main categories: proposal success rates, share of signed grant agreements, and share of H2020 funding received at the time of the first results report of H2020[161] (see Table 28).

Table 28 Performance of Ireland in H2020

H2020 performance area	Rank	Value
Proposal success rates	12th	15% *
Share of signed grant agreements	14th	2% *
Share of H2020 funding received	13th	2% *
Performance in specific themes/programmes		Ireland performs well in ICT (in terms of overall funding secured), and ranks top in the SME instrument by proposal success rate **

Source: * extracted from DG Research and Innovation, "Horizon 2020 First Results", 2015; ** based on eCorda analysis (March 2016)

More recently, the interim evaluation of Ireland's participation in H2020,[162] using data to March 2016, found that Ireland (when compared with the same period of FP7) was submitting more and larger proposals to H2020, and had secured notably higher financial return in EC contributions (a 228% increase on the funding in the first two years of FP7). At the time of the evaluation, there had been high business demand driven by SMEs, and a slightly higher success rate for industry than for higher education institutions over the same period. Company funding accounted for 30% of funding for the period, and it was estimated that client companies of Ireland's enterprise agencies accounted for 85% of company funding in the period. Intel Ireland is listed in the Top 50 H2020 Companies,[163] and at the time of the evaluation of participation, Ireland ranked top in the SME instrument, based on proposal success rate.

Objectives and targets of the current national strategy

Ireland's current, dedicated H2020 Strategy, "EU Framework Programme for Research and Innovation (2014-2020): Ireland's Strategy and Target for Participation" was published in 2014 by the Department of Jobs, Enterprise and Innovation (DJEI).[164] As well as more than doubling the target for financial return when compared to FP7 (from €600m to €1.25bn), the current strategy identifies a strategic

161 See: https://ec.europa.eu/programmes/horizon2020/sites/horizon2020/files/horizon_2020_first_results_1.pdf.

162 C. Rosemberg Montes, P. Simmonds, M. Wain, K. Nielsen, "Interim evaluation of Ireland's Participation in Horizon 2020", DJEI, 2016.

163 Building Research Relationships with International Industry Partners (February 2015 presentation given by Dr Imelda Lambkin).

164 DJEI, "EU Framework Programme for Research and Innovation (2014-2020). Ireland's Strategy and Target for Participation", 2014.

objective to build on the success of SME participation in FP7, to further build on the success of Irish coordinators, and to overcome a perceived relative underperformance in securing ERC funding. Specific support mechanisms or schemes are in place for each of these areas. Finally, there is a cross-border strategy for Northern Ireland and Ireland, which sets a target of €175m in funding for cross-border projects.[165] The strategy was published by InterTradeIreland, the cross-border trade and business development body.

Key organisations involved in supporting FP participation

Overall Ministerial responsibility for H2020 sits with DJEI, who set the remit of the support structures. The "operational" support structure for H2020, the National Support Network, is led by Enterprise Ireland, the national agency responsible for supporting Irish businesses in the manufacturing and internationally-traded service sectors. The National Support Network is comprised of two government departments,[166] two national agencies,[167] the major national research funding bodies,[168] a national research institute,[169] and the Irish Universities Association. The National Support Network has the remit to "optimise Irish participation" in H2020,[170] and has been organised broadly in line with the three pillars of H2020, and the organisations' strengths.[171]

There are several important groups, too. DJEI chairs a High-Level Group for H2020, which has been established to oversee implementation of the national strategy, and to identify and champion strategic "big wins" for Ireland in the programme. There is also a working group focused on strategic research proposals, chaired by the Director General of Science Foundation Ireland (and Chief Scientific Advisor to the Irish Prime Minister). The group is backed by the Minister for Skills, Research and Innovation.[172] Finally, the All-Island H2020 Steering Group is convened and chaired by InterTradeIreland. The Steering Group comprises members from Irish and Northern Irish government departments and agencies involved in H2020 support networks, as well as representatives from the North-South Ministerial Council[173] and the European Commission.

Framework Programme support measures

Ireland's range of supports for prospective H2020 participants is fairly comprehensive, with support measures present across each of five major categories. The country's support for participation in the FPs has been developed over successive programming periods since FP5, as national aspirations and targets for participation have also increased sharply. The majority of supports described below are specific to H2020. All supports are summarised in Table 29.

Advisory services

Each organisation in the National Support Network provides direct support to their stakeholders, from information, advice and guidance, to mock interviews, peer learning, research infrastructure and funding schemes.

The network of National Contact Points (NCPs) is overseen by Enterprise Ireland, and comprises 36 representatives from 10 research and industry agencies. The NCPs cover all sub-programmes of H2020 and work on an All-Island basis to provide guidance and information, as well as "hand-holding" support through proposal preparation. The NCP service has been designed in light of the European

165 European Commission Joint Research Centre, "Research & Innovation Observatory Country Report – Ireland", 2015.

166 DJEI and the Department for Agriculture, Food and Marine.

167 The Environmental Protection Agency and the Sustainable Energy Authority of Ireland.

168 The Health Research Board, Higher Education Authority, Irish Research Council, and Science Foundation Ireland.

169 The Marine Institute.

170 Enterprise Ireland, "Strategies to maximise participation in Horizon 2020", 2013.

171 For example, the Industrial Leadership pillar is largely covered by Enterprise Ireland, and Excellent Science by Science Foundation Ireland and the Irish Research Council.

172 See: http://www.horizon2020.ie/minister-damien-english-wants-researchers-to-think-big/.

173 See: https://www.northsouthministerialcouncil.org/.

Commission's recommendation of "professionalised" support services.[174] The last couple of years has also seen the development of a special team to support industry engagement and multi-disciplinary research. The team comprises relevant NCPs, National Delegates and agency development advisors to support bringing expertise and businesses into multi-sectoral and multi-disciplinary projects such as ICT (which, as an enabling technology, can apply to projects in energy, manufacturing, and health). The NCPs are available for each type of potential participant, from government, academia, research organisations and businesses, with two dedicated NCPs for SMEs. Enterprise Ireland also host the Enterprise Europe Network (EEN) in Ireland, which provides a range of complementary services, including technology assessments to identify funding opportunities and partner searches.[175]

The Irish Marie Curie Office is funded by the Irish Research Council, and managed by the Irish Universities Association. It exists to support the full range of stakeholders that are eligible for the Marie Skłodowska-Curie Actions (MSCA) in the process of applying for and managing an award. Its resourcing includes the dedicated MSCA NCP, and dedicated staff to deal with immigration issues.

Science Foundation Ireland (SFI) have a dedicated EU support team within their EU Affairs Office. This team is in place to support SFI award holders, whether individual researchers or organisations,[176] or any of the SFI-funded research centres,[177] and the wider research community to leverage national funding against European monies.

Funding for proactive actions to influence calls

Ireland's support system features both financial and "soft" supports for proactive actions to influence calls. SFI offers grants of up to €50k through their Brussels Conference Programme for researchers to host an event in Brussels for the purpose of enhancing H2020 funding through influencing, promoting activities, and building networks. On the "softer" side, Enterprise Ireland's Brussels office[178] is made available for partner meetings and hosting of events in Brussels, for any Irish applicant.

Funding to find calls and partners

Enterprise Ireland offers funding for academic researchers to meet research partners in other countries. The funding is available for multiple visits, to facilitate participation in H2020 (excluding COST), and up to €3k (at €400 per day) is available for out of pocket expenses such as hotels, meals, taxis, local fares and incidentals.

The cross-border trade body InterTradeIreland provides funding for Northern Irish/Irish partnerships to i) travel to meet with each other, and ii) travel for meetings with overseas partners, or to attend relevant events. The funding is available for both academics and industry/other organisations, with up to €550 available to support cross-border partnerships to travel to meet with each other, and up to €437 to support cross-border partnerships to travel to Europe.

Funding to produce proposals

There is a large range of financial support available for those aiming to coordinate a project under H2020, and/or those applying to the ERC. While most support is available for researchers, it may be possible for Irish companies to avail of financial assistance towards the cost of preparing their H2020 proposal, via their assigned development advisor.[179]

Enterprise Ireland's Coordination Support Grants are available to facilitate the preparatory work leading to a proposal for the coordination of projects. Two types of support grant are available:

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174 See: http://ec.europa.eu/research/participants/data/support/20131125_NCP%20Minimum%20standards.pdf.

175 See: http://www.een-ireland.ie/content/services/access_eu_funding/.

176 See: http://www.sfi.ie/funding/funding-overview.html.

177 See: http://www.sfi.ie/investments-achievements/sfi-research-centres/.

178 See: https://enterprise-ireland.com/en/Export-Assistance/International-Office-Network-Services-and-Contacts/Belgium.html.

179 For example, if the company is a client of one of the Irish enterprise agencies.

- Coordination grants for academic coordinators, for any research project within H2020, up to €12.5k available.
- ERC preparation grants for academic researchers applying to the ERC, up to €8k available for a Starting Grant, Consolidator Grant or Advanced Grant. Up to €5k is available for applicants to a Proof of Concept Grant.

SFI offers "second chance" grants to academic ERC applicants. The SFI ERC Development Programme supports researchers based in Ireland that have submitted a proposal to the ERC Starting Grant, Consolidator Grant and Advanced Grant programmes, that were deemed fundable, but were not eventually funded by the ERC due to a lack of available programme budget. The grants are available for up to 50% of the original ERC proposal, or €500k, whichever is lower, for a maximum of 24 months.

The Irish Research Council's Basic Research Excellence Award offers between €60k and €100k to researchers in the Arts, Humanities and Social Sciences who applied to the ERC and achieved an "A" rated outcome but had not received funding. The grant is contingent upon the intention to re-apply to the ERC in the next available call.

Co-funding for FP participants

SFI offers financial support for ERC participants. The SFI ERC Support Programme provides an additional overhead payment to the Host Institution of ERC award winners, which is designed to assist awardees to successfully carry out their ERC-funded research. Awardees who secured ERC funding while at an Irish institution, as well as those subsequently recruited to an Irish institution from overseas are eligible. The amounts differ as follows:

- ERC award (2015 call or later) with an Irish Host Institution: €150k, regardless of ERC scheme.
- ERC award from a 2014 call with an Irish Host Institution: 20% of the award stated in the ERC grant agreement, up to a maximum of €300k, regardless of ERC scheme.
- ERC awardees (from any year) that have been recruited to work in an Irish Host Institution: The award may depend on the time remaining on the ERC award and will depend on the type of ERC award held, as follows: ERC Starting Grant up to €500k; ERC Consolidator Grant up to €750k; ERC Advanced Grant up to €1m.

Ireland also invests structurally, in the broader research population and infrastructure, to boost participation in the FPs. Through 2016, the Irish Research Council invested approximately €90k in workshops to support the embedding of interdisciplinary thinking in the Irish research system.[180] The SFI-funded Research Centres have been set targets for H2020 funding,[181] and have been awarded supplementary funding to support dedicated EU Grant Managers within the centres that co-ordinate European activity. There are 13 such posts in the 12 funded centres.

Furthermore, national research funding has been aligned to both national strengths and European priorities. This was first undertaken through the national Research Prioritisation Exercise in 2014,[182] and was refined in the national strategy Innovation 2020.[183] Applicants to some national research funding must present a concrete plan for accessing European funding as an eligibility criterion.

[180] See: http://www.research.ie/scheme/workshops-cultivate-interdisciplinary-research-ireland-call-closed. Figure provided by IRC.

[181] SFI Annual Plan 2015.

[182] See: https://www.djei.ie/en/Publications/Publication-files/Forf%C3%A1s/National-Research-Prioritisation-Exercise-First-Progress-Report.pdf.

[183] See: https://www.djei.ie/en/Publications/Publication-files/Innovation-2020.pdf.

Table 29 Summary of FP participation support measures in Ireland.

Type of measure	Name of measure	Responsible body	Scope, scale and eligibility	Funding available
Advisory services	Network of National Contact Points (NCPs)	Enterprise Ireland	36 NCPs All-island basis Advice and guidance across all H2020 programmes	--
	Enterprise Europe Network	Enterprise Ireland	Services to SMEs include technology assessments to identify funding opportunities and partner searches.	--
	Irish Marie Curie Office	Irish Universities Association	Supports proposal for and management of MSCA awards	--
	EU support team (EU Affairs Office)	Science Foundation Ireland	Supports SFI award holders	--
Funding for proactive actions to influence calls	Brussels Conference Programme	Science Foundation Ireland	Hosting a Brussels event for influencing, promoting activities, and building networks	Up to €50,000
Funding to find calls and partners	Travel grants for academic researchers	Enterprise Ireland	Facilitates visits to meet research partners in other countries	Up to €3,000 (€400 per day)
	Travel grants	InterTradeIreland	Facilitates Northern Irish/Irish partnerships to i) travel to meet with each other, and ii) to travel for meetings with overseas partners, or to attend relevant events. Available for both academics and industry/other organisations.	Between €400-€550
Funding to produce proposals	Coordination support	Enterprise Ireland	A grant to support the preparatory work for a proposal that will lead to the coordination of a project under H2020	Up to €12,500 for academic coordinators, Up to €3,000 for a COST action
	ERC preparation	Enterprise Ireland	For applicants to an ERC Starting Grant, Consolidator Grant or Advanced Grant, as well as for ERC Proof of Concept Grants.	Up to €8,000 Up to €5,000 is available for an ERC Proof of Concept Grant
	ERC Development Programme	Science Foundation Ireland	Supports academic researchers that submitted a proposal for an ERC Starting Grant, Consolidator Grant or Advanced Grant that was deemed fundable, but did not receive funding due to a lack of available programme budget.	The lower of €500,000 or 50% of the original ERC proposal, for up to 24 months
	New Horizons	Irish Research Council	For AHSS researchers: 15-month "Starter Grant" to provide seed funding for an ERC grant in the medium term 15-24 month "Interdisciplinary Grant" for AHSS researchers to collaborate with STEM researchers on interdisciplinary projects that would address societal challenges under H2020, or establish consortia on upcoming topics across the societal challenge pillar	Up to €100,000 Up to €220,000

	Basic Research Excellence Award	Irish Research Council	Funding to non-funded AHSS applicants to an ERC grant that achieved an "A" rating. The award is contingent upon intention to re-apply to the ERC in the next available call.	Between €60,000 and €100,000
Co-funding for FP participants	ERC Support Programme	Science Foundation Ireland	Provides an additional overhead payment to the Irish host institution of ERC award winners, to assist the successful implementation of ERC-funded research.	€150,000 is offered for ERC awards from a 2015 call or later, regardless of ERC scheme

Source: Desk research and consultation.

Effectiveness

In addition to examining Ireland's participation in the programme to date, the 2016 evaluation of Ireland's participation in H2020[184] examined the relevance, adequacy and effectiveness of the support available to applicants and participants.

The evaluation found that the NCP network was well-regarded by those consulted. A majority of respondents to the survey conducted for the interim evaluation reported that their interaction with the NCP network had helped them to i) improve their understanding of critical success factors, ii) understand which calls to target, and iii) identify a specific opportunity relevant to their organisation. More than a third of respondents agreed that interaction with the NCP network had improved the implementation and impact aspects of their proposal. A comparative analysis between FP7 and H2020 revealed an increase in positive views of benefits of the different NCP functions, including being alerted to specific opportunities, understanding what calls to target, and making improvements to implementation aspects. The evaluation remarked that Ireland's less-dramatic reversal in success rates between H2020 and FP7, as compared with the programme overall, may reflect the investment in the support system and the growing experience of Ireland's research base. The evaluation also found general satisfaction among respondents with the wide-range of financial support measures that are available, and in particular the coordinator support grant and travel grant available from Enterprise Ireland.

Our interviewee suggested that the effectiveness of the support system lies in two main areas:

- The conscious development of the support structure has been overseen by strong political leadership over the last 10-15 years. Ireland follows an "all-of-government" (i.e. cross-departmental) approach to supporting H2020 participation, and publishes ambitious targets for participation. The all-of-government approach to reaching these targets is underpinned by a set of metrics, and it was suggested that these metrics "focus the mind" and productively bring together the bodies operating in the support structure.
- Taking a proactive approach to which parts of the programme to target and how was presented in two ways. The High-Level Group, chaired by DJEI was discussed in light of the political leadership for participation, focusing on "bigger picture" aspects of where Ireland Inc. can or should participate. It was suggested that this group has been the proponent of pursuing more and larger-scale projects. In addition, the network of NCPs work proactively to build relationships with researchers and industry, implementing the "how" of getting people involved. This is also backed by the special multidisciplinary team mentioned in above, and is an extension of the remit of Enterprise Ireland to bring more industry into H2020 as the lead agency in that funds industry nationally.

Lessons learned

In addition to setting a significantly higher overall target for secured funding in comparison to FP7, Ireland has sought to increase the number of Irish coordinators, to build on the success of SME

184 C. Rosemberg Montes, P. Simmonds, M. Wain, K. Nielsen, "Interim evaluation of Ireland's Participation in Horizon 2020", DJEI, 2016.

participation, and to improve performance in the ERC. The suite of support measures available to applicants and participants is set out rather clearly to support these goals, and depending on eligibility, financial support is available to academics, researchers and businesses.

In the interim evaluation of Ireland's participation in H2020, all support measures scored well for relevance, suggesting that they are well designed and oriented for the needs of Irish applicants and participants. The financial support for coordinators and travel for academic researchers were particularly well-regarded based on consultation for the evaluation, and scored best of all supports for effectiveness.

Our interviewee stressed the importance of the strong political leadership in driving the development of the system since FP5, setting the focus (i.e. pursuing larger strategic projects), and mobilising all relevant bodies. Ireland has, perhaps as a small system, been able to purposefully structure its network of NCPs and other experts to facilitate bringing both industry partners and national strengths (in, for example, ICT) to proposals.

Finally, the approach to setting H2020 funding targets for nationally-funded research centres, and making the consideration of European funding an eligibility criterion for some national research funding may prove important to building awareness and capability elsewhere in the research system.

C.2.7 Case study: Germany

This case study presents an overview of Germany's support measures for participation in Horizon 2020 (H2020). Some support in Germany is organised at the level of the 16 Länder (states), rather than solely at the Federal (national) level. This case study maintains a focus on the suite of support available and organised at the national level.

The case study sets out the suite of support across five main categories: advisory services, funding for proactive actions to influence calls, funding to find calls and partners, funding to produce proposals, and co-funding for FP participants. In describing the support available, the document also sets out the "target audience" for the support, whether government, academia, research performing organisations, businesses, or a combination thereof. In addition to setting out the financial and non-financial support for participation in H2020, the document briefly sets out any structural support. The case study then mobilises previous evaluations and interviews with key individuals in-country to discuss the effectiveness of the support available, before concluding with a set of "lessons learned".

Germany's participation in H2020

According to the H2020 First Results report (2015), Germany performed among the top-ranked Member States in the first year of the programme. Common with all other Member States, Germany's application success rate decreased between FP7 and H2020 (-8 percentage points). Germany's overall share of signed grant agreements has also decreased slightly since FP7 (-1 percentage point), though the share of EU financial contribution increased, by approximately 5 percentage points (see Table 30).

Table 30 Performance of Ireland in H2020 (2015)

H2020 performance area	Rank	Value
Application success rates	7th	16%
Share of signed grant agreements	2nd	14%
Share of H2020 funding received	1st	22%
Performance in specific themes/programmes		Based on the most recent evaluation of participation, Germany performs well in ICT, Health, NMP, and Transport.*

Source: extracted from DG Research and Innovation (2015) Horizon 2020 First Results. *Grimm (2010) German study on participation patterns in the Framework Programme

In consultation, the participation pattern of German entities was described as satisfactory, and rather even: approximately one third higher education institutions, one third industry, and one third non-higher education research organisations, such as the Max Planck Institute. The 2014 RIO Country Report on Germany also cites participation of the private sector in FP7 as 33%.[185] The 2009 evaluation of German participation in FP6 cited industry participation as 26% through FP6, above the EU average of 19%.[186] Despite these positive messages, it was also noted in consultation that there remain some challenges in engaging SMEs and universities of applied science (Fachhochschulen).

Objectives and targets of the current national strategy

The German Federal government has published three central strategies in which H2020 is discussed as a contributor to obtaining objectives. Primary among these is the 2014 "Strategy of the Federal Government on the European Research Area (ERA): Guidelines and National Roadmap", published in 2014 by the Federal Ministry of Education and Research (BMBF). The strategy outlines a set of key objectives, including to increase the participation of German science and industry in H2020, in

185 Sofka, "RIO Country Report Germany 2014", 2015.

186 BMBF, "German participation in the Sixth European Framework Programme for Research and Technological Development", 2009.

particular small and medium-sized enterprises (SMEs).[187] The strategy suggests that this will be based on the development of BMBF strategies for Europeanisation and the strengthening of synergies between national funding activities and H2020. The strategy also sets an objective to expand on the approaches to cooperation with third countries and EU13 Member States, with a view to contributing to the strengthening of the European Research Area as a whole.[188]

Key organisations involved in supporting FP participation

There are a broad range of organisations that participate in the support system for FP participation. However, here we focus on two that are cited as the major players in enabling international research collaboration, and which provide the largest share of resources.[189]

The Federal Ministry of Education and Research (BMBF) promotes education, science and research as important contributors to Germany's prosperity. The ministry supports innovative projects and ideas in research through targeted funding programmes,[190] and is the ministerial body responsible for H2020. The EU Office of BMBF (EU-Büro) plays a particularly important role, uniting several tasks and services under H2020, including coordination of the German NCP network.

The Deutsche Forschungsgemeinschaft (DFG) is the central research funding body, and covers all disciplines of science and the humanities. DFG is a self-governing organisation for science and research in Germany, and its membership consists of German research universities, non-university research institutions, scientific associations and the Academies of Science and the Humanities. The DFG receives the majority of its funds from the federal government and the Länder, which are represented in all grants committees. The central element of DFG research funding is its Individual Grants Programme,[191] as well as specific programmes that focus on international cooperation.

Framework Programme support measures

This section sets out the FP support measures available at the national level in Germany. There does not appear to be specific funding for proactive actions to influence calls, or for co-funding at the national level.

Advisory services

The German National Contact Points (NCP) system comprises over 120 individuals, and provides information and advice. The NCP system operates 22 functions, including SME-specific guidance on, for example, how companies can claim venture capital under H2020. The NCP system is funded by the federal government, with the largest share coming from the BMBF, though other ministries (e.g. the Ministry for Economic Affairs and Energy, BMWi) and other entities (e.g. the Research Centre Jülich) also support and participate in the system. Due to this, the NCP system is highly distributed, though there remains a common federal government guideline for NCPs based on the standards and guiding principles of the European Commission. Due to the distributed structure of the NCP system, thematic expertise is fulfilled by key national experts in relevant host organisations. An important principle of the information and advisory system for H2020 is that it aims to reach out to new players.[192]

The European Liaison Office of the German Research Organisations (KoWi) is a joint service platform for German research organisations, located in Brussels and Bonn. KoWi was described in consultation as representing a "two-pillar" approach: it receives funding from the federal government and DFG, but is also self-organised by its scientific members, emphasising the importance of strong research

187 This objective is mirrored in the other two strategy documents: 'Strategy for the Internationalisation of Education, Science and Research', published in 2016 by BMBF (p.14), and in the New High-Tech Strategy Innovations for Germany, published in 2014. The High-Tech Strategy sets focal topics for development and programmes.

188 This objective is mirrored in the 'Strategy for the Internationalisation of Education, Science and Research', published in 2016 by BMBF (p.14).

189 Vogt, "ERAWATCH Country Reports 2013: Germany.", 2014.

190 See: https://www.bmbf.de/en/research-funding-1411.html.

191 See: http://www.dfg.de/en/research_funding/programmes/individual/.

192 BMBF, "Strategy of the Federal Government on the European Research Area (ERA)", 2014, p.8.

institutions. KoWi offers a comprehensive service to researchers, administrators and institutions nationwide, covering all steps of scientific careers, all instruments of H2020, and all phases of any EU research project.[193] Services include:[194]

- Advice and coaching on European research funding, including positioning in H2020
- Information and a tailored alert service on EU R&D opportunities, and
- Specific training, such as: "EU-Kompakt", an introduction to EU research funding, funding schemes and mechanisms, and "EU-Intensiv", in-depth training on proposal writing, project management, background information, and ERC Starting and Consolidator Grants interview training

In consultation, the Enterprise Europe Network was described as very strong, and this was stressed in relation to the support for businesses in Germany.

Funding to find calls and partners

Funding for travel and stays by German and foreign researchers and experts is integrated within the grant schemes set out below in the "Co-funding for FP participants" section.

Funding to produce proposals

BMBF oversees various programmes to promote the preparation and application of projects under H2020. These programmes support specific activities, and promote the participation of German applicants in H2020 together with partners from selected global regions, in alignment with strategic objectives. There are currently four open programmes, which support collaboration with partners in EU13 Member States and third countries, as well as supporting the participation of the universities of applied science. Commercial organisations are eligible to apply for funding under two of the schemes, with SMEs specifically targeted for recruit into applying consortia under one scheme:

- A grant scheme for International Cooperation in Education and Research, Central and South Eastern Europe Region.[195] This program provides funding in two phases to promote the preparation and submission of projects in the Societal Challenges, Industrial Leadership and other areas of H2020, as well as on other research-related EU programmes. Phase one supports the establishment or development of project consortia. The funding covers one round-trip journey for German scientists and experts, plus a fixed rate per diem of €94 per day for accommodation and meals. Foreign scientists and experts may also stay in Germany with a per diem of €104 per day or €2.3k per month.[196] The programme particularly aims to attract SMEs into consortia.[197] Eligible project-related expenditure is calculated on the basis of each recipient type, with universities and research institutions eligible for up to 100% of costs for a maximum of €80k over 24 months. Commercial entities may be funded for up to 50% of eligible costs. The grants may cover non-cash resources (such as expendables), workshops, and personnel costs.
- A grant scheme to support preparation of applications to H2020 with partners from North and South America.[198] Science and technology cooperation with North and South America is of strategic importance for Germany. Funding covers exploratory and networking activities to promote the preparation and submission of projects to thematically relevant H2020 areas, including the travel and stays of German and foreign scientists and experts. The grant also funds workshops, project-

193 See: http://www.kowi.de/en/kowi/about-kowi/about-kowi.aspx.

194 See: http://www.kowi.de/en/kowi/services/services.aspx.

195 This comprises: the EU Member States Bulgaria, Estonia, Greece, Croatia, Latvia, Lithuania, Poland, Romania, the Slovak Republic, Slovenia, the Czech Republic and Hungary; the official EU candidate countries Albania, the Former Yugoslav Republic of Macedonia, Montenegro and Serbia; and, the potential candidates for EU accession to Bosnia and Herzegovina and the Republic of Kosovo.

196 See: https://www.bmbf.de/files_anncmnt/Bekanntmachung_auf_Englisch.pdf.

197 See: https://www.bmbf.de/foerderungen/bekanntmachung-1226.html.

198 The countries comprise: Argentina, Brazil, Chile, Colombia, Mexico (and Canada and the US).

related resources and equipment, and personnel costs.[199] The grant lasts up to 12 months, and universities, research and scientific institutions may be funded up to 100%, for a maximum of €60k, while commercial organisations may be funded up to 50%.

- A grant scheme to support the preparation of applications to H2020 with partners from the Asia-Pacific Research Area.[200] The grant is intended to strengthen the strategic internationalisation of German universities and the deepening of regional cooperation through the preparation of research proposals in the H2020 Societal Challenges, as well as in the area of Excellent Science. The grant covers the travel and stays of German and foreign scientists and experts, workshops and personnel costs. Funding is for up to 100% of eligible costs, with a maximum of €150k for up to 36 months.
- A grant scheme to support the universities of applied science in cross-border networking and submission of proposals for H2020.[201] The grant is to support universities of applied science to participate more intensively in H2020 and complementary EU programs. The grant may cover travel and coordination of a project idea, preliminary work on the approach, and personnel costs. Funding of up to €25k over nine months is available for state and state-recognised universities of applied sciences, though with potential to extend the amount to €40k in specific cases (e.g. when coordinating the planned EU application).

Co-funding for FP participants

In terms of structural investment, the Strategy of the federal government on the European Research Area stresses that measures are developed to strengthen the synergies between national funding activities and H2020.[202]

Effectiveness

The most recent evaluation of Framework Programme performance is the 2009 evaluation of German participation in the Sixth Framework Programme.[203] However, in consultation, it was revealed that there is continual internal discussion, and that the German national support system is regularly internally compared to that of other Member States.

In consultation, the German support system was described as complex in its organisation, though largely effective. The effectiveness of the support system was described as being underpinned by the two pillars that research support is built on:

- Governmental support for research, and
- Scientific self-organisation by research institutions

For example, KoWi represents a complementary support structure for entities. KoWi was co-created by big research organisations such as the Max Planck and Alexander von Humboldt Institutes, and features both governmental funding and independent funding from the DFG. This perhaps emphasises the importance of strong research institutions taking a lead role in supporting the development of the research system.

Despite broadly satisfactory participation patterns, consultation highlighted that there are two types of organisation whose FP participation could be improved. First are the universities of applied science, which are small, specialised, and oriented to applied research, and have been so far under-represented in the funding system. Second are German SMEs. The engagement of SMEs was described in consultation as being due in part to relatively plentiful provision of national SME funding for research and innovation, such as the "KMU-innovativ: Priority for Cutting-Edge Research in SMEs" and the

199 See: https://www.bmbf.de/files_anncmnt/FBK_H2020_Fact_Sheet_ENG_final.pdf.

200 Australia, China, India, Japan, New Zealand, Singapore, South Korea. See: https://www.bmbf.de/foerderungen/bekanntmachung-1335.html.

201 See: https://www.bmbf.de/foerderungen/bekanntmachung-1345.html.

202 BMBF, 2014, op. cit.

203 BMBF, 2009, op. cit.

"Central Innovation Programme SMEs (ZIM)",[204] perhaps makes application to European funding less attractive than in other Member States. The second challenge in recruiting SMEs was described as a misalignment between the European Commission and definition of SMEs: the typical German "Mittelstand" are often larger or beyond the EU definition of SMEs. It was suggested that the impact of this technical challenge is mostly evident in areas of single funding such as under the SME instrument, where Mittelstand may consequently not be eligible for participation. It was suggested that this does not impact SME participation in areas of collaborative funding or, for example, Joint Technology Initiatives (JTIs), though more is being done to attract SMEs to participate in the FPs. The selection of funding for the production of proposals set out above demonstrates how policy makers are addressing these two groups.

Table 31 Summary of FP participation support measures in Germany.

Type of measure	Name of measure	Responsible body	Scope, scale and eligibility	Annual budget (€m)
Advisory services	NCPs	BMBF	121 NCPs 22 functions, advice and guidance	--
	KoWi (EU Liaison Office)	DFG	Provides information, advice and training on the wide range of EU research funding programmes.	--
Funding to find calls and partners	Components of proposal support funding (below)	BMBF	Support for German and foreign scientists and experts	Travel, plus: A per diem of €94 per day for German scientists and experts €104 per day or €2,300 per month for foreign scientists and experts
Funding to produce proposals	International Cooperation in Education and Research, Central and South Eastern Europe Region	BMBF	Funding for projects to promote the preparation and submission of projects on the thematic priorities of H2020 Universities, research organisations, commercial entities	€80k for 24 months
	Funding for the Submission of Applications under Horizon2020 with Partners from North and South America	BMBF	Funding for applicants under Societal Challenges, Excellent Science and preparatory projects under LEIT from Germany Universities, research organisations, commercial entities	€60k for 12 months
	Funding for universities and partners in partners from the Asia-Pacific Research Area	BMBF	Funding to support the preparation of research proposals in line with the H2020 "Social Challenges" Universities	€150k for 36 months
	Cross-border networking and submission of proposals	BMBF	Support for the fachhochschulen to participate more intensively	Up to €25k for nine months

Source: Desk research and consultation

Lessons learned

Germany's system is rather de-centralised, but with close alignment between the national funding programmes and German EU support structures. This has implications for the structure and delivery of

[204] More information is available at http://www.foerderinfo.bund.de/en/funding-for-smes-1786.php

NCP services, for example, where those that fulfil positions of key expertise in national delivery also deliver expertise to participants in European programmes.

The two-pillars of federal government funding and scientific self-organisation are important. For example, the comprehensive advice, guidance and coaching available for researchers that wish to participate in FPs is supported by government funding, but, driven by research stakeholders.

It is evident that the support organised at the national level is oriented clearly to deliver key strategic goals and areas of need. Funding is available to develop internationally collaborative proposals with partners in certain international geographies, and to promote and encourage the universities of applied science to develop proposals. One grant scheme specifically aims to attract and recruit German SMEs to applying consortia.

C.2.8 Best practices for supporting FP participation

Most EU Member States offer a diverse range of financial, non-financial and structural support measures to help potential and current applicants to engage with the FPs. To harness the diversity of support practices, we have selected a broad range of countries for this review. This allows us to draw lessons for Norway from the five study comparator countries (Austria, Denmark, Finland, Netherlands and Sweden) as well as from the very many examples of practice among a broader range of high-performing Member States.

There are few specific evaluations of FP support measures that would allow us to draw on conclusions related to relevance, effectiveness, efficiency, and impact. Therefore, to reach a view of which of the multitude of supports may constitute best practice, we have taken a three-pronged approach to the search of information:

- Identifying examples of best practice within the five study comparator countries
- Identifying other top-performing Member States in H2020 by examining which appear in the top-15 in any two of three categories[205] in the Horizon 2020 First Results report, published by the European Commission in 2015.[206] Good performance in the FPs may reflect strong institutions more than best practice in the support system, though we may assume that support systems co-evolve with the research systems in the majority of cases. Each of the five study comparator countries appear in this top-15
- Highlighting interesting examples from Member States that speak to relevant strategic objectives, and particularly where changes or amendments to the systems of support are observable (i.e. elements that have been introduced, removed or re-focused as the support system has been developed between H2020 and FP7)

As part of this review, we have prepared case studies of the support systems for FP participation in two of the identified high-performing Member States, one focusing on Ireland and one on Germany. The countries were selected in agreement with RCN, and each country presents interesting lessons for this review. The full case studies are available in Appendices C.2.6 and C.2.7 above.

The following sub-sections set out a synthesis of the FP support measures observed, per each type of support. The chapter is not exhaustive, rather presenting pertinent examples first from the study comparator countries and then from the broader group of high-performing Member States selected for this review.

Advice and guidance

Central to Member States' support to FP participation are their networks of NCPs. Though NCP services are generally designed to the standards and guiding principles of the European Commission,[207] and cover all sub-programmes of H2020, networks of NCPs are organised differently in different Member States.[208]

Examining the NCPs across the comparator countries and other high-performing Member States reveals that their visibility and their ability to connect with other parts of the support system and a broad range of target constituents are most often stressed as key to their effectiveness.

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205 The three categories are: i) Application success rates, ii) Share of signed grant agreements, iii) Share of Horizon 2020 funding received. 15 Member States appear in at least two of those categories: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Poland, Portugal, Spain, Sweden, and the UK. In addition, we see that one Associated country – Switzerland – performs particularly well.

206 See: https://ec.europa.eu/programmes/horizon2020/sites/horizon2020/files/horizon_2020_first_results_1.pdf.

207 See: http://ec.europa.eu/research/participants/data/support/20131125_NCP%20Minimum%20standards.pdf.

208 Simmonds, Brown, Wain, Rosemberg Montes, Izsak, Roman, "Review of the support mechanisms provided by the Northern Ireland Executive to support delivery of the Executive's target of participants winning €145m from Horizon 2020", 2016.

The Danish, Finnish and Dutch NCP networks are regarded positively in these areas.[209] Specifically, the role of the EuroCenter[210] (Denmark's NCP for H2020) is perceived as important to, *inter alia*, extending coverage to further strategic priority areas, and increasing the support to SMEs in addition to researchers and higher education institutions.[211] Similarly, the Finnish NCP network is well-regarded for its success in reaching different types of organisations,[212] and the Dutch NCP network is well-regarded in terms of reported high levels of awareness and satisfaction among stakeholders.[213]

The NCP networks in the other high-performing Member States offer further examples of the importance of visibility and connectedness.

The Greek NCP network is well-regarded for its expertise and visibility, as well as its knowledge in managing EU projects and close links with the national public research infrastructure. However, it has been acknowledged that a lack of national co-funding and frequent changes in key staff have been limiting factors. The network has also been assessed as having few links to the private sector (and especially with SMEs), and little involvement of regional players.[214]

The Irish NCP network contains two dedicated NCPs for SMEs that work primarily to raise awareness, build relationships and then provide hands-on support. In addition, Ireland has introduced a special "industry team" for H2020. The team is made up of relevant NCPs and National Delegates, and has been introduced to increase connectivity with industry and ensure that relevant expertise can be brought to multi-sectoral and multi-disciplinary projects. In consultation with a member of Ireland's team, the study team was informed of the team's ability to mobilise thematic expertise such as ICT – a key area of success for Ireland in the FPs.

In preparation for H2020, France launched an intensive promotion campaign for its NCPs, through which all NCPs were encouraged to establish mutually-supportive relationships with support services acting at regional and local level.[215]

NCPs' connectivity to stakeholders is sometimes addressed through supplementary regional contact point networks, present in several of the broader set of high-performing Member States (e.g. Belgium,[216] Poland,[217] the UK – Northern Ireland[218]). Poland offers one interesting example of an NCP network that is augmented by regional contact points: The NCP network focuses on specialist issues, while the regional contact points offer more generic support as the first contact for applicants, and refers requests for specific expertise to relevant experts within the NCP network.[219] Conversely, Sweden disbanded its Regional Contact Point network during FP7, due to structural changes and the creation of other national support structures that would undertake this work.[220]

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209 Ibid.

210 See: http://eusupport.dk/en/list-of-advisors/eurocenter.

211 Simmonds, Brown, Wain, Rosemberg Montes, Izsak, Roman, "Review of the support mechanisms provided by the Northern Ireland Executive to support delivery of the Executive's target of participants winning €145m from Horizon 2020", 2016.

212 Ibid.

213 Ibid.

214 Sakellariou, "The structure of the NCP System in Greece, strengths and weaknesses, evaluation and potential steps for improvement", presentation, 2009.

215 See: http://www.horizon2020.gouv.fr.

216 See: http://www.ncpwallonie.be/, https://www.ncpbrussels.be/.

217 Dall, Nyiri and Schuch, "Capacity Building and institutional strengthening of Science and Research in BiH International benchmarking of the NCP systems in Europe", 2010.

218 See: http://h2020ni.com/supportcontacts/.

219 Gulda, Walendowski, Markianidou, Otte, "Peer review of the Polish research and innovation system - Background report", 2017. Available at: https://rio.jrc.ec.europa.eu/sites/default/files/report/Peer%20review%20of%20the%20Polish%20research%20and%20innovation%20system%20-%20Background%20report.pdf.

220 Vinnova, "FP7 and Horizon 2020: a comparative study of the support services in the Nordic countries", 2013.

In addition to the NCP networks, there are many other advisory support structures that offer examples of best practice. Among these, we see a trend towards providing more value-added services, such as training and targeted, in-depth advice for specific groups.

Under FP7, the Austrian Research Promotion Agency (FFG)[221] ran a programme of "Strategy Talks", targeting leading Austrian firms, higher education institutions and research organisations to explore their participation in the FPs, addressing organisations rather than individual researchers. The 2010 evaluation of the support services for FP participation support in Austria found that the Strategy Talks had been very well received.[222] The Strategy Talks have since been developed into comprehensive consulting services. The FFG Academy now offers in-depth training to applicants to H2020, including, for example, how to write a competitive ERC bid. The training covers basic principles, tips, how evaluation panel members view and review proposals, and the opportunity to share the experiences of an ERC grant holder. [223]

In Denmark, the EU-DK Support network is a cooperation between all EU-advising organisations in Denmark (including public national, regional and local partners).[224] EU-DK Support is coordinated by the Danish NCP, EuroCenter,[225] and operates as a virtual help-desk along the lines of the "no wrong door" principle. EU-DK Support was among the national schemes cited as stimulating high Danish participation in prior FPs.[226]

In Sweden, VINNOVA and the Swedish Agency for Economic and Regional Growth fund a dedicated advisory support network for SMEs. EUSMESupport2020 is overseen by RISE, and offers free advice and support, as well as training and workshops and exchange of good practice for businesses looking to engage in H2020 and Eurostars.[227]

Among the other high-performing Member States, Germany's European Liaison Office of the German Research Organisations (KoWi) is a comprehensive service platform for German research organisations, self-organised by its scientific members and co-funded by the federal government.[228] It offers services across a range of research funding streams and project lifecycle stages, from advice and coaching to specific training on EU proposal writing and project management.[229]

Several Member States have launched specific support measures that provide help with proposal writing, finding partners and building partnerships, or organising networking events through their NCP system. In some cases, these kinds of functions are fulfilled for businesses through close alignment with the EEN.

Funding for proactive actions to influence calls

Most Member States have drafted their research and innovation strategies or action plans in line with the European research priorities to achieve maximum synergy (e.g. the Netherlands' "Top Sectors"

221 FFG is the lead national agency for H2020, and oversees both the national strategy to increase participation and the NCP network.

222 Arnold, Boekholt, Good, Radauer, Stroyan, Tiefenthaler, Vermeulen, "Evaluation of Austrian Support Structures for FP 7 & Eureka and Impact Analysis of EU Research Initiatives on the Austrian Research & Innovation System", 2010.

223 See https://www.ffg.at/europa/veranstaltungen/ffg-akademie_2016-07-07.

224 See: https://era.gv.at/object/event/15/attach/Vienna_210114_Danish_H2020_Strategy_and_Support_[Schreibgesch__tzt__[Kompatibilit__tsmodus_.pdf.

225 See: http://eusupport.dk/en/list-of-advisors/eurocenter.

226 Presentation of Morten Ostergaard, Minister for Science, Innovation and Higher Education at the official H2020 launching conference in Copenhagen October 29th 2013.

227 See: http://eusme.se/hur-kan-vi-hjalpa-dig/om-oss/.

228 See: http://www.kowi.de/en/kowi/about-kowi/about-kowi.aspx.

229 See: http://www.kowi.de/en/kowi/services/services.aspx.

policy,[230] France Europe 2020[231]). In addition, a select few have conducted specific national exercises to align national and European research priorities. Among the broader group of high-performing Member States, Ireland's "National Research Prioritisation Exercise",[232] for example, sought to ensure that H2020 participation is aligned with the country's leading economic and research sectors. The priority areas were subsequently refined in its national strategy for research and development, science and technology, Innovation 2020.[233]

In addition, the majority of Member States invest in some form of support to influence the H2020 Work Programmes and calls. Rather than grant schemes, these investments are mostly made up of directly-funded activities to promote national research strengths and facilitate participation in the European policy formulation process, as well as to coordinate and provide inputs to national representatives in the H2020 Programme Committees and Advisory Groups. We also see examples of national coordination of participation in the JTIs and ERA-NETs.

Commonly, there is a Brussels presence or office, which provides intelligence between the national or regional researchers and the European Commission. A powerful example of this is the Netherlands House for Education and Research (Neth-ER), a collaborative approach between Dutch higher education institutions, regional education centres, and national research organisations[234] to develop the positioning of Dutch research within European research and innovation policy. Neth-ER is part-funded by the Dutch Ministry of Education, Culture and Science.[235] In Finland, Tekes and the Academy of Finland jointly run and staff the Finnish Liaison Office for EU R&D (FiLi) in Brussels.[236] FiLi facilitates Finnish participation in the European policy formulation processes, and monitors developments in EU research and innovation policy on behalf of its home agencies up to date.

In some cases, Member States have put in place special national groups made up of senior officials to drive the strategic approach to influencing calls and pursuing opportunities. The Austrian Federal Ministry of Science, Research and Economy (BMWFW) organises a quarterly "Delegates Roundtable", where all National Delegates meet to discuss strategic issues and current developments ahead of H2020 Programme Committee meetings. Similarly, Denmark established Strategic Reference Groups in priority programme areas. The Reference Groups consist of National Delegates and core participant organisations within each H2020 sub-programme, to provide up-to-date information on research developments, strengths and Danish positions to the Programme Committee members.[237] The decision to establish the Reference Groups was informed by the evaluation of Danish participation in FP6 and FP7, which found that Denmark should strengthen its approach to influencing the EU Work Programmes and securing its interests.[238] Sweden established a national coordination committee as part of its review of the support system to support the Swedish government in its decision making and prioritisation for participation in H2020.[239] Among the broader group of high-performing Member States, Ireland has established a single High-Level Group for H2020, chaired by the Chief Scientific Advisor to the Irish Prime Minister, and backed by the Minister for Skills, Research and Innovation.[240]

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230 The Ministry of Economic Affairs and Ministry of Education, Culture and Science, "Global challenges, Dutch solutions", 2014.

231 See: http://www.agence-nationale-recherche.fr/PA2018&usg=ALkJrhjZuJoOzF_cpnTHH7iftZk-YA28Mw.

232 Research Prioritisation Action Group, "National Research Prioritisation Exercise: First Progress Report June 2014", 2014.

233 See: https://dbei.gov.ie/en/Publications/Innovation-2020.html.

234 For example, the Netherlands Organisation for Scientific Research (NWO), the Royal Netherlands Academy of Arts and Sciences (KNAW) and TNO (the national technology laboratory).

235 See: https://www.neth-er.eu/en/about-neth-er.

236 See: http://www.fili-office.fi/about-fili/.

237 Kolar, Hunter, Boekholt, and Teichler, "Mutual Learning Exercise: Alignment and Interoperability of National Research Programmes. National Coordination", 2015.

238 Technopolis Group, "Evaluation of Danish Participation in the 6th and 7th Framework Programmes", 2010.

239 Simmonds, Brown, Wain, Rosemberg Montes, Izsak, Roman, "Review of the support mechanisms provided by the Northern Ireland Executive to support delivery of the Executive's target of participants winning €145m from Horizon 2020", 2016.

240 See: http://www.horizon2020.ie/minister-damien-english-wants-researchers-to-think-big/.

The High-Level Group is similar to the committee seen in Sweden, and is in place to drive the identification and pursuit of opportunities in H2020. Elsewhere, France operates a national 'Mirror Group' to support the French representatives in the Joint Programming Initiative (JPI) Governing Boards.[241]

Some Member States have also sought to increase participation in Advisory Groups and evaluation panels. For example, France reorganised its national representatives for H2020 as part of the broader drive to address falling participation in prior FPs, and to increase the French research community's influence in the European Research Area's decision-making. [242]

In some Member States, the national organisation that oversees the NCP network also coordinates the country's representation in the ERA-NETS, European Technology Platforms (ETPs) and Joint Technology Initiatives (JTIs). The Netherlands takes a central state co-ordination approach in this: the Netherlands Organisation for Scientific Research (NWO) acts as the coordination agency, providing oversight of the national participation in the ERA-NETs. Among the group of other high-performing Member States, a similar approach is taken by the Portuguese Office for the Promotion of the R&TD Framework Program (Gabinete de Promoção do Programa Quadro de I&DT, GPPQ), whose mission is to bridge the gap between researchers and Portuguese companies, and the activities of H2020.[243] Adopting this type of mutual coordination was discussed as a possible avenue to increase the influence of Ireland in the ETPs and JTIs within the interim evaluation of Ireland's participation in H2020.[244]

Funding to find calls and partners

Most Member States offer some form of grant to support international networking, partner meetings and attendance at relevant events, such as conferences. The grants are usually small (in the order of €100-€600 per day), and cover out-of-pocket expenses such as travel, accommodation and subsistence, as well as certain fees, such as registration for conferences. Schemes are mostly targeted at researchers, but may also be available to businesses dependent upon eligibility and strategic orientation.

Like Norway (via PES2020) some Member States include travel and accommodation funding within their financial support measures for proposal preparation. For example, in Germany, the current support for proposal preparation focuses on collaboration with partners in key strategic geographies (see section 0, below). The funding covers travel and accommodation for both German and foreign researchers and experts.

Funding to produce proposals

Funding to support applicants to produce proposals is the most common form of support offered among the Member States examined, and usually offers a larger amount of funding than the other categories of support. Funding to produce proposals generally covers the costs of preparatory work, including project-related resources, equipment, and personnel costs. Often, funding is differentiated depending on the proposed project role or type of organisation. Larger amounts of funding are generally available for those applying to coordinate an H2020 consortium, and where funding is available to a broader set of organisations, amounts vary depending on the recipient (i.e. research organisations or commercial entities).

While Member States continue to offer financial support to higher education institutions and research organisations to prepare proposals as in prior FPs, there is an observable trend among more developed Member States to shift financial support away from generic support and towards areas of specific need, such as addressing perceived under-performance in H2020 sub-programmes, increasing

241 Kolar, Hunter, Boekholt, and Teichler, "Mutual Learning Exercise: Alignment and Interoperability of National Research Programmes. National Coordination", 2015.

242 See: http://www.horizon2020.gouv.fr/.

243 See: https://rio.jrc.ec.europa.eu/en/organisations/office-support-participation-horizon-2020.

244 Rosemberg Montes, Simmonds, Wain and Nielsen, "Interim evaluation of Ireland's Participation in Horizon 2020", 2016.

internationalisation of the research base, or increasing the participation of certain types of organisations (e.g. SMEs, broader industry or Universities of Applied Science).

The general shift away from generic support for proposal preparation is strongly exemplified among the five study comparator countries: neither Austria or the Netherlands offer direct financial support to produce proposals, while each of Denmark, Finland, and Sweden do, though with specific criteria or targeted toward specific areas or sub-programmes.

Austria offers a rather striking example of a change in national support, having ceased the provision of direct financial support for the preparation of proposals ahead of H2020. In place of financial support, Austria realigned its budgets toward addressing organisations or groups in areas of need via, for example, advisory support and training. The 2010 evaluation of the Austrian support system suggested that rather than subsidise activities that actors would undertake anyway (or that actors are able to do by themselves), state support should rather aim to create added value and induce learning among applicants.[245]

In Denmark, the Ministry of Higher Education and Science offers two schemes to support the production of proposals. The first, EUopSTART, offers grants to both companies and knowledge institutions.[246] The second scheme, Horizon 2020-NET, is aimed at intensifying Danish participation and collaboration in H2020, and is rather more specific in terms of its intended beneficiaries. The scheme offers between €67k and €202k[247] to existing networks and clusters for knowledge sharing and project maturation in relation to specific application opportunities. The information pages of the scheme stress that funded activities should result in the submission of a minimum of five major applications (or a larger application of more than €1.5m) to H2020.[248]

In Finland, funding for the preparation of H2020 projects has been available via Tekes since January 2015. [249] Support is available in three ways:

- Project preparation as part of a Tekes-funded project, where a specific H2020 project would demonstrably further the ongoing Tekes project. Support is based on eligible costs, which Tekes specify must be reasonable in comparison with the potential amount of H2020 funding
- Support for the preparation of large projects (with a total budget of at least €3m), and where the role of Finnish participants is financially or otherwise significant. Funding is available for research organisations and companies, at up to 5 percent of the Finnish partners' total budget in the proposed project based on eligible costs. A formal eligibility criterion of this scheme is to have a Finnish SME included in the consortium as a full partner.
- Support for existing innovation clusters for activities related to participating in H2020 projects. Tekes state that applicants ideally are already involved in an existing Tekes-funded innovation cluster project. Funding is available up to 50 percent of eligible costs (maximum €1m). The remaining 50 percent must be made up from private sources.

In Sweden, there are a number of planning and preparation grants for FP applicants offered by the public agencies. These grants are generally offered specifically for projects under selected sub-programmes or areas of research, or for specific project roles, such as coordinator.[250] Some grants are offered to specific types of organisation, too, such as SMEs. Eligible costs include help with the application writing through

245 Arnold, Boekholt, Good, Radauer, Stroyan, Tiefenthaler, and Vermeulen, "Evaluation of Austrian Support Structures for FP 7 & Eureka and Impact Analysis of EU Research Initiatives on the Austrian Research & Innovation System", 2010.

246 See: https://ufm.dk/en/research-and-innovation/funding-programmes-for-research-and-innovation/find-danish-funding-programmes/euopstart/euopstart-opslag-may-2017-uk.pdf.

247 Converted from DKK 500,000 and DKK 1,500,000 using InforEuro. Current rates. See: http://ec.europa.eu/budget/contracts_grants/info_contracts/inforeuro/index_en.cfm.

248 See: http://ufm.dk/forskning-og-innovation/tilskud-til-forskning-og-innovation/find-danske-tilskudsprogrammer/horizon2020-net.

249 See: https://www.tekes.fi/en/funding/horizon-2020-project-preparation/.

250 Vinnova, "FP7 and Horizon 2020: a comparative study of the support services in the Nordic countries", 2013.

private consultants. One example of this is a grant of up to €26k[251] available to support to academic coordinators in the planning of H2020 projects, offered by the Swedish Research Council for Sustainable Development (Formas).[252]

The trend away from generic support is also evident also among the broader group of high-performing Member States.

In France, the programme "Setting up European or International Scientific Networks" (Montage de réseaux scientifiques européens ou internationaux, MRSEI) has been established for H2020 as part of a suite of measures to address declining participation observed in prior FPs. The programme aims to facilitate access to European research funding through the formation and coordination of transnational networks. Up to €30k is available over 18 months across all disciplines for research networks that specifically intend to prepare and submit a collaborative project in response to a large-scale European or international call for proposals with major technological and scientific impact.[253]

Germany's national funding to produce proposals under H2020 specifically supports collaborative applications to H2020 with partners from three strategically-important global regions.[254] Funding ranges between €60k for 12 months, to €150k for 36 months, and variously supports proposals to the three pillars of Societal Challenges, Excellent Science and Industrial Leadership. The amount of funding is calculated based on the type of beneficiary (where commercial entities may be funded for up to 50 percent of their eligible costs). Germany also offers a grant of up to €25k over nine months to support the Universities of Applied Science (Fachhochschulen), which have been identified as an area for improvement in terms of FP participation.

Ireland's performance in successive FPs suggests significant development in its capacity and capability to engage with the FPs, and its financial support measures have consequently developed: current national financial support is aimed at coordinators, and at researchers applying to the ERC – including researchers in disciplines that that are traditionally less-exposed to the FPs. Grants of up to €12.5k is available to those applying to coordinate an H2020 project, covering all costs except consultancy, while the remainder of funding in this category is aimed at applicants to the ERC. Funding to ERC applicants includes funding of up to €500k for those who submitted a proposal that was deemed fundable but did not receive funding due to a lack of available programme budget. Two grant schemes are aimed at supporting researchers from the Arts, Humanities and Social Sciences (AHSS) to access the ERC, including a grant of up to €220k to develop interdisciplinary projects with research from the Science, Technology, Engineering and Maths (STEM) subjects.

The Polish Ministry of Science and Higher Education (MNiSW) launched a scheme for H2020 called "Grants for grants" (Granty na granty). The scheme is part of a suite of supports to address low levels of internationalisation,[255] and provides approximately €7.5k for research institutions intending to take a coordinator role in a project consortium.[256] The scheme offers differentiated funding amounts based on beneficiary (research organisations or SMEs, for example).[257] The grants support the preparation of an application (including consultancy) in the writing and reviewing of the application or the organisation of project consortium. The grant process is flexible, and may be requested ex ante (before preparing and submitting the funding application) or ex post (after the funding application has been submitted and

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251 Converted from SEK 250,000 using InforEuro. Current rates. See: http://ec.europa.eu/budget/contracts_grants/info_contracts/inforeuro/index_en.cfm.

252 See: http://www.formas.se/en/financing/calls-for-proposals/support-to-coordinators-for-the-planning-of-eu-projects.

253 See: https://uk.ambafrance.org/ANR-Montage-de-reseaux-scientifiques-europeens-ou-internationaux-MRSEI.

254 Currently i) Central and South Eastern Europe, ii) North and South America, and iii) the Asia-Pacific Research Area.

255 European Commission Joint Research Centre, "Research & Innovation Observatory Country Report – Poland", 2016. Available at: https://rio.jrc.ec.europa.eu/en/country-analysis/Poland/country-report.

256 See: http://www.granty-na-badania.com/2016/06/granty-na-granty-2016.html.

257 Gulda, Walendowski, Markianidou, Otte, "Peer review of the Polish research and innovation system - Background report", 2017. Available at: https://rio.jrc.ec.europa.eu/sites/default/files/report/Peer%20review%20of%20the%20Polish%20research%20and%20innovation%20system%20-%20Background%20report.pdf.

evaluated). In the latter case, costs for preparing the application can be reimbursed, however, only if the application has reached a certain scoring threshold in the evaluation process. Prior consultation suggests that uptake has been rather high,[258] and the scheme appears to replace an SME-specific grant in place for FP7, which received little uptake.[259] Poland also launched an incentive scheme to encourage applications from employees of research institutes (Benefits on the Horizon). A "bonus" equivalent to approximately 10 percent of the EU funding secured, is available to individual staff members if the organisation is successful and takes a coordination role in the project.

While the range of beneficiaries of Member States' main funding schemes for proposal preparation often includes SMEs and industry, there are few funding schemes aimed primarily at industry and SME participation. However, such schemes do exist in a small number of cases, such as in the UK Devolved Administrations. The Scottish Funding Council (SFC) launched a new "Horizon 2020 SME Engagement Scheme"[260] to encourage greater SME participation. SMEs apply for a voucher of between €1k-€6k to access Scottish higher education expertise and advice for assistance in the H2020 application process. A similar scheme was launched by Invest Northern Ireland, though uptake was found to be rather low.[261] Invest Northern Ireland also offers Project Definition Funding, a grant of up to €15k for proposal preparation, covering the full range of costs (from travel to legal advice and consultancy). This scheme is not industry-specific, but is available to businesses that meet Invest Northern Ireland's broader funding eligibility criteria.[262] The Welsh government offers the ScoRE Cymru (Supporting Collaborative Research and Innovation in Europe) scheme, which provides funding to stimulate Wales-based organisations to participate in European collaborative research such as H2020. ScoRE Cymru can provide up to approximately €13.5k for the bid writing costs of applications, and approximately €1k for travel and meetings.[263,264] While not strictly a dedicated SME-facing scheme, as of late 2014, 72 percent of funding awarded through the scheme had been awarded to SMEs.

Co-funding for FP participants

There are a small number of examples of co-funding for FP participants, each of which aim to mitigate the impact of funding shortfalls and support the successful implementation of projects. As such, these are largely aimed at higher education institutions and research institutes.

Among the comparator countries, the Academy of Finland provides match-funding for non-commercial research organisations with projects under the H2020 Societal Challenges priority, in order to address funding shortfalls and encourage participation in European projects.

Among the broader range of high-performing Member States, Science Foundation Ireland provides an additional overhead payment to the Irish host institution of ERC award winners, to assist the successful implementation of ERC-funded research. Science Foundation Ireland also offers additional funding to support Irish host institutions that have recruited an ERC awardee from abroad.

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258 Simmonds, Brown, Wain, Rosemberg Montes, Izsak, Roman, "Review of the support mechanisms provided by the Northern Ireland Executive to support delivery of the Executive's target of participants winning €145m from Horizon 2020", 2016.

259 Gulda, Walendowski, Markianidou, Otte, op. cit.

260 See: http://www.gov.scot/Topics/Business-Industry/support/Horizon2020.

261 Simmonds, Brown, Wain, Rosemberg Montes, Izsak, Roman, op. cit.

262 See: http://h2020ni.com/financial-support/.

263 See: http://gov.wales/funding/eu-funds/horizon2020/?lang=en.

264 See: https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/support-measure/score-cymru.

Appendix D FP participation analyses

D.1 Methodology

This section presents statistics and analyses of the participation of Norway (NO) in FP7 and H2020, including comparisons with performance in and amongst five selected comparator countries: Sweden (SE), Denmark (DK), Finland (FI), Austria (AT) and the Netherlands (NL).

The analyses are based on eCorda databases of proposals and grants covering the entirety of FP7 and the first three years of H2020 (data extracted 27 February 2017). It should be noted that some H2020 proposals that are not currently showing as successful may have been awarded grants after the current data extract and will therefore appear in updated versions of the grants database in the future. H2020 success rates and funding may therefore increase slightly as a result.

Throughout the section, we use shading to indicate comparator country figures that are greater than Norway's. This helps to visualise the locations of greatest activity/success, as well the extent to which Norway is over- or underperforming relative to this wider peer group. Where we weight participation data by the number of researchers, we use UIS figures on the total number of R&D personnel (FTE) in each country. For FP7, an average is taken of the years 2007 to 2013, while for H2020 the figure for 2014 (latest available) is used (see Table 32). Where we weight H2020 financial data by the GDP, we use Eurostat figures on GDP at market prices for 2014 (latest available) (see Table 33).

Table 32 Total R&D personnel (FTE) per country – used for weighting of participation data.

	NO	SE	DK	FI	AT	NL
FP7 (2007 – 2013 average)	36,361	78,617	55,942	55,207	59,934	105,499
H2020 (2014 figure)	40,297	83,473	58,745	52,130	67,135	123,096

Source: UIS.

Table 33 GDP per country at market prices, 2014, EUR Million.

	NO	SE	DK	FI	AT	NL
H2020 (2014 figure)	375,894	432,691	265,232	205,474	330,417	663,008

Source: Eurostat. GDP and main components [nama_10_gdp].

The initial analysis covers FP7/H2020 overall, while subsequent analysis covers participation statistics in relation to the three study areas of ICT, Health and Industry – going beyond the obvious core programme areas (e.g. H2020 HEALTH). To define these areas of FP activity, we initially identified and categorised relevant R&I fields (in the areas of ICT and health) and industry sectors, based on Norwegian policy priorities and R&I strengths. Further details of the categorisation used for each of the ICT, Health and Industry areas is set out in the relevant section of the main report. We then undertook a detailed screening of the FP sub-programme and action line descriptions and matched them to the identified categories. Action lines (and thereby the proposals submitted and grants funded against these) were tagged against one or more of the three study areas, where relevant.

There were two areas (Marie Curie Actions[265] and the European Research Council) without sub-programmes or action lines on which to base the screening and matching process described above. Rather than exclude these, a separate semantic analysis of proposal titles and abstracts was undertaken to identify and tag proposals/projects of relevance to the health and ICT areas. For consistency, the categorisations and descriptions developed for the main mapping process were also used as the basis for selecting relevant concepts in the semantic analysis. This exercise identified an additional ~23,000 FP7 projects and ~7,000 H2020 projects of relevance to the Health and ICT areas.

[265] Funded through the People Programme of FP7 and the MSCA programme of H2020

D.2 Sub-programmes of FP7 and H2020

Table 34 FP7 programmes and sub-programmes.

Programme	Sub-programme acronym	Sub-programme title
COOPERATION	HEALTH	Health
	KBBE	Food, Agriculture, and Biotechnology
	ICT	Information and Communication Technologies
	NMP	Nanosciences, Nanotechnologies, Materials and new Production Technologies
	ENERGY	Energy
	ENV	Environment (including Climate Change)
	TPT	Transport (including Aeronautics)
	SSH	Socio-economic sciences and Humanities
	SPA	Space
	SEC	Security
	GA	General Activities (Annex IV)
	SP1-JTI	Joint Technology Initiatives (Annex IV-SP1)
IDEAS	ERC	European Research Council
PEOPLE	PEOPLE	Marie-Curie Actions
CAPACITIES	INFRA	Research Infrastructures
	SME	Research for the benefit of SMEs
	REGIONS	Regions of Knowledge
	REGPOT	Research Potential
	SiS	Science in Society
	COH	Coherent development of research policies
	INCO	Activities of International Cooperation
Euratom	Fusion	Fusion Energy
	Fission	Nuclear Fission and Radiation Protection

Table 35 H2020 programmes and sub-programmes.

Programme	Sub-programme acronym	Sub-programme title
Excellent Science	EXCSCI-CROSST	Excellent Science - Cross-theme
	ERC	European Research Council
	FET	Future and Emerging Technologies
	MSCA	Marie Sklodowska-Curie actions
	INFRA	Research infrastructures
Industrial Leadership	INDLEAD-CROSST	Industrial Leadership - Cross-theme
	LEIT	Leadership in enabling and industrial technologies (LEIT)
	ICT	Information and Communication Technologies
	NMP	Nanotechnologies, Advanced Materials and Production
	ADVMAT	Advanced materials
	BIOTECH	Biotechnology
	ADVMANU	Advanced manufacturing and processing
	SPACE	Space
	RISKFINANCE	Access to risk finance
	SME	Innovation in SMEs
Societal Challenges	SOCCHAL-CROSST	Societal Challenges - Cross-theme
	HEALTH	Health, demographic change and wellbeing
	FOOD	Food security, sustainable agriculture and forestry, marine and maritime and inland water research
	ENERGY	Secure, clean and efficient energy
	TPT	Smart, green and integrated transport
	ENV	Climate action, environment, resource efficiency and raw materials
	SOCIETY	Europe in a changing world - inclusive, innovative and reflective Societies
	SECURITY	Secure societies - Protecting freedom and security of Europe and its citizens
Spreading excellence and widening participation	SEAWP-CROSST	Spreading excellence and widening participation - Cross-theme
	WIDESPREAD	Teaming of excellent research institutions and low performing RDI regions
	TWINING	Twinning of research institutions
	ERA	ERA chairs
	PSF	Policy Support Facility (PSF)
	INTNET	Supporting access to international networks
	NCPNET	Transnational networks of National Contact Points
Science with and for Society	SWAFS-CROSST	Science with and for Society - Cross-theme
	CAREER	Make scientific and technological careers attractive for young people
	GENDEREQ	Promote gender equality in research and innovation
	INEGSOC	Integrate society in science and innovation
	SCIENCE	Encourage citizens to engage in science
	RESACCESS	Develop the accessibility and the use of the results of publicly-funded research
	GOV	Develop the governance for the advancement of responsible research and innovation
	IMPACT	Anticipating and assessing potential environmental, health and safety impacts
	KNOWLEDGE	Improve knowledge on science communication
Euratom	EURATOM	Euratom
EC	CROSST	Cross-theme

D.3 Overall participation patterns

This first section presents overall statistics and analyses of the participation of Norway in FP7 and H2020, including comparisons with performance amongst the five selected comparator countries.

D.3.1 Participation in proposals

Norwegian actors have contributed to the submission of 4,410 proposals to H2020 (as of the end of February 2017). This equates to 3.8% of all proposals submitted to the programme during this period. This is currently slightly lower than the proportion of all FP7 proposals involving Norway (4.5%).

As is shown in Table 36, all five comparator countries have participated in both a greater number and a greater proportion of all proposals than Norway, in both FP7 and H2020. However, when taking into account the number of R&D personnel in each country, the level of Norwegian involvement in proposals compares more favourably with some of the comparator countries. Specifically, Norway's 109 proposals per 1,000 researchers in H2020 is greater than either Sweden or Austria, while its 195 proposals per 1,000 researchers in FP7 was greater than Sweden, Denmark and Finland.

Table 36 FP7/H2020 proposals involving Norway and comparator countries.

H2020	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Number of proposals involving…	116,586	4,410	8,547	6,881	6,223	7,318	14,950
Proportion of all proposals involving…	100%	3.8%	7.3%	5.9%	5.3%	6.3%	12.8%
Number of proposals per 1,000 researchers in…		109	102	117	119	109	121
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Number of proposals involving…	158,562	7,078	15,259	9,316	9,667	12,093	23,053
Proportion of all proposals involving…	100%	4.5%	9.6%	5.9%	6.1%	7.6%	14.5%
Number of proposals per 1,000 researchers in…		195	194	167	175	202	219

In 41% of the H2020 proposals involving Norway, it has been a Norwegian actor that has held the role of coordinator. This is a higher rate than was seen during FP7, where just 33% of Norwegian proposals were led by a Norwegian coordinator. Most comparator countries have seen a similar increase in their proposal coordination rate between the two programmes, although only Denmark and Finland have achieved a higher rate than Norway so far in H2020 (coordinating 44% of their proposals each), see Table 37.

Taking account of the relative size of the researcher populations in each country, the level of H2020 proposal coordination in Norway (45 coordinators per 1,000 researchers) is below the rates seen in Denmark (52), Finland (53) and the Netherlands (50), but above that of Sweden (39) and Austria (33). Similarly, Norway's rate of coordinators per 1,000 researchers (64) in FP7 was higher than Denmark, Finland and Austria, but below that of Sweden and the Netherlands.

Table 37 FP7/H2020 proposals with a "domestic" coordinator.

H2020	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Number of proposals with domestic coordinator	116,585	1,816	3,235	3,037	2,767	2,238	6,106
% of country's proposals with domestic coordinator	100%	41%	38%	44%	44%	31%	41%
Coordinators per 1,000 researchers		45	39	52	53	33	50
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Number of proposals with domestic coordinator	158,561	2,309	5,336	3,143	3,219	3,708	8,476
% of country's proposals with domestic coordinator	100%	33%	35%	34%	33%	31%	37%
Coordinators per 1,000 researchers		64	68	56	58	62	80

Many FP proposals (66% in H2020) involve just one participant, who is therefore by default also the coordinator. This is particularly the case in some areas of the programme (e.g. nearly all of the 19,000 proposals to the ERC involve just one participant). These single-participant proposals can therefore give

a misleading picture of true proposal coordination rates. If we repeat the above analysis of proposal coordination, but just for multi-partner proposals (i.e. excluding proposals with only one partner), the data changes significantly. In particular it increases the extent to which Norway holds the role of coordinator, relative to its comparators.

Norway has participated in 3,267 multi-partner H2020 proposals, of which it was the coordinator in 673 (21%) cases, see Table 38. This is a higher rate than any of the comparator countries other than Finland, and slightly higher than was achieved by Norway in FP7. The Norwegian rate of multi-partner proposal coordination in H2020, relative to the FTE researcher population (17 coordinators per 1,000 FTE), is also higher than most other comparator countries.

Table 38 FP7/H2020 "multi-partner" (MP) proposals with a "domestic" coordinator.

H2020	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Number of MP proposals involving…	40,181	3,267	6,225	4,723	4,377	6,011	11,050
Number of MP proposals with domestic coordinator	40,181	673	912	879	921	931	2,206
% of country's MP proposals with domestic coordinator	100%	21%	15%	19%	21%	15%	20%
Coordinators of MP proposals per 1,000 researchers		17	11	15	18	14	18
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Number of MP proposals involving…	70,763	5,959	12,066	7,429	7,837	10,308	18,060
Number of MP proposals with domestic coordinator	70,763	1,190	2,143	1,256	1,389	1,923	3,483
% of country's MP proposals with domestic coordinator	100%	20%	18%	17%	18%	19%	19%
Coordinators of MP proposals per 1,000 researchers		64	68	56	58	62	80

On average, H2020 proposals involving Norway included 1.3 other Norwegian actors each. In fact, just under one-quarter of the proposals from Norway involved more than one domestic actor, and – at the extreme – some 50 of proposals involved more-than five Norwegian actors each. During FP7, a similar number of Norwegian actors (1.4) were involved in each Norwegian proposal on average. In both cases (FP7 and H2020) the average number is below that of Finland and the Netherlands, see Table 39. Excluding single-partner projects increases the average number slightly (e.g. for Norway in H2020, from 1.3 to 1.4 local partners per proposal). However, the overall pattern is similar.

Table 39 Average number of "domestic" actors in each of its FP7/H2020 proposals.

Of proposals involving country…	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
H2020 – Average number of local actors		1.3	1.3	1.3	1.4	1.3	1.4
FP7 – Average number of local actors		1.4	1.4	1.3	1.4	1.3	1.4
Of MP proposals involving country…	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
H2020 – Average number of local actors		1.4	1.4	1.4	1.5	1.4	1.6
FP7 – Average number of local actors		1.4	1.4	1.4	1.5	1.4	1.6

Norwegian proposals to H2020 also included (on average) 7.9 actors from other countries (i.e. beyond Norway). These 34,733 proposal partners came from 137 different countries, but with over half (52%) located in Germany, the UK, Spain, Italy, France, the Netherlands and Belgium. Other countries that account for an unusually high proportion of Norwegian partners (unusual compared with their overall levels of participation) include Denmark, Sweden, Finland, Iceland, China and Canada.

Because of multiple Norwegian participations in some proposals, the total number of Norwegian participations in H2020 proposals (5,797) is a third higher than the number of unique proposals in which Norway is involved (4,410). Norway accounts for just 1.5% of all participations in H2020 proposals, which is lower than for each of the comparator countries, see Table 40. Even taking account

of the size of the respective researcher populations of these countries, Norway still has a lower level of participations in H2020 proposals (per 1,000 R&D personnel) than all other comparator countries except Sweden. Norway accounted for the same proportion (1.5%) of all participations in FP7 proposals. However, because of the longer time-period covered, its participation rate (266 per 1,000 R&D personnel) is nearly twice as high as in H2020 so far. It is also high relative to three of the five comparator countries.

Table 40 Participations in FP7/H2020 proposals from Norway and comparator countries.

H2020	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Number of participations in proposals	396,453	5,797	11,275	8,764	8,608	9,755	21,657
% of all participations in proposals	100%	1.5%	2.8%	2.2%	2.2%	2.5%	5.5%
Number of participations in proposals per 1,000 researchers in…		144	135	149	165	145	176
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Number of participations in proposals	656,159	9,658	20,663	12,068	13,330	16,303	33,247
% of all participations in proposals	100%	1.5%	3.1%	1.8%	2.0%	2.5%	5.1%
Number of participations in proposals per 1,000 researchers in…		266	263	216	241	272	315

Norwegian participations in H2020 proposals came from 1,179 unique organisations ("participants"), meaning that each of these actors (on average) participated in 3.7 proposals. This is a substantially higher rate of proposal participation than the average for H2020 as a whole, where each organisation (on average) participates in just 1.5 proposals each.

However, the average of 3.7 proposals per Norwegian organisation masks a concentration of activity within a small number of organisations (which is not unusual to Norway). More than one-third (38%) of Norwegian proposal participations are accounted for by just 7 organisations, who have participated in 100 or more proposals each. These most active participants are the universities of Oslo (UiO), Bergen (UiB) and Tromsø (UiT), Oslo University Hospital (OUS), the Norwegian University of Life Sciences (NMBU), Norwegian University of Science and Technology (NTNU) and the SINTEF institute group.

Table 41 shows the distribution of H2020 proposal participations between different types of actor (categorisations as used in eCorda). For Norway, it shows that two organisation types (HES and PRC) account for the majority (70%) of participations in proposals, with REC accounting for a further 25%. Compared to other countries, the proportion of Norway's proposal participations accounted for by HES is relatively low (although it is similar to the all country average), while the proportion of Norwegian participations accounted for by REC is higher than all comparator countries, as well as being higher than the overall (all country) average. Norway's PRC rate is slightly below the overall rate and below that of several comparator countries. The table also shows the proportion of PRC participations that are SMEs.[266] For Norway, the rate is 81%, which is slightly higher than the overall average, and also slightly higher than three of the comparator countries, but below the rate seen in Denmark and Finland.

There are 192 participations in H2020 proposals from Norwegian hospital trusts (a Norwegian categorisation not used in eCorda, and therefore not comparable with other countries).[267] This total includes organisations classified under each of the four main organisation types used by eCorda, though mostly HES (136) and REC (42). These organisations account for 3.3% of all Norwegian participations in H2020 proposals.

266 Across all countries, information on whether a PRC participation is from an SME or not is only available in 78% of cases. For the percentages shown in the table, the denominator is the total population of PRCs where the status is known (i.e. SME or not).

267 RCN provided a list of Norwegian H2020 proposal participants, with hospital trusts (*helseforetak*) tagged. Based on unique organisation PIC numbers this information has been matched with eCorda data.

Table 41 Distribution of participations in H2020 proposals by organisational type.

H2020	All	NO	SE	DK	FI	AT	NL
HES – Higher or secondary education	38%	37%	54%	52%	42%	36%	44%
PRC – Private for profit (excl. education)	37%	33%	31%	32%	35%	36%	35%
REC – Research organisations	18%	25%	9%	8%	18%	21%	14%
PUB – Public body (excl. REC/HES)	4%	3%	4%	5%	3%	2%	3%
OTH - Others	4%	2%	2%	3%	3%	5%	4%
Total	**396,453**	**5,797**	**11,275**	**8,764**	**8,608**	**9,755**	**21,657**
SMEs as a % of PRC	*78%*	*81%*	*75%*	*83%*	*87%*	*73%*	*79%*

The most frequent Norwegian proposal participants in each organisational category are shown in Table 42. The number of proposal participations they account for is also shown in parenthesis in each case.

Table 42 Norwegian organisations (from each organisational type) that participated most frequently in H2020 proposals.

Organisation type	Most frequent participants in H2020 proposals (number of participations)
HES – Higher or secondary education	(560) UNIVERSITETET I OSLO (557) NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET NTNU (289) UNIVERSITETET I BERGEN (161) UNIVERSITETET I TROMSOE (116) OSLO UNIVERSITETSSYKEHUS HF (111) NORGES MILJO-OG BIOVITENSKAPLIGE UNIVERSITET
PRC – Private for profit (excl. education) [** SMEs]	(32) DNV GL AS (20) PROTECH AS ** (17) CERAMIC POWDER TECHNOLOGY AS ** (17) SMERUD MEDICAL RESEARCH INTERNATIONAL AS ** (16) KARDE AS ** (15) INTEGRATED DETECTOR ELarge companyCTRONICS AS ** (15) MARITIME ROBOTICS AS ** (14) TELarge companyNOR ASA
REC – Research organisations	(410) STIFTELSEN SINTEF (60) NORWEGIAN INSTITUTE OF BIOECONOMY RESEARCH - NIBIO (57) NORSK INSTITUTT FOR LUFTFORSKNING (57) SIMULA RESEARCH LABORATORY AS (57) SINTEF ENERGI AS (50) NORSK INSTITUTT FOR VANNFORSKNING (49) NOFIMA AS (41) INSTITUTT FOR ENERGITEKNIKK
PUB – Public body (excl. REC/HES)	(53) NORGES FORSKNINGSRAD (14) NORGES GEOLOGISKE UNDERSOKELSE (10) STATENS VEGVESEN (9) OSLO KOMMUNE (5) NORGES VASSDRAGS- OG ENERGIDIREKTORAT (5) ROGALAND FYLKESKOMMUNE
OTH - Others	(22) EUROPEAN CENTRE FOR WOMEN AND TECHNOLOGY (ECWT) FORENING (10) OSLO MEDTECH FORENING (6) ENERGIRAD INNLANDET AS (6) NORSK TEKNISK MUSEUM
Hospital trusts	*(116) OSLO UNIVERSITETSSYKEHUS HF* *(22) UNIVERSITETSSYKEHUSET NORD-NORGE HF* *(20) HELSE BERGEN HF, HAUKELAND UNIVERSITY HOSPITAL* *(20) HELSE STAVANGER HF* *(6) AKERSHUS UNIVERSITETSSYKEHUS HF* *(6) ST OLAVS HOSPITAL HF*

RCN is interested in the partnering habits of companies (PRC), and particularly the extent to which they partner with Norwegian research organisations (REC) – as well as any impact this might have on success rates (which we return to later).

Norwegian PRCs have participated in 1,586 H2020 proposals in total. In the majority of these cases (998) the proposal just involves one Norwegian PRC organisation and no other Norwegian participants at all. In a further 83 cases, there is more than one Norwegian PRC organisation (and no other Norwegian partner). Therefore, in around one-third of proposals involving a Norwegian PRC, there are also Norwegian participants from other organisational types involved. Of the 505 proposals in question, Norwegian PRC organisations are partnering with the following:

- At least one Norwegian REC organisation in 329 cases (i.e. 21% of all proposals involving a Norwegian PRC organisation also involve at least one Norwegian REC organisation)
- At least one Norwegian HES organisation in 265 cases
- At least one Norwegian PUB organisation in 41 cases
- At least one Norwegian OTH organisation in 18 cases

The average EC funding request per Norwegian participation in H2020 proposals was around €551k, which is slightly higher than in three of the comparator countries, but lower than Sweden or Finland, see Table 43.[268] The overall average funding request is significantly higher, but this is skewed by a small number of extremely large funding requests.

Table 43 EC contributions requested in H2020 proposals.

H2020	All	NO	SE	DK	FI	AT	NL
Selected participations in proposals (with financial data)	374,227	5,473	10,686	8,370	8,207	9,265	20,539
Total EC contribution requested (€m)	€ 307,780	€ 3,017	€ 5,926	€ 4,539	€ 4,666	€ 4,282	€ 11,154
Average EC contribution requested per participation	€ 822,443	€ 551,218	€ 554,541	€ 542,317	€ 568,564	€ 462,117	€ 543,050

The average Norwegian funding request to H2020 is highest amongst HES and hospital trusts, as well as amongst REC organisations, see Table 44. Average requests from HES, REC and OTH organisations in Norway are above that of most comparator countries, while average requests from PUB and PRC (including SMEs) tends to be lower than in most of the other countries looked at.

Table 44 Average EC contributions requested in H2020 proposals by different organisational types.

H2020	All	NO	SE	DK	FI	AT	NL
HES	€ 526,279	€ 643,999	€ 607,495	€ 587,964	€ 658,733	€ 533,873	€ 631,293
REC	€ 516,628	€ 574,604	€ 565,302	€ 472,909	€ 574,773	€ 463,347	€ 535,027
PUB	€ 320,406	€ 333,826	€ 427,403	€ 525,261	€ 427,599	€ 297,153	€ 366,216
PRC	€ 413,294	€ 457,607	€ 488,966	€ 498,715	€ 483,717	€ 423,571	€ 471,631
OTH	€ 9,451,950	€ 371,036	€ 321,024	€ 412,703	€ 342,027	€ 268,656	€ 317,685
PRC-SMEs	*€ 416,164*	*€ 459,106*	*€ 574,224*	*€ 550,807*	*€ 559,965*	*€ 395,595*	*€ 483,475*
Hospital Trusts	*n/a*	*€ 569,562*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*

The distribution of Norwegian participations in proposals across the main programme areas of H2020 is shown below, alongside comparable figures for H2020 overall and for the comparator countries, see Table 45. While the Norwegian distribution largely reflects the overall pattern, Norway appears less active in Excellent Science and more active in relation to Societal Challenges compared to most of the comparator countries.

[268] Participant level funding information is missing (or total cost exceeds EC contribution) in 22,226 cases (6% of all participations in H2020 proposals). These have been excluded from our calculations. For example, the €898k average for Norway is based on 5,473 Norwegian participations in proposals (94% of all participations), where total cost and EC contribution data was available, and where total cost was greater than/equal to EC contribution requested.

Table 45 Distribution of participations in H2020 proposals by programme area (% of all country's participations).

H2020	All	NO	SE	DK	FI	AT	NL
Cross-theme	2%	2%	2%	2%	2%	3%	2%
Excellent Science	31%	29%	35%	38%	26%	27%	34%
Industrial Leadership	23%	21%	20%	17%	28%	25%	19%
Societal Challenges	41%	46%	40%	41%	41%	42%	42%
Spreading excellence and widening participation	1%	0%	1%	1%	1%	1%	1%
Science with and for society	2%	2%	1%	1%	2%	3%	2%
Euratom	0%	0%	1%	0%	1%	0%	0%
Total	**396,453**	**5,797**	**11,275**	**8,764**	**8,608**	**9,755**	**21,657**

This relative concentration of Norwegian activity within particular areas of the programme can be seen more clearly if we compare the distribution of proposal participations at the sub-programme level. While in absolute terms Norway's participation in proposals is concentrated in Marie Skłodowska-Curie Actions (MSCA) (17% of Norwegian participations), ICT (12%) and Health (9%) programmes, these are also some of the biggest programmes in H2020. If we weight the data by calculating Norway's share of all proposals participations to a sub-programme, then we find that the country has been (relatively) very active in some areas, and less so in others, see Table 46. Overall, Norway accounts for 1.5% of all participations in H2020 proposals. It accounts for a higher proportion of participations in proposals in ten sub-programmes shown below. These are the areas where Norway has been relatively more "active".

Table 46 Sub-programmes with a relatively high participation rate of Norway in proposals.

Programme	Sub-programme		NO participations in proposals	as % of all participations in sub-programme
Spreading excellence and widening participation	GOV	Develop the governance for the advancement of responsible research and innovation	22	2.6%
Societal Challenges	FOOD	Food security, sustainable agriculture and forestry, marine and maritime and inland water research	472	2.1%
Industrial Leadership	BIOTECH	Biotechnology	51	2.1%
Excellent Science	INFRA	Research infrastructures	128	2.0%
Societal Challenges	ENERGY	Secure, clean and efficient energy	514	1.8%
Societal Challenges	SECURITY	Secure societies - Protecting freedom and security of Europe and its citizens	259	1.7%
Societal Challenges	ENV	Climate action, environment, resource efficiency and raw materials	307	1.7%
Cross-theme	CROSST	Cross-theme	143	1.6%
Societal Challenges	TPT	Smart, green and integrated transport	316	1.6%
Industrial Leadership	ADVMAT	Advanced materials	66	1.5%
H2020 all programmes			**5,797**	**1.5%**

At the same time, Norway has been less "active" (i.e. accounting for <1.5% of proposal participations) in other sub-programmes, including the Health and ICT programmes that are of particular interest for this study, see Table 47.

Table 47 Sub-programmes with a relatively low participation rate of Norway in proposals

Programme	as % of all participations in sub-programme
CAREER	1.5%
HEALTH; ERC; MSCA	1.4%
ICT; ADVMANU	1.3%
SOCIETY; SPACE; SCIENCE	1.2%
TWINING; NMP; SME	1.1%
FET; GENDEREQ	1.0%
INEGSOC; ERATOM; RISKFINANCE	<1%
WIDESPREAD; ERA; INTENET; NCPNET; RESACCESS	0%

Joint Technology Initiatives (JTIs) were used within both FP7 and H2020 as a new means to support large-scale trans-national cooperation in key areas where R&D can contribute to European competitiveness and quality of life. These are long-term public-private partnerships, established as Joint Undertakings (JUs), with each organising its own research agenda and awarding funding on the basis of open calls. There were five JTIs set up within the Cooperation specific programme of FP7, including two (ARTEMIS and ENIAC) of particular relevance to ICT and another (IMI) of particular relevance to Health. By the time of H2020 there were seven JTIs active, including IMI2 (health) and ECSEL (ICT).

The tables below summarise the number of proposals submitted to each JTI and the number of participations in these proposals overall. The proportion of these participations accounted for by Norway and its comparator countries is then also shown. In FP7, Norway accounted for 1.3% of participations in JTI proposals, see Table 48. This is below the rates seen in all comparator countries, and also slightly lower than the country's rate of participation in FP7 more generally (1.5%). Norway was more active in FCH proposals (2.4% of all participations) and – to a lesser extent – ARTEMIS (1.7%) and ENIAC (1.6%) proposals. At the other end of the scale, it only accounted for 0.1% of participations in proposals to the Clean Sky and 0.8% of proposals to the IMI.

Table 48 Participations in proposals to JTIs – Norway and comparators (FP7).

JTIs	Proposals	Participations in Proposals	% of all participations in proposals					
			NO	SE	DK	FI	AT	NL
FCH – Fuel cells and hydrogen	386	3,018	2.4%	3.1%	4.2%	3.0%	1.7%	5.5%
ARTEMIS – Embedded computing systems	232	4,230	1.7%	4.3%	2.2%	10.6%	4.0%	8.3%
ENIAC – Nanoelectronics technology	152	2,782	1.6%	2.6%	0.0%	2.6%	6.5%	14.6%
IMI – Innovative medicines	438	5,272	0.8%	4.6%	3.1%	1.9%	2.1%	7.0%
CLEAN SKY – Aeronautics and air transport	1,693	3,225	0.1%	2.7%	0.1%	0.2%	2.8%	3.1%
JTI Total	**2,901**	**18,527**	**1.3%**	**3.7%**	**2.1%**	**3.9%**	**3.2%**	**7.5%**
All H2020 Total	**158,562**	**656,159**	**1.5%**	**3.1%**	**1.8%**	**2.0%**	**2.5%**	**5.1%**

In H2020, Norway accounted for 1.7% of participations in JTI proposals, see Table 49. This is below the rates seen in the five comparator countries, but slightly higher than in FP7 and also greater than Norway's overall rate of proposal participation in H2020 (1.5%). Norway has been particularly active in proposals to FCH2 (3.3%), SESAR (2.6%) and ECSEL (2.0%). Similar to FP7, it accounts for a small proportion of participations in proposals to IMI.

Table 49 Participations in proposals to JTIs – Norway and comparators (H2020).

JTIs	Proposals	Participations in Proposals	% of all participations in proposals					
			NO	SE	DK	FI	AT	NL
FCH2 – Fuel cells and hydrogen	204	1,538	3.3%	2.3%	3.6%	2.3%	2.8%	4.3%
SESAR – Single European sky air traffic management research	219	1,468	2.6%	4.6%	1.9%	0.4%	3.9%	5.9%
ECSEL – Electronic components and systems for European leadership	187	4,687	2.0%	3.3%	1.3%	7.1%	5.8%	9.8%
BBI – Bio-based facilities	228	2,461	1.5%	3.0%	2.7%	4.6%	3.7%	7.8%
IMI2 – Innovative medicines	125	1,670	0.9%	4.2%	2.9%	2.9%	2.0%	8.0%
Shift2Rail	57	455	0.9%	4.6%	0.4%	1.3%	6.8%	2.6%
CS2 – Aeronautics and air transport	557	1,366	0.0%	2.6%	0.1%	0.1%	2.8%	3.0%
JTI Total	**1,577**	**13,645**	**1.7%**	**3.4%**	**1.9%**	**4.0%**	**4.1%**	**7.3%**
All H2020 Total	**116,586**	**396,453**	**1.5%**	**2.8%**	**2.2%**	**2.2%**	**2.5%**	**5.5%**

D.3.2 Success rates and participation in projects

To February 2017, 650 H2020 grants had been awarded to projects involving Norwegian participants. This represents 4.8% of all H2020 projects, which is lower than any of the comparator countries (each of which accounts for between 6% and 17%). However, Norway compares slightly better when one adjusts for the size of the research base in each country. Norway has been awarded 16 H2020 projects for every 1,000 R&D personnel in the country, which is higher than either Sweden or Finland, see Table 50.

Table 50 Projects (per 1,000 R&D personnel) – Norway and comparator countries

H2020	All	NO	SE	DK	FI	AT	NL
Projects	13,640	650	1,266	1,026	823	1,130	2,319
Projects per 1,000 researchers		16.1	15.2	17.5	15.8	16.8	18.8
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Projects	25,238	1,485	3,080	2,011	1,779	2,436	5,024
Projects per 1,000 researchers		40.8	39.2	35.9	32.2	40.6	47.6

The 650 H2020 projects involving Norway came from 1,440 proposals. This equates to a proposal success rate of 14.7%, which is substantially higher than the overall success rate of H2020 proposals (11.7%), but slightly below the rates achieved in most comparator countries, see Table 51. Norwegian success rates in FP7 were much higher (21.0%) than in H2020, but this partly reflects higher success rates seen in FP7 overall (15.9%). However, Norway's FP7 success rate was also above that of Sweden, Finland and Austria, and only slightly below that of Denmark and the Netherlands. As such, Norway's performance relative to comparator countries (in terms of success rates) has tended to worsen in the first period of H2020 compared with the whole of FP7.

Table 51 Success rate of proposals – Norway and comparator countries.

H2020	All	NO	SE	DK	FI	AT	NL
Proposals	116,586	4,410	8,547	6,881	6,223	7,318	14,950
Projects	13,640	650	1,266	1,026	823	1,130	2,319
Success rate	11.7%	14.7%	14.8%	14.9%	13.2%	15.4%	15.5%
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Proposals	158,562	7,078	15,259	9,316	9,667	12,093	23,053
Projects	25,238	1,485	3,080	2,011	1,779	2,436	5,024
Success rate	15.9%	21.0%	20.2%	21.6%	18.4%	20.1%	21.8%

H2020 grants have been awarded to 198 projects with a Norwegian coordinator. The equates to 4.9 project coordinators for every 1,000 R&D personnel in the country. This rate is higher than for Sweden or Finland, but lower than the other comparator countries, see Table 52.

Table 52 Coordinators (per 1,000 R&D personnel) – Norway and comparator countries.

H2020	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Coordinators	13,640	198	366	419	248	334	945
Coordinators per 1,000 researchers		4.9	4.4	7.1	4.8	5.0	7.7
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Coordinators	25,238	350	722	503	355	675	1634
Coordinators per 1,000 researchers		9.6	9.2	9.0	6.4	11.3	15.5

The success rate of Norwegian-coordinated proposals is 10.9%, which is much lower than the rate of success for proposals where Norway is only a partner (17.4%). It is also slightly lower than the overall H2020 figure (11.7%), and below the rates of coordinator success achieved in most comparator countries, see Table 53. In FP7, Norway's success rate for coordinators was also slightly below the overall average, as well as below that of Denmark, Austria and the Netherlands.

Table 53 Success rate of proposals with/without domestic coordinator – Norway and comparator countries.

H2020 success rates	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Proposal with domestic coordinator	11.7%	10.9%	11.3%	13.8%	9.0%	14.9%	15.5%
Proposal without domestic coordinator		17.4%	16.9%	15.8%	16.6%	15.7%	15.5%
FP7 success rates	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Proposal with domestic coordinator	15.9%	15.2%	13.5%	16.0%	11.0%	18.2%	19.3%
Proposal without domestic coordinator		23.8%	23.8%	24.4%	22.1%	21.0%	23.3%

If we look only at those proposals/projects with multiple participants (i.e. excluding those where the coordinator is the only partner), the success rate for Norwegian coordinators increases from 10.9% to 13.7% for H2020, and from 15.2% to 20.0% for FP7. While there is an increase in the success rate overall with this measure, the increase for Norway is more significant than for many of its comparator countries. As a result, the success rate of multi-partner H2020 proposals with a Norwegian coordinator (14%) is higher than those with a Swedish (12%), Danish (12%) or Finnish (9%) coordinator, see Table 54.

Table 54 Success rate of multi-partner proposals with domestic coordinator.

H2020 – multi partner	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Proposals	40,181	673	912	879	921	931	2,206
Projects	4,977	92	111	106	85	156	341
Success rate	12.4%	13.7%	12.2%	12.1%	9.2%	16.8%	15.5%
FP7 – multi partner	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Proposals	70,763	1,190	2,143	1,256	1,389	1,923	3,483
Projects	12,055	238	353	225	220	383	832
Success rate	17.0%	20.0%	16.5%	17.9%	15.8%	19.9%	23.9%

The 650 grants awarded to Norway in H2020 involve 905 individual Norwegian participations**.** This represents 1.6% of all H2020 participations, which is lower than any of the comparator countries (each of which accounts for between 2% and 7% of all participations). However, Norway compares better when one adjusts for the size of the research base. Norway has 24.9 project participations in H2020 for every 1,000 R&D personnel in the country, which is higher than Sweden, Denmark or Finland, but below Austria or the Netherlands, see Table 55.

Table 55 Participations (per 1,000 R&D personnel) – Norway and comparator countries.

H2020	All	NO	SE	DK	FI	AT	NL
Participations in projects	57,788	905	1,795	1,364	1,188	1,626	3,702
Participations per 1,000 researchers		24.9	22.8	24.4	21.5	27.1	35.1
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Participations in projects	133,615	2,185	4,506	2,754	2,650	3,516	8,151
Participations per 1,000 researchers		60.1	57.3	49.2	48.0	58.7	77.3

The 905 Norwegian participations in successful projects, from 5,797 participations in proposals, represents a participation success rate of 15.6% in H2020 so far. This is slightly above the overall rate of success for all participations in proposals (14.6%), as well as being higher than the rates in Denmark and Finland, see Table 56. During FP7, the Norwegian participation success rate was also slightly above average, as well as higher than in three of the five comparator countries.

Table 56 Success rate of participations – Norway and comparator countries

Participation success rate	All	NO	SE	DK	FI	AT	NL
H2020	14.6%	15.6%	15.9%	15.6%	13.8%	16.7%	17.1%
FP7	20.4%	22.6%	21.8%	22.8%	19.9%	21.6%	24.5%

Comparing across different organisation types, H2020 success rates were highest amongst Norwegian participations from public bodies (40.6%). Rates here were also much higher than the overall average (26.9%) and than in most of the comparator countries. Norwegian participations from research organisations also performed well against these comparators, in terms of their success rates. Elsewhere (HES, PRC), Norwegian participations achieved similar success rates to the overall average, but below the levels of success seen across most comparator countries, see Table 57. It is interesting to note that while the share of Norwegian proposal participations accounted for by industry (33%) is similar to the comparator countries (31–36%), their success rates tend to be lower. Austria in particular stands out, with a 17.3% success rate for PRC participations, compared to Norway's 13.8%. The table also shows the success rate of PRC-SME participations.[269] For Norway, the rate is 11.4%, which is slightly below the H2020 average, as well as lower than in nearly all comparator countries. There are 17 participations in H2020 projects from hospital trusts, compared with the 192 participations in proposals from these organisations. The participation success rate for this group is therefore 8.9%, which is lower than for any other organisational type.

Table 57 Success rate of participations, by organisation type – Norway and comparator countries (H2020).

Participation success rate	All	NO	SE	DK	FI	AT	NL
HES – Higher or secondary education	12.7%	12.8%	13.5%	14.8%	11.0%	13.2%	15.2%
PRC – Private for profit (excl. education)	13.1%	13.8%	16.7%	14.2%	12.9%	17.3%	15.7%
REC – Research organisations	17.8%	18.8%	18.5%	15.6%	18.8%	17.5%	23.6%
PUB – Public body (excl. research and education)	26.9%	40.6%	32.9%	25.1%	25.5%	41.5%	28.1%
OTH - Others	20.0%	15.2%	20.3%	26.0%	25.2%	21.3%	20.5%
PRC-SMEs	*11.7%*	*11.4%*	*13.2%*	*13.5%*	*11.0%*	*14.0%*	*14.6%*
Hospital trusts		*8.9%*					

We have examined the activities of private for-profit companies (PRC) in more depth, see Table 58. The overall success rate for Norwegian PRC participations is 14%. The rate is slightly lower (13%) for those with no other Norwegian partners and those whose only Norwegian partners are other PRC organisations. The rate is even lower (11%) where PRCs are partnering with at least one HES or OTH partner from Norway. By comparison, the success rates of Norwegian PRCs in a consortium with

269 As mentioned previously, information on whether a PRC participant is an SME or not is only available for 78% of proposal participations and 80% of project participations. Success rates are calculated based only on those that are known.

Norwegian REC organisations is 18% and with PUB it is 20%. This suggests that partnering with Norwegian REC organisations (possibly also with PUB organisations – though the numbers here are small) can increase the chances of success for Norwegian PRCs.

Table 58 Success rate of PRC participations, by organisation type.

Participation success rate	Proposals	Projects	Success rate
PRC participations (all)…	1,586	218	14%
• With no other NO partners	998	130	13%
• With only NO PRC partners	83	11	13%
• With other NO partner types…	505	77	15%
– with at least one NO REC partner	329	60	18%
– with at least one NO HES partner	265	30	11%
– with at least one NO PUB partner	41	8	20%
– with at least one NO OTH partner	18	2	11%

EC contributions to Norwegian participations in H2020 projects total €425m, which equates to 1.8% of all funding to project participations to date (slightly below the country's 2% return target). This is below the proportion realised by each of the other comparator countries. If we "normalise" contributions by using national GDP figures, then Norway also compares unfavourably with its comparator countries, see Table 59. However, the average contribution to each Norwegian participation (at €481k) is relatively high; only the Netherlands has a higher average contribution. Because financial information is missing or incorrect for 6% of all proposal participations and for 2% of all project participations, we have not looked in detail at EC contributions received as a proportion of those requested. However, based on the data available, this suggest that Norway was awarded around 14% of that requested in proposals.

Table 59 EC contributions as a proportion of requested funding – Norway and comparator countries.

H2020	All	NO	SE	DK	FI	AT	NL
Selected participations in projects (those with financial data)	56,350	882	1,727	1,327	1,169	1,579	3,620
Total EC contribution (€m)	€ 23,652	€ 425	€ 823	€ 582	€ 501	€ 650	€ 1,842
% of total EC contributions	100%	1.8%	3.5%	2.5%	2.1%	2.7%	7.8%
EC contributions per €M GDP		€ 1,130	€ 1,902	€ 2,193	€ 2,437	€ 1,967	€ 2,778
Average EC contribution per participation	€ 419,730	€ 481,381	€ 476,534	€ 438,396	€ 428,387	€ 411,667	€ 508,708

Norwegian success rates across the main programme areas of H2020 broadly follow the patterns for H2020 overall. However, the country has seen above average levels of success in the areas of societal challenges, industrial leadership and science with and for society, see Table 60. In the latter two areas Norway also compares favourably with all/most comparator countries as well.

Table 60 Participation success rate by programme area.

	All	NO	SE	DK	FI	AT	NL
Cross-theme	4.9%	2.1%	5.4%	1.6%	3.1%	3.6%	8.7%
Excellent Science	13.6%	12.7%	13.1%	14.1%	13.0%	15.0%	16.3%
Industrial Leadership	15.2%	18.5%	16.6%	15.5%	13.0%	17.7%	16.6%
Societal Challenges	15.3%	16.9%	18.4%	17.8%	14.7%	17.8%	18.5%
Spreading excellence and widening participation	15.8%	8.0%	11.8%	12.5%	17.5%	17.6%	16.3%
Science with and for society	9.8%	14.1%	7.5%	12.4%	9.6%	15.8%	12.0%
Euratom	44.3%	33.3%	34.2%	50.0%	46.8%	41.7%	43.5%
H2020	14.6%	15.6%	15.9%	15.6%	13.8%	16.7%	17.1%

Looking in more detail, there are 14 sub-programmes where Norwegian participations achieved a higher success rate than average. Table 61 shows the six areas where this difference was greatest (shown in the final column) – which includes the ICT programme. The other sub-areas (not listed), where Norwegian success rates were a little above the overall H2020 average are SPACE, INFRA, FOOD, SECURITY, ADVMAT, ENV, ENERGY and GOV.

Table 61 Sub-programmes with relatively high Norwegian success rates.

Programme	Sub-programme		Overall	NO	% difference
Industrial Leadership	BIOTECH	Biotechnology	11%	22%	+95%
Science with and for society	CAREER	Make scientific and technological careers attractive for young people	6%	12%	+88%
Science with and for society	INEGSOC	Integrate society in science and innovation	10%	18%	+84%
Societal Challenges	SOCIETY	Europe in a changing world - inclusive, innovative and reflective Societies	8%	11%	+40%
Industrial Leadership	NMP	Nanotechnologies, Advanced Materials and Production	10%	14%	+40%
Industrial Leadership	ICT	Information and Communication Technologies	14%	19%	+35%

There were also 10 sub-programmes of H2020 where Norwegian participations achieved a lower success rate than average. Table 62 shows the areas where the difference was greatest – including the health programme. The other areas were TPT and ADVMANU.

Table 62 Sub-programmes with relatively low Norwegian success rates.

Programme	Sub-programme		Overall	NO	% difference
Excellent Science	ERC	European Research Council	14%	8%	-46%
Industrial Leadership	SME	Innovation in SMEs	48%	29%	-40%
Spreading excellence and widening participation	TWINING	Twinning of research institutions	12%	8%	-34%
Excellent Science	FET	Future and Emerging Technologies	6%	4%	-33%
Euratom	EURATOM	Euratom	44%	33%	-25%
Societal Challenges	HEALTH	Health, demographic change and wellbeing	11%	9%	-22%
Science with and for society	GENDEREQ	Promote gender equality in research and innovation	13%	10%	-21%
Excellent Science	MSCA	Marie Sklodowska-Curie actions	13%	10%	-20%

From a funding perspective, there are 14 sub-programmes in H2020 where EC contributions to Norwegian participations account for at least 2% of the total awards made. In the five areas in Table 63, Norway has received a total 3% or more of the total EC contributions awarded. Other areas (2–3%) include SOCIETY, ENV, INEGSOC, SECURITY, ENERGY, ADVMAT, INFRA, GENDEREQ AND ADVMANU.

Table 63 Sub-programmes where Norway accounts for the highest proportion of EC contributions awarded.

H2020 Programme	Sub-programme		Total EC contributions (€m)	EC contributions to Norway (€m)	%
Industrial Leadership	SME	Innovation in SMEs	112	9	8.4%
Societal Challenges	FOOD	Food security, sustainable agriculture and forestry, marine and maritime and inland water research	1,258	66	5.2%
Industrial Leadership	BIOTECH	Biotechnology	148	6	4.3%
Science with and for society	CAREER	Make scientific and technological careers attractive for young people	32	1	3.6%
Science with and for society	GOV	Develop the governance for the advancement of responsible research and innovation	46	2	3.4%

In the nine sub-programmes shown in Table 64, EC contributions to Norwegian participations account for less than 2% of all funding to each of these areas of H2020. In addition, there are other sub-programmes where Norway has not received any funding. These include ERA, EURATOM, INTNET, NCPNET, RESACCESS, RISKFINANCE, SCIENCE and WIDESPREAD.

Table 64 Sub-programmes where Norway accounts for the lowest proportion of EC contributions awarded.

H2020 Programme	Sub-programme		Total EC Contr. (€m)	EC Contr. to NO (€m)	%
Spreading excellence and widening participation	TWINING	Twinning of research institutions	67	0.31	0.5%
Excellent Science	ERC	European Research Council	4,110	40	1.0%
Excellent Science	FET	Future and Emerging Technologies	702	7	1.0%
Societal Challenges	HEALTH	Health, demographic change and wellbeing	2,107	22	1.1%
Excellent Science	MSCA	Marie Sklodowska-Curie actions	2,478	31	1.3%
Societal Challenges	TPT	Smart, green and integrated transport	1,758	23	1.3%
Industrial Leadership	ICT	Information and Communication Technologies	2,822	46	1.6%
Industrial Leadership	SPACE	Space	368	6	1.7%
Industrial Leadership	NMP	Nanotechnologies, Advanced Materials and Production	375	7	1.8%

Overall, 37% of Norwegian participations in proposals to H2020 JTIs were successful. This is above the overall average (32%) and a higher rate of success than most of the comparator countries, see Table 65. The success rate for Norway varied considerably across the JTIs. Relative to overall success rates, and those of comparator countries, Norway did well in proposals to SESAR, BBI and ECSEL JTIs. By comparison, Norway's success rate in both Shift2Rail and IMI2 was lower than half the overall rate.

Table 65 Success rate of participations in proposals to JTIs – Norway and comparators (H2020).

JTIs	All	NO	SE	DK	FI	AT	NL
SESAR	52%	71%	66%	75%	33%	68%	43%
BBI	30%	38%	47%	23%	38%	23%	42%
ECSEL	26%	33%	27%	29%	19%	38%	26%
FCH2	30%	26%	31%	45%	40%	35%	30%
Shift2Rail	58%	25%	67%	0%	33%	87%	42%
IMI2	27%	13%	24%	21%	27%	24%	47%
CS2	35%	n/a	36%	0%	0%	37%	88%
JTI Total	**32%**	**37%**	**38%**	**34%**	**25%**	**40%**	**36%**

By comparison, 42% of Norwegian participations in proposals to FP7 JTIs were successful. This was above the overall average (31%) and a higher rate of success than any of the comparator countries, see Table 66. The success rate for Norway was between 40% and 50% across all JTIs, except IMI, where only 10% of its 42 participations in proposals were successful.

Table 66 Success rate of participations in proposals to JTIs – Norway and comparators (FP7).

JTI	All	NO	SE	DK	FI	AT	NL
ENIAC	48%	52%	44%	100%	68%	49%	51%
CLEAN SKY	28%	50%	53%	50%	20%	27%	31%
FCH	39%	49%	33%	52%	36%	36%	29%
ARTEMIS	25%	47%	33%	30%	17%	38%	20%
IMI	25%	10%	36%	38%	29%	16%	25%
JTI Total	**31%**	**42%**	**38%**	**41%**	**26%**	**36%**	**32%**

D.4 Participation in health-related research

D.4.1 Participation in proposals

Norwegian actors have contributed to the submission of 948 **Health proposals** in H2020 (as of February 2017). This equates to 2.8% of all such proposals submitted to the programme during this period. This is slightly higher than the proportion of FP7 Health proposals involving Norway (2.4%).

As is shown in the table below, all five comparator countries have participated in a greater number and proportion of Health proposals than Norway, in both FP7 and H2020. Even when taking into account the relative number of R&D personnel in each country, the number of proposals involving Norway is lower than all comparator countries in FP& (and all but one – AT – in H2020).

Table 67 FP7/H2020 Health proposals involving Norway and comparator countries

H2020	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Number of proposals involving…	33,325	948	2,267	1,920	1,326	1,489	4,365
Proportion of all proposals involving…		2.8%	6.8%	5.8%	4.0%	4.5%	13.1%
Number of proposals per 1,000 researchers in…		24	27	33	25	22	35
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Number of proposals involving…	54,991	1,313	4,175	2,434	2,094	2,391	6,290
Proportion of all proposals involving…		2.4%	7.6%	4.4%	3.8%	4.3%	11.4%
Number of proposals per 1,000 researchers in…		36.1	53.1	43.5	37.9	39.9	59.6

In 49% of H2020 Health proposals involving Norway, a Norwegian actor held the role of **coordinator**. This is similar to FP7, where 51% of Norwegian Health proposals were led by a Norwegian coordinator. Most comparator countries had a higher rate of coordination in both FP7 and H2020.

If we take account of the relative size of the researcher base in each country, the number of Health proposal coordinators from Norway (12) in H2020 is below the rate for all comparator countries except AT. In FP7, the Norwegian rate (19 coordinators per 1,000 personnel) was below that of all comparators.

Table 68 FP7/H2020 Health proposals with a "domestic" coordinator

H2020	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Number of proposals with domestic coordinator	33,325	465	1,191	1,078	746	691	2,378
% of country's proposals with domestic coordinator		49%	53%	56%	56%	46%	54%
Coordinators per 1,000 researchers		12	14	18	14	10	19
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Number of proposals with domestic coordinator	54,991	676	2,367	1,197	1,175	1,179	3,559
% of country's proposals with domestic coordinator		51%	57%	49%	56%	49%	57%
Coordinators per 1,000 researchers		18.6	30.1	21.4	21.3	19.7	33.7

Norway has participated in 590 **multi-partner H2020 Health proposals**, of which it has served as the coordinator in 107 (18%). This is a lower rate than all comparator countries except AT. However, the Norwegian rate of Health proposal coordination in H2020, relative to the FTE researcher population, compares favourably with three of these countries.

Table 69 FP7/H2020 "multi-partner" (MP) Health proposals with a "domestic" coordinator

H2020	All	NO	SE	DK	FI	AT	NL
Number of MP proposals involving…	7,752	590	1,323	1,082	747	950	2,621
Number of MP proposals with domestic coordinator	7,752	107	247	240	167	152	634
% of country's MP proposals with domestic coordinator		18%	19%	22%	22%	16%	24%
Coordinators of MP proposals per 1,000 researchers		3	3	4	3	2	5
FP7							
Number of MP proposals involving…	14,241	791	2,341	1,511	1,165	1,577	3,683
Number of MP proposals with domestic coordinator	14,241	155	535	275	248	366	954
% of country's MP proposals with domestic coordinator		20%	23%	18%	21%	23%	26%
Coordinators of MP proposals per 1,000 researchers		4.3	6.8	4.9	4.5	6.1	9.0

Because of multiple Norwegian participations in some proposals, the total number of Norwegian **participations** in H2020 Health proposals (1,115) is slightly higher than the number of unique Health proposals in which Norway is involved (948). These Norwegian participations represent just 1.4% of all participations in H2020 Health proposals, which is lower than for each of the comparator countries. Even taking account of the size of the respective researcher populations, Norway still has a lower number of participations in H2020 Health proposals (28 per 1,000 R&D personnel) than all other comparators except Austria.

Norway accounted for a similar proportion (1.2%) of all FP7 participations in Health proposals. However, because of the longer time period covered, its participation rate (42 per 1,000 R&D personnel) was higher than in H2020. It was still lower than all comparator countries though.

Table 70 Participations in FP7/H2020 Health proposals from Norway and comparator countries

H2020	All	NO	SE	DK	FI	AT	NL
Number of participations in proposals	82,054	1,115	2,760	2,294	1,664	1,806	6,054
Proportion of all participations in proposals		1.4%	3.4%	2.8%	2.0%	2.2%	7.4%
Number of participations in proposals per 1,000 researchers in…		28	33	39	32	27	49
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Number of participations in proposals	132,111	1,530	5,022	2,852	2,523	2,947	8,351
Proportion of all participations in proposals		1.2%	3.8%	2.2%	1.9%	2.2%	6.3%
Number of participations in proposals per 1,000 researchers in…		42	64	51	46	49	79

The table below shows the distribution of H2020 Health proposal participations between different types of actor (categorisations as used in eCorda). For Norway, it shows that one **organisation type** (HES) accounts for the majority (67%) of participations in Health proposals, with REC and PRC organisations (combined) accounting for a further 31%. Compared to other countries, the proportion of Norway's Health proposal participations accounted for by HES and REC is relatively high, while the proportion accounted for by PRC organisations is relatively low.

The table also shows the proportion of PRC participations that are **SMEs**[270]. For Norway, the rate is 90%, which is higher than the overall average, and also higher than most of the comparator countries.

[270] Across all countries, information on whether a PRC participation is from an SME or not is only available in 78% of cases. For the percentages shown in the table, the denominator is the total population of PRCs where the status is known (i.e. SME or not).

There are 139 participations in H2020 proposals from Norwegian **Hospital Trusts**[271] (12% of all participations).

Table 71 Distribution of participations in H2020 Health proposals by organisational type

H2020	All	NO	SE	DK	FI	AT	NL
HES – Higher or secondary education	54%	67%	74%	62%	62%	58%	64%
REC – Research organisations	20%	16%	3%	6%	13%	18%	9%
PRC – Private for profit (excl. education)	22%	15%	18%	22%	22%	21%	23%
PUB – Public body (excl. REC/HES)	3%	2%	4%	9%	2%	2%	1%
OTH - Others	2%	1%	1%	1%	1%	2%	3%
Total	**82,054**	**1,115**	**2,760**	**2,294**	**1,664**	**1,806**	**6,054**
SMEs as a % of PRC	*84%*	*90%*	*85%*	*77%*	*92%*	*84%*	*82%*

The average **EC funding request** per Norwegian participation in H2020 Health proposals was around €676k, which is higher than in most of the comparator countries and than the overall average.

Table 72 EC contributions requested in H2020 Health proposals

H2020	All	NO	SE	DK	FI	AT	NL
Selected participations in proposals (those with financial data)	77,880	1,052	2,633	2,217	1,606	1,705	5,767
Total EC contribution requested (€m)	€ 45,083	€ 711	€ 1,791	€ 1,353	€ 1,214	€ 983	€ 3,750
Average EC contribution requested per participation	€ 578,874	€ 676,172	€ 680,239	€ 610,107	€ 755,711	€ 576,729	€ 650,187

Below we compare the distribution of Health proposal participations at the **sub-programme** level. Overall, Norway accounts for 3% of all participations in H2020 Health proposals. However, it is more active (relatively) in NMP, HEALTH and ADVMAT sub-programmes, where it accounts for 4-6% of all Health proposal participations in each case. By comparison, Norway only accounts for 1% of participations in Health proposals within the ERC sub-programme.

Only in the ADVMAT programme is Norway more active than most of the comparator countries in relation to Health proposals. It is also more active than one or two comparator countries in NMP and MSCA sub-programmes.

Table 73 Participation rate of Norway in H2020 Health proposals – by sub-programme

Sub-programme		All participation	NO %	SE %	DK %	FI %	AT %	NL %
NMP	Nanotechnologies, Advanced Materials and Production	125	6%	14%	6%	5%	14%	21%
HEALTH	Health, demographic change and wellbeing	8,706	5%	10%	8%	7%	7%	20%
ADVMAT	Advanced materials	56	4%	7%	2%	2%	4%	14%
MSCA	Marie Sklodowska-Curie actions	14,470	3%	7%	7%	3%	4%	13%
ERC	European Research Council	9,960	1%	4%	3%	3%	2%	8%
ICT	Information and Communication Technologies	8	0%	50%	38%	75%	13%	63%
		33,325	**3%**	**7%**	**6%**	**4%**	**4%**	**13%**

[271] RCN provided a list of Norwegian H2020 proposal participants, with Hospital Trusts (Helseforetak) tagged. Based on unique organisation PIC numbers this information has been matched with eCorda data.

D.4.2 Success rates and participation in Health projects

To February 2017, 97 H2020 grants had been awarded to Health **projects** involving Norway. This represents 2.2% of all H2020 Health projects, which is lower than any of the comparator countries (each of which accounts for between 3% and 15%). Norway compares little better when one adjusts for the size of the research base in each country. Norway has been awarded 2.4 H2020 Health projects for every 1,000 R&D personnel in the country, which is lower than any of the comparator countries.

Table 74 Health Projects (per 1,000 R&D personnel) – Norway and comparator countries

H2020	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Projects	4,320	97	279	273	130	203	639
Projects per 1,000 researchers		2.4	3.3	4.6	2.5	3.0	5.2
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Projects	8,902	209	736	459	321	483	1,287
Projects per 1,000 researchers		5.7	9.4	8.2	5.8	8.1	12.2

The 97 H2020 Health projects involving Norway came from 948 proposals. This equates to a **proposal success rate** of 10.2% - which is slightly below the overall success rate of H2020 Health proposals (13.0%), as well as below the rate achieved in most comparator countries (except FI). Norwegian success rates in FP7 Health proposals were higher (15.9%) than in H2020, but this partly reflects higher success rates seen in FP7 overall (16.2%).

Table 75 Success rate of Health proposals – Norway and comparator countries

H2020	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Proposals	33,325	948	2,267	1,920	1,326	1,489	4,365
Projects	4,320	97	279	273	130	203	639
Success rate	13.0%	10.2%	12.3%	14.2%	9.8%	13.6%	14.6%
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Proposals	54,991	1,313	4,175	2,434	2,094	2,391	6,290
Projects	8,902	209	736	459	321	483	1,287
Success rate	16.2%	15.9%	17.6%	18.9%	15.3%	20.2%	20.5%

H2020 grants have been awarded to 41 Health projects with a Norwegian **coordinator**. The equates to 1.0 projects for every 1,000 R&D personnel in the country. This rate is below that of all comparator countries except FI. The rate (2.0 coordinators per 1,000 personnel) for Norway in FP7 also compared poorly with comparators.

Table 76 Coordinators of Health projects (per 1,000 R&D personnel) – Norway and comparator countries

H2020	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Coordinators	4,320	41	137	164	54	101	399
Coordinators per 1,000 researchers		1.0	1.6	2.8	1.0	1.5	3.2
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Coordinators	8,902	73	303	177	117	227	679
Coordinators per 1,000 researchers		2.0	3.9	3.2	2.1	3.8	6.4

The **success rate of Norwegian-coordinated** Health proposals is 8.8% - which is lower than the rate of success for Health proposals where Norway is only a partner (11.6%). It is also significantly lower than the overall H2020 figure (13.0%), and below the rates of coordinator success achieved in all comparator countries. In FP7, Norway's success rate for coordinators was slightly better (10.8%), but this was still lower than all but one comparator country.

Table 77 Success rate of Health proposals with/without domestic coordinator – Norway and comparator countries

H2020 success rates	All	NO	SE	DK	FI	AT	NL
Proposal with domestic coordinator	13.0%	8.8%	11.5%	15.2%	7.2%	14.6%	16.8%
Proposal without domestic coordinator		11.6%	13.2%	12.9%	13.1%	12.8%	12.1%
FP7 success rates	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Proposal with domestic coordinator	16.2%	10.8%	12.8%	14.8%	10.0%	19.3%	19.1%
Proposal without domestic coordinator		21.4%	23.9%	22.8%	22.2%	21.1%	22.3%

If we look only at those H2020 Health proposals/**projects with multiple participants** (i.e. excluding those where the coordinator is the only partner), the success rate for NO coordinators increases from 8.8% to 9.3%. This compares favourably with all comparator countries except DK and NL.

Table 78 Success rate of multi-partner Health proposals with domestic coordinator

H2020 – multi partner	All	NO	SE	DK	FI	AT	NL
Proposals	7,752	107	247	240	167	152	634
Projects	795	10	22	32	10	14	81
Success rate	10.3%	9.3%	8.9%	13.3%	6.0%	9.2%	12.8%

The 97 Health grants awarded to Norway in H2020 involve 110 individual Norwegian **participations.** This represents 1.1% of all participations in H2020 projects, which is lower than any of the comparator countries (each of which accounts for between 2% and 9% of all participations). Even taking account of the size of the researcher base, Norway does not compare favourably with these countries. The 2.7 Health participations per 1,000 R&D personnel in Norway is below the 3-7 achieved elsewhere.

Table 79 Participations in Health projects (per 1,000 R&D personnel) – Norway and comparator countries

H2020	All	NO	SE	DK	FI	AT	NL
Participations in projects	10,165	110	352	330	164	240	907
Participations per 1,000 researchers		2.7	4.2	5.6	3.1	3.6	7.4
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Participations in projects	25,086	247	959	558	409	627	1,861
Participations per 1,000 researchers		6.8	12.2	10.0	7.4	10.5	17.6

The 110 Norwegian participations in successful H2020 Health projects, from an original 1,115 participations in proposals, represents a **participation success rate** of 9.9% in H2020 so far. This is below the overall rate of success for all participations in Health proposals (12.4%), as well as below that achieved in all-but-one of the comparator countries (FI).

Table 80 Success rate of Health participations – Norway and comparator countries

Participation success rate	All	NO	SE	DK	FI	AT	NL
H2020	12.4%	9.9%	12.8%	14.4%	9.9%	13.3%	15.0%
FP7	19.0%	16.1%	19.1%	19.6%	16.2%	21.3%	22.3%

Comparing across different **organisation types** for FP7, success rates for Health participations were highest amongst Norwegian Research Organisations (27%), although this was lower than the overall (all country) success rate for REC participations. Only Norwegian PUB organisations achieved a higher than average success rate, as well as a higher success rate than several of the competitors. The success rates of Norwegian participations from the other organisation types tended not to compare well with the comparator countries. In particular, the success rate for PRC organisations in Norway (14%) is well below that achieved for all countries (20%).

The table also shows the success rate of **SME**-PRC participations in FP7 Health proposals[272]. For Norway, the rate is 12%, which is below the FP7 average (21%), as well as below that achieved in all comparator countries.

Table 81 Success rate of Health participations, by organisation type – Norway and comparator countries (FP7)

Participation success rate	All	NO	SE	DK	FI	AT	NL
HES – Higher or secondary education	24%	22%	26%	22%	23%	24%	31%
PRC – Private for profit (excl. education)	20%	14%	25%	25%	19%	31%	20%
REC – Research organisations	30%	27%	25%	34%	36%	30%	31%
PUB – Public body (excl. research and education)	22%	24%	37%	34%	17%	19%	23%
OTH - Others	9%	4%	4%	5%	7%	6%	11%
PRC-SMEs	*21%*	*12%*	*26%*	*23%*	*17%*	*26%*	*21%*

Comparing across different **organisation types** for H2020, success rates for Health participations were highest amongst Norwegian public bodies (42%). Rates here were much higher than the overall average (20%) and than all of the comparator countries. The success rates of Norwegian participations from other organisation types did not compare well with other countries. In particular, the success rate for PRC organisations in Norway (5%) was half that of all countries (10%).

The table also shows the success rate of **SME**-PRC participations in Health proposals. For Norway, the rate is 6%, which is below the H2020 average (11%), as well as below that achieved in all comparator countries.

There are 10 participations in H2020 Health projects from **Hospital Trusts**, compared with the 139 participations in proposals from these organisations. The participation success rate for this group is therefore 7%, which is lower than that achieved by HES, REC or PUB organisations in Norway.

Table 82 Success rate of Health participations, by organisation type – Norway and comparator countries (H2020)

Participation success rate	All	NO	SE	DK	FI	AT	NL
HES – Higher or secondary education	12%	10%	12%	15%	9%	13%	15%
PRC – Private for profit (excl. education)	10%	5%	13%	11%	9%	12%	12%
REC – Research organisations	14%	12%	13%	9%	14%	14%	21%
PUB – Public body (excl. research and education)	20%	42%	21%	20%	16%	24%	18%
OTH - Others	14%	0%	12%	25%	6%	18%	18%
PRC-SMEs	11%	6%	14%	12%	10%	10%	14%
Hospital Trusts		*7%*					

EC contributions to Norwegian participations in H2020 Health projects totalled €56m, which equates to 1.1% of all funding to Health participations to date (well below the country's overall 2% drawdown target). This is below the proportion realised by each of the other comparator countries. The average contribution to each Norwegian Health participation (at €518k) is also below that achieved by all comparator countries.

[272] As mentioned previously, information on whether a PRC participant is an SME or not is only available for 78% of proposal participations and 80% of project participations. Success rates are calculated based only on those that are known.

Table 83 EC contributions to Health participations as a proportion of requested funding – Norway and comparator countries

H2020	All	NO	SE	DK	FI	AT	NL
Selected participations in projects (those with financial data)	10,007	109	350	324	160	235	889
Total EC contribution (€m)	€ 5,289	€ 56	€ 204	€ 171	€ 90	€ 142	€ 550
% of total EC contributions		1.1%	3.9%	3.2%	1.7%	2.7%	10.4%
Average EC contribution per participation	€ 528,518	€ 517,862	€ 583,250	€ 529,053	€ 560,399	€ 604,228	€ 618,472

There were 3 **sub-programmes** of FP7 where Norwegian participation success rates were above average (i.e. above the 16.1% success rate of all Norwegian participations in H2020 Health proposals). These were the KBBE, Health and People sub-programmes. In the first area, the success rate also compared favourably with comparator country rates. In the other sub-programmes of relevance (ICT, ERC and ENV), Norwegian success rates were lower. Rates in these areas also compare unfavourably with all comparator countries.

Table 84 Health participation success rates in FP7 by sub-programme

Sub-programme		All	NO	SE	DK	FI	AT	NL
KBBE	Food, Agriculture, and Biotechnology	18.6%	42.9%	7.1%	0.0%	6.7%	0.0%	25.0%
HEALTH	Health	27.6%	25.6%	31.2%	28.9%	29.3%	27.9%	31.5%
PEOPLE	Marie-Curie Actions	18.2%	16.8%	16.1%	18.2%	13.8%	20.0%	19.7%
ICT	Information and Communication Technologies	13.5%	8.7%	14.4%	14.7%	15.7%	14.5%	16.5%
ERC	European Research Council	10.5%	6.3%	9.4%	8.6%	6.7%	16.3%	14.6%
ENV	Environment (including Climate Change)	14.2%	0.0%	30.0%	37.5%	16.7%	25.0%	44.4%
INFRA*	Research Infrastructures	111.1%	n/a	100.0%	100.0%	n/a	n/a	100.0%
		19.0%	16.1%	19.1%	19.6%	16.2%	21.3%	22.3%

*Note that in INFRA, the number of funded projects was eventually 20, although only 18 proposals were submitted (hence a >100% success rate overall). This can occur, e.g. if proposals are split during the negotiation phase.

Overall, EC contributions to Norwegian participations in FP7 Health projects accounted for 1.0% of total EC contributions to relevant projects. However, there are four sub-programmes where Norway achieved a higher proportion of the total – and in particular the KBBE programme, where Norway secured over 8% of the €21m in EC contributions awarded to Health projects. In the three sub-programmes awarding most funding to Health projects (ERC, HEALTH and People), Norway's share of contributions were well below that achieved in most comparator countries.

Table 85 Participations in Health projects – proportion of total EC contributions within sub-programme, FP7

Sub-programme		All	NO	SE	DK	FI	AT	NL
KBBE	Food, Agriculture, and Biotechnology	€ 21	8.2%	0.2%	0.0%	1.7%	0.0%	7.6%
HEALTH	Health	€ 4,760	1.1%	5.2%	2.9%	2.0%	2.4%	10.0%
PEOPLE	Marie-Curie Actions	€ 2,078	1.1%	4.2%	2.9%	1.1%	2.7%	7.9%
ICT	Information and Communication Technologies	€ 674	1.1%	2.1%	1.9%	2.2%	3.5%	7.6%
ERC	European Research Council	€ 4,342	0.9%	4.1%	1.7%	1.8%	2.6%	8.7%
INFRA	Research Infrastructures	€ 13	0.0%	1.0%	1.6%	0.0%	0.0%	2.4%
ENV	Environment (including Climate Change)	€ 11	0.0%	16.6%	14.8%	3.1%	2.3%	19.1%
		€ 11,899	1.0%	4.4%	2.4%	1.8%	2.6%	9.0%

There are 3 **sub-programmes** of H2020 where Norwegian participation success rates were above average (i.e. above the 9.9% success rate of all Norwegian participations in H2020 Health proposals). These were the ADVMAT, NMP and MSCA sub-programmes. In the first two areas, success rates also compared favourably with comparator country rates. In the other sub-programmes of relevance (HEALTH and ERC), Norwegian success rates were lower. Rates in these areas also compare unfavourably with all comparator countries.

Table 86 Health participation success rates in H2020 by sub-programme

Sub-programme		All	NO	SE	DK	FI	AT	NL
ADVMAT	Advanced materials	27.1%	50.0%	50.0%	0.0%	100.0%	33.3%	30.0%
NMP	Nanotechnologies, Advanced Materials and Production	11.4%	42.9%	0.0%	12.5%	0.0%	8.7%	12.8%
MSCA	Marie Sklodowska-Curie actions	13.4%	11.6%	13.1%	16.0%	12.5%	14.8%	15.6%
HEALTH	Health, demographic change and wellbeing	10.6%	8.8%	12.7%	12.8%	9.5%	9.5%	12.6%
ERC	European Research Council	15.0%	6.3%	12.7%	13.7%	7.3%	23.1%	20.7%
ICT	Information and Communication Technologies	11.2%	n/a	0.0%	0.0%	8.8%	0.0%	33.3%
		12.4%	**9.9%**	**12.8%**	**14.4%**	**9.9%**	**13.3%**	**15.0%**

Overall, EC contributions to Norwegian participations in H2020 Health projects accounted for 1.1% of total EC contributions to relevant projects. However, there are three sub-programmes where Norway achieved a higher proportion of the total – and in particular the NMP programme, where Norway secured nearly 4% of the €44m in EC contributions awarded to Health projects. In the three sub-programmes awarding most funding to Health projects (MSCA, HEALTH and ERC), Norway's share of contributions was well below that achieved in most comparator countries.

Table 87 Participations in Health projects – proportion of total EC contributions within sub-programme, H2020

Sub-programme		All	NO	SE	DK	FI	AT	NL
NMP	Nanotechnologies, Advanced Materials and Production	€ 44	3.7%	0.0%	0.8%	0.0%	1.7%	8.9%
MSCA	Marie Sklodowska-Curie actions	€ 1,187	1.4%	3.7%	5.0%	1.4%	2.6%	9.6%
HEALTH	Health, demographic change and wellbeing	€ 1,723	1.3%	4.6%	3.3%	2.0%	2.1%	11.9%
ERC	European Research Council	€ 2,292	0.7%	3.4%	2.4%	1.7%	3.3%	9.7%
ADVMAT	Advanced materials	€ 36	0.7%	6.6%	0.0%	2.9%	1.8%	5.2%
ICT	Information and Communication Technologies	€ 6	0.0%	0.0%	0.0%	4.8%	0.0%	40.1%
		€ 5,289	**1.1%**	**3.9%**	**3.2%**	**1.7%**	**2.7%**	**10.4%**

D.4.3 Data on additional funding for Health: the JPIs

Based on discussion with NCPs we have identified several other programmes with Norwegian participation, beyond that identifiable within eCorda. These are three Joint Programming Initiatives relating to Health (AAL, JPND and AMR). We present below a brief analysis of available Norwegian participation data for these programmes, to complement the main FP/H2020 analysis.

The second database lists **40 Norwegian participations in 40 projects** that began between 2009 and 2017 (i.e. 4-5 started each year). Each lasts between 1 and 5 years (3 on average). The participations are split between:

- AAL – Ambient Assisted Living (22)
- JPND – Neurodegenerative Diseases (11)
- AMR – Antimicrobial resistance (6)

(There is one further participation listed as “under evaluation”. However, as we do not hold details of other (unsuccessful) application, this has been excluded from the analysis.)

Budgets for Norwegian participations in these projects range from NOK271k to NOK7.6m, with an **average per participation budget of NOK3.1m**. The average budget per participation is highest in JPIAMR projects (NOK4.1m), while the average for JPND (NOK3.1m) and AAL (NOK2.8m) projects is lower.

There are just **23 separate Norwegian organisations** listed, meaning that some (n=10) appear more than once. Those with 3 or more entries are: the University of Oslo (6), Karde AS (3) and University Hospital North Norway HF (3).

D.5 Participation in ICT research

D.5.1 Participation in proposals (FP7 & H2020)

Norwegian actors have contributed to the submission of 1,193 **ICT proposals** in H2020 (as of February 2017). This equates to 3.2% of all such proposals submitted to the programme during this period. This is slightly lower than the proportion of FP7 ICT proposals involving Norway (3.4%).

As is shown in Table 88, all five comparator countries have participated in a greater number and proportion of ICT proposals than Norway, in both FP7 and H2020. Even when taking into account the relative number of R&D personnel in each country, the number of proposals involving Norway is lower than all comparator countries in H2020 (and all but one – DK – in FP7).

Table 88 FP7/H2020 ICT proposals involving Norway and comparator countries

H2020	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Number of proposals involving…	37,265	1,193	2,697	2,046	2,022	2,306	4,658
Proportion of all proposals involving…		3.2%	7.2%	5.5%	5.4%	6.2%	12.5%
Number of proposals per 1,000 researchers in…		30	32	35	39	34	38
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Number of proposals involving…	57,047	1,914	5,028	2,589	3,397	4,495	7,472
Proportion of all proposals involving…		3.4%	8.8%	4.5%	6.0%	7.9%	13.1%
Number of proposals per 1,000 researchers in…		52.6	64.0	46.3	61.5	75.0	70.8

In 39% of H2020 ICT proposals involving Norway, a Norwegian actor has held the role of **coordinator**. This is higher than FP7, where just 32% of Norwegian ICT proposals were led by a Norwegian coordinator. Most comparator countries have seen a similar increase between the two programmes, although only Denmark and Finland have a higher rate of coordination in H2020 compared to Norway.

If we take account of the relative size of the researcher base in each country, the number of ICT proposal coordinators from Norway in H2020 is below the rate in DK, FI and NL, but above that of SE and AT.

Table 89 FP7/H2020 ICT proposals with a "domestic" coordinator

H2020	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Number of proposals with domestic coordinator	37,265	465	958	935	918	747	1,834
% of country's proposals with domestic coordinator		39%	36%	46%	45%	32%	39%
Coordinators per 1,000 researchers		12	11	16	18	11	15
FP7	All	NO	SE	DK	FI	AT	NL
Number of proposals with domestic coordinator	**57,047**	**604**	**1,809**	**928**	**1,221**	**1,416**	**2,738**
% of country's proposals with domestic coordinator		32%	36%	36%	36%	32%	37%
Coordinators per 1,000 researchers		16.6	23.0	16.6	22.1	23.6	26.0

Norway has participated in 905 **multi-partner H2020 ICT proposals**, of which it has served as the coordinator in 177 (20%). This is a higher rate than in SE, AT or NL, but slightly below the rate in DK and FI. It is also slightly higher than was the case during FP7. The Norwegian rate of ICT proposal coordination in H2020, relative to the FTE researcher population, is also higher than SE and AT.

Table 90 FP7/H2020 "multi-partner" (MP) ICT proposals with a "domestic" coordinator

H2020	All	NO	SE	DK	FI	AT	NL
Number of MP proposals involving…	12,912	905	1,998	1,436	1,397	1,859	3,471
Number of MP proposals with domestic coordinator	12,912	177	259	325	293	300	645
% of country's MP proposals with domestic coordinator		20%	13%	23%	21%	16%	19%
Coordinators of MP proposals per 1,000 researchers		4	3	6	6	4	5
FP7							
Number of MP proposals involving…	26,181	1,622	3,989	1,993	2,719	3,802	5,766
Number of MP proposals with domestic coordinator	26,181	312	770	332	543	723	1,032
% of country's MP proposals with domestic coordinator		19%	19%	17%	20%	19%	18%
Coordinators of MP proposals per 1,000 researchers		8.6	9.8	5.9	9.8	12.1	9.8

Because of multiple Norwegian participations in some proposals, the total number of Norwegian **participations** in H2020 ICT proposals (1,580) is a third higher than the number of unique ICT proposals in which Norway is involved (1,193). These Norwegian participations represent just 1.2% of all participations in H2020 ICT proposals, which is lower than for each of the comparator countries. Even taking account of the size of the respective researcher populations, Norway still has a lower number of participations in H2020 ICT proposals (39 per 1,000 R&D personnel) than all other comparators.

Norway accounted for a similar proportion (1.1%) of all FP7 participations in ICT proposals. However, because of the longer time period covered, its participation rate (68 per 1,000 R&D personnel) was nearly twice as high as in H2020. It was still lower than most comparator countries though.

Table 91 Participations in FP7/H2020 ICT proposals from Norway and comparator countries

H2020	All	NO	SE	DK	FI	AT	NL
Number of participations in proposals	127,452	1,580	3,509	2,669	2,831	3,045	6,708
Proportion of all participations in proposals		1.2%	2.8%	2.1%	2.2%	2.4%	5.3%
Number of participations in proposals per 1,000 researchers in…		39	42	45	54	45	54
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Number of participations in proposals	216,435	2,462	6,660	3,137	4,548	5,840	10,271
Proportion of all participations in proposals		1.1%	3.1%	1.4%	2.1%	2.7%	4.7%
Number of participations in proposals per 1,000 researchers in…		67.7	84.7	56.1	82.4	97.4	97.4

Table 92 shows the distribution of H2020 ICT proposal participations between different types of actor (categorisations as used in eCorda). For Norway, it shows that two **organisation types** (HES and PRC) account for the majority (72%) of participations in ICT proposals, with REC accounting for a further 23%. Compared to other countries, the proportion of Norway's ICT proposal participations accounted for by HES and PRC is relatively low (although it is similar to the all country average), while the proportion of NO ICT proposal participations accounted for by REC is higher than all comparator countries. Norway's PUB rate is similar to the other countries and to the all country average.

The table also shows the proportion of PRC participations that are **SMEs**[273]. For Norway, the rate is 78%, which is higher than the overall average, and also higher than three of the comparator countries.

[273] Across all countries, information on whether a PRC participation is from an SME or not is only available in 78% of cases. For the percentages shown in the table, the denominator is the total population of PRCs where the status is known (i.e. SME or not).

There are 60 participations in H2020 ICT proposals from Norwegian **Hospital Trusts**[274] (4% of all participations).

Table 92 Distribution of participations in H2020 ICT proposals by organisational type

H2020	All	NO	SE	DK	FI	AT	NL
HES – Higher or secondary education	42%	42%	60%	56%	47%	40%	48%
PRC – Private for profit (excl. education)	35%	30%	29%	31%	34%	36%	34%
REC – Research organisations	17%	23%	6%	6%	14%	20%	12%
PUB – Public body (excl. REC/HES)	3%	3%	4%	5%	3%	1%	2%
OTH - Others	3%	2%	1%	2%	3%	3%	5%
Total	**127,452**	**1,580**	**3,509**	**2,669**	**2,831**	**3,045**	**6,708**
SMEs as a % of PRC	*74%*	*78%*	*72%*	*79%*	*87%*	*69%*	*76%*

The average **EC funding request** per Norwegian participation in H2020 ICT proposals was around €553k, which is slightly higher than in most of the comparator countries, but lower than in FI.

Table 93 EC contributions requested in H2020 ICT proposals

H2020	All	NO	SE	DK	FI	AT	NL
Selected participations in proposals (those with financial data)	125,511	1,561	3,468	2,642	2,795	3,022	6,640
Total EC contribution requested (€m)	€ 60,286	€ 863	€ 1,874	€ 1,421	€ 1,573	€ 1,426	€ 3,454
Average EC contribution requested per participation	€ 480,322	€ 553,025	€ 540,386	€ 537,946	€ 562,818	€ 471,812	€ 520,141

Below we compare the distribution of ICT proposal participations at the **sub-programme** level. Overall, Norway accounts for 3% of all participations in H2020 ICT proposals. However, it is much more active (relatively) in some sub-programmes, for example ADVMANU, ENF and IFRA, where it accounts for 12-15% of all ICT proposal participations in each case. By comparison, Norway only accounts for 1% of participations in ICT proposals within the ERC sub-programme.

Only in the ENV programme is Norway more active than most of the comparator countries. It is also more active than one or two of these comparators in INFRA, SECURITY, TPT, MSCA and GOV.

274 RCN provided a list of Norwegian H2020 proposal participants, with Hospital Trusts (Helseforetak) tagged. Based on unique organisation PIC numbers this information has been matched with eCorda data.

Table 94 Participation rate of Norway in H2020 ICT proposals – by sub-programme

Sub-programme		All participation	NO %	SE %	DK %	FI %	AT %	NL %
ADVMANU	Advanced manufacturing and processing	53	15%	21%	17%	28%	17%	26%
ENV	Climate action, environment, resource efficiency and raw materials	106	13%	8%	8%	15%	22%	40%
INFRA	Research infrastructures	257	12%	21%	12%	16%	23%	53%
SECURITY	Secure societies - Protecting freedom and security of Europe and its citizens	259	8%	13%	5%	13%	19%	22%
ENERGY	Secure, clean and efficient energy	418	6%	15%	18%	18%	21%	23%
TPT	Smart, green and integrated transport	423	6%	12%	4%	5%	13%	18%
HEALTH	Health, demographic change and wellbeing	2,498	5%	12%	9%	10%	9%	21%
SOCIETY	Europe in a changing world - inclusive, innovative and reflective Societies	628	5%	8%	8%	7%	15%	19%
ICT	Information and Communication Technologies	10,089	4%	8%	5%	8%	9%	14%
FET	Future and Emerging Technologies	218	4%	21%	8%	6%	17%	24%
MSCA	Marie Sklodowska-Curie actions	13,298	3%	7%	7%	3%	5%	12%
ERC	European Research Council	9,014	1%	4%	2%	3%	2%	6%
GOV	Develop the governance for the advancement of responsible research and innovation	4	0%	0%	25%	0%	50%	75%
		37,265	**3%**	**7%**	**5%**	**5%**	**6%**	**12%**

D.5.2 Success rates and participation in ICT projects

To February 2017, 145 H2020 grants had been awarded to ICT **projects** involving Norway. This represents 3% of all H2020 projects, which is lower than any of the comparator countries (each of which accounts for between 5% and 16%). Norway compares little better when one adjusts for the size of the research base in each country. Norway has been awarded 3.6 H2020 ICT projects for every 1,000 R&D personnel in the country, which is significantly lower than any of the comparator countries.

Table 95 ICT Projects (per 1,000 R&D personnel) – Norway and comparator countries

H2020	All	NO	SE	DK	FI	AT	NL
Projects	4,604	145	372	269	230	336	744
Projects per 1,000 researchers		3.6	4.5	4.6	4.4	5.0	6.0
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Projects	8,701	291	816	437	475	790	1,403
Projects per 1,000 researchers		8.0	10.4	7.8	8.6	13.2	13.3

The 145 H2020 ICT projects involving Norway came from 1,193 proposals. This equates to a **proposal success rate** of 12.2% - which is similar to the overall success rate of H2020 ICT proposals (12.4%) and slightly above the rate for FI (11.4%). However, it is lower than all other comparator countries. Norwegian success rates in FP7 ICT proposals were higher (15.2%) than in H2020, but this partly reflects higher success rates seen in FP7 overall (15.3%).

Table 96 Success rate of ICT proposals – Norway and comparator countries

H2020	All	NO	SE	DK	FI	AT	NL
Proposals	37,265	1,193	2,697	2,046	2,022	2,306	4,658
Projects	4,604	145	372	269	230	336	744
Success rate	12.4%	12.2%	13.8%	13.1%	11.4%	14.6%	16.0%
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Proposals	57,047	1,914	5,028	2,589	3,397	4,495	7,472
Projects	8,701	291	816	437	475	790	1,403
Success rate	15.3%	15.2%	16.2%	16.9%	14.0%	17.6%	18.8%

H2020 grants have been awarded to 52 ICT projects with a Norwegian **coordinator**. The equates to 1.3 projects for every 1,000 R&D personnel in the country. This rate is below that of all comparator countries. The rate (coordinators per 1,000 personnel) for Norway in FP7 compared slightly better.

Table 97 Coordinators of ICT projects (per 1,000 R&D personnel) – Norway and comparator countries

H2020	All	NO	SE	DK	FI	AT	NL
Coordinators	4,604	52	114	123	77	112	330
Coordinators per 1,000 researchers		1.3	1.4	2.1	1.5	1.7	2.7
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Coordinators	8,701	87	218	128	119	267	527
Coordinators per 1,000 researchers		2.4	2.8	2.3	2.2	4.5	5.0

The **success rate of Norwegian-coordinated** ICT proposals is 11.2% - which is slightly lower than the rate of success for ICT proposals where Norway is only a partner (12.8%). It is also slightly lower than the overall H2020 figure (12.4%), and below the rates of coordinator success achieved in most comparator countries (except FI). In FP7, Norway's success rate for coordinators was slightly better (14.4%), surpassing that achieved by SE, DK or FI.

Table 98 Success rate of ICT proposals with/without domestic coordinator – Norway and comparator countries

H2020 success rates	All	NO	SE	DK	FI	AT	NL
Proposal with domestic coordinator	12.4%	11.2%	11.9%	13.2%	8.4%	15.0%	18.0%
Proposal without domestic coordinator		12.8%	14.8%	13.1%	13.9%	14.4%	14.7%
FP7 success rates	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Proposal with domestic coordinator	15.3%	14.4%	12.1%	13.8%	9.7%	18.9%	19.2%
Proposal without domestic coordinator		15.6%	18.6%	18.6%	16.4%	17.0%	18.5%

If we look only at those H2020 ICT proposals/**projects with multiple participants** (i.e. excluding those where the coordinator is the only partner), the success rate for NO coordinators increases from 11.2% to 14.1%. This compares favourably with all comparator countries except AT.

Table 99 Success rate of multi-partner ICT proposals with domestic coordinator

H2020 – multi partner	All	NO	SE	DK	FI	AT	NL
Proposals	12,912	177	259	325	293	300	645
Projects	1,514	25	33	38	24	45	86
Success rate	11.7%	14.1%	12.7%	11.7%	8.2%	15.0%	13.3%

The 145 ICT grants awarded to Norway in H2020 involve 213 individual Norwegian **participations.** This represents 1.2% of all participations in H2020 projects, which is lower than any of the comparator countries (each of which accounts for between 2% and 7% of all participations). Even taking account of the size of the researcher base, Norway does not compare favourably with these countries. The 5 ICT participations per 1,000 R&D personnel in Norway is below the 6-9 achieved elsewhere.

Table 100 Participations in ICT projects (per 1,000 R&D personnel) – Norway and comparator countries

H2020	All	NO	SE	DK	FI	AT	NL
Participations in projects	17,255	213	510	378	325	492	1,133
Participations per 1,000 researchers		5.3	6.1	6.4	6.2	7.3	9.2
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Participations in projects	36,406	393	1,125	565	727	1,127	2,087
Participations per 1,000 researchers		10.8	14.3	10.1	13.2	18.8	19.8

The 215 Norwegian participations in successful H2020 ICT projects, from an original 1,580 participations in proposals, represents a **participation success rate** of 13.5% in H2020 so far. This is the same as the overall rate of success for all participations in ICT proposals, but below that achieved in all-but-one of the comparator countries (FI).

Table 101 Success rate of ICT participations – Norway and comparator countries

Participation success rate	All	NO	SE	DK	FI	AT	NL
H2020	13.5%	13.5%	14.5%	14.2%	11.5%	16.2%	16.9%
FP7	16.8%	16.0%	16.9%	18.0%	16.0%	19.3%	20.3%

Comparing across different **organisation types** for FP7, success rates for ICT participations were highest amongst Norwegian PUB (26%). Rates here were much higher than the overall average (17%) and than nearly all of the comparator countries. Norwegian PRC success rates were also slightly above average, but lower than all comparator countries. The success rates of Norwegian participations from the other organisation types tended not to compare well with most comparator countries.

The table also shows the success rate of **SME**-PRC participations in FP7 ICT proposals[275]. For Norway, the rate is 15%, which is the same as the FP7 average, but below that of all comparator countries.

Table 102 Success rate of ICT participations, by organisation type – Norway and comparator countries (FP7)

Participation success rate	All	NO	SE	DK	FI	AT	NL
HES – Higher or secondary education	19%	16%	20%	20%	16%	21%	24%
PRC – Private for profit (excl. education)	19%	20%	20%	22%	21%	23%	21%
REC – Research organisations	21%	18%	16%	16%	21%	22%	29%
PUB – Public body (excl. research and education)	17%	26%	24%	29%	22%	14%	22%
OTH - Others	9%	5%	5%	13%	18%	6%	14%
PRC-SMEs	*15%*	*15%*	*15%*	*19%*	*16%*	*19%*	*17%*

Comparing across different **organisation types** for H2020, success rates for ICT participations were highest amongst Norwegian public bodies (26%). Rates here were much higher than the overall average (18%) and than all of the comparator countries. Norwegian participations from PRC organisations also performed well against these comparators. Elsewhere (HES, REC), Norwegian participations achieved success rates that were slightly below the overall average, as well as below that achieved in most comparator countries.

The table also shows the success rate of **SME**-PRC participations in ICT proposals. For Norway, the rate is 14%, which is slightly above the H2020 average (12%), as well as higher than in nearly all comparator countries.

275 As mentioned previously, information on whether a PRC participant is an SME or not is only available for 78% of proposal participations and 80% of project participations. Success rates are calculated based only on those that are known.

There are 2 participations in H2020 ICT projects from **Hospital Trusts**, compared with the 60 participations in proposals from these organisations. The participation success rate for this group is therefore 3%, which is lower than for any other organisational type.

Table 103 Success rate of ICT participations, by organisation type – Norway and comparator countries (H2020)

Participation success rate	All	NO	SE	DK	FI	AT	NL
HES – Higher or secondary education	12%	10%	13%	14%	9%	14%	16%
PRC – Private for profit (excl. education)	13%	16%	17%	14%	12%	16%	16%
REC – Research organisations	16%	14%	15%	10%	15%	18%	19%
PUB – Public body (excl. research and education)	18%	26%	19%	19%	14%	23%	20%
OTH - Others	18%	15%	9%	31%	19%	26%	20%
PRC-SMEs	12%	14%	14%	12%	11%	12%	15%
Hospital Trusts		*3%*					

EC contributions to Norwegian participations in H2020 ICT projects totalled €99m, which equates to 1.3% of all funding to ICT participations to date (well below the country's overall 2% drawdown target). This is below the proportion realised by each of the other comparator countries. However, the average contribution to each Norwegian ICT participation (at €475k) is slightly higher than in FI and AT.

Table 104 EC contributions to ICT participations as a proportion of requested funding – Norway and comparator countries

H2020	All	NO	SE	DK	FI	AT	NL
Selected participations in projects (those with financial data)	169,684	209	502	365	320	485	1,115
Total EC contribution (€m)	€ 7,667	€ 99	€ 242	€ 180	€ 148	€ 211	€ 612
% of total EC contributions		1.3%	3.2%	2.4%	1.9%	2.8%	8.0%
Average EC contribution per participation	€ 45,182	€ 474,790	€ 481,202	€ 493,682	€ 461,524	€ 435,158	€ 548,479

There were 5 **sub-programmes** of FP7 where Norwegian participation success rates were above average (i.e. above the 16.0% success rate of all Norwegian participations in FP7 ICT proposals). These were the JTI, Energy, Infra, Env and Health sub-programmes. In most of these areas (with the exception of the Health sub-programme), the success rate also compared favourably with comparator country rates. In the other sub-programmes of relevance, Norwegian success rates were lower. Rates in several of these areas (People, ICT and TPT) also compare unfavourably with most comparator countries.

Table 105 ICT participation success rates in FP7 by sub-programme

Sub-programme		All	NO	SE	DK	FI	AT	NL
SP1-JTI	Joint Technology Initiatives (Annex IV-SP1)	36.3%	67.4%	46.7%	46.7%	28.7%	43.3%	27.6%
ENERGY	Energy	26.1%	50.0%	33.3%	37.5%	0.0%	150.0%	23.5%
INFRA	Research Infrastructures	36.2%	50.0%	39.7%	62.5%	46.9%	26.8%	36.4%
ENV	Environment (including Climate Change)	29.8%	45.5%	40.0%	0.0%	0.0%	40.0%	32.4%
HEALTH	Health	23.6%	16.7%	34.8%	28.6%	61.5%	16.7%	32.6%
PEOPLE	Marie-Curie Actions	17.9%	15.6%	17.4%	18.7%	14.4%	21.2%	20.1%
ICT	Information and Communication Technologies	16.6%	14.8%	16.9%	17.7%	17.0%	18.4%	19.9%
SEC	Security	12.5%	14.3%	11.4%	14.3%	0.0%	17.9%	17.1%
TPT	Transport (including Aeronautics)	32.2%	12.5%	26.2%	57.1%	20.8%	34.6%	30.6%
ERC	European Research Council	10.0%	9.5%	9.2%	8.9%	6.0%	13.1%	17.2%
		16.8%	16.0%	16.9%	18.0%	16.0%	19.3%	20.3%

Overall, EC contributions to Norwegian participations in FP7 ICT projects accounted for 1.2% of total EC contributions to relevant projects. However, there are six sub-programmes where Norway achieved a higher proportion of the total – and in particular the ENV programme, where Norway secured over 9% of the €40m in EC contributions awarded to ICT projects. In the three sub-programmes awarding most funding to ICT projects (ICT, ERC and People), Norway's share of contributions was well below that achieved in most comparator countries.

Table 106 Participations in ICT projects – proportion of total EC contributions within sub-programme, FP7

Sub-programme		All	NO	SE	DK	FI	AT	NL
ENV	Environment (including Climate Change)	€ 40	9.3%	4.2%	0.0%	0.0%	2.7%	11.0%
SEC	Security	€ 44	4.5%	3.7%	2.0%	0.0%	2.6%	5.0%
ENERGY	Energy	€ 42	3.7%	2.6%	19.6%	0.0%	2.5%	5.3%
SP1-JTI	Joint Technology Initiatives (Annex IV-SP1)	€ 115	2.5%	4.6%	1.8%	7.3%	9.8%	13.1%
ICT	Information and Communication Technologies	€ 7,854	1.4%	3.5%	1.3%	2.2%	3.5%	5.3%
HEALTH	Health	€ 53	1.3%	4.2%	0.4%	5.9%	1.0%	11.7%
ERC	European Research Council	€ 3,418	1.0%	3.3%	1.5%	1.6%	2.6%	9.1%
PEOPLE	Marie-Curie Actions	€ 2,216	0.9%	3.3%	2.8%	1.2%	2.7%	6.6%
INFRA	Research Infrastructures	€ 448	0.5%	1.8%	2.8%	2.0%	0.7%	7.5%
TPT	Transport (including Aeronautics)	€ 136	0.4%	2.7%	3.8%	0.8%	3.0%	7.1%
		€ 14,365	1.2%	3.4%	1.7%	1.9%	3.1%	6.6%

There are 5 **sub-programmes** of H2020 where Norwegian participation success rates were above average (i.e. above the 13.5% success rate of all Norwegian participations in H2020 ICT proposals). These included the ENERGY and ICT sub-programmes (where success rates were also higher than all comparator countries), as well as the ENV, TPT and INFRA sub-programmes (where NO success rates also compared well with several of the comparators). In the other sub-programmes of relevance, Norwegian success rates were lower. This is particularly true in HEALTH, SOCIETY and ADVMANU, where success rates were below 3% in each case. In these sub-programmes, Norway's success rate also tends to compare poorly with that achieved by most comparator countries.

Table 107 ICT participation success rates in H2020 by sub-programme

Sub-programme		All	NO	SE	DK	FI	AT	NL
ENERGY	Secure, clean and efficient energy	16.4%	32.8%	22.0%	20.7%	9.2%	24.6%	17.1%
ENV	Climate action, environment, resource efficiency and raw materials	28.6%	23.8%	42.9%	22.2%	10.0%	25.7%	29.2%
TPT	Smart, green and integrated transport	26.6%	23.7%	31.0%	28.6%	18.5%	21.4%	39.4%
INFRA	Research infrastructures	28.7%	21.6%	31.4%	19.5%	26.5%	20.8%	30.5%
ICT	Information & Communication Technologies	14.0%	18.1%	15.7%	17.0%	14.2%	17.3%	17.3%
FET	Future and Emerging Technologies	18.2%	12.5%	21.3%	21.1%	10.5%	21.4%	15.6%
MSCA	Marie Sklodowska-Curie actions	12.5%	10.9%	12.4%	12.9%	9.7%	15.5%	15.0%
ERC	European Research Council	14.9%	6.7%	12.1%	12.4%	10.1%	19.1%	23.5%
SECURITY	Secure societies - Protecting freedom and security of Europe and its citizens	16.3%	5.9%	17.6%	25.0%	18.2%	22.5%	12.8%
HEALTH	Health, demographic change and wellbeing	7.7%	2.6%	9.0%	10.3%	5.8%	4.8%	10.8%
SOCIETY	Europe in a changing world - inclusive, innovative and reflective Societies	5.5%	2.5%	7.8%	2.9%	3.0%	6.8%	5.2%
ADVMANU	Advanced manufacturing and processing	21.3%	0.0%	32.1%	0.0%	14.8%	6.7%	28.6%
GOV	Develop the governance for advancement of responsible research and innovation	32.1%	n/a	n/a	0.0%	n/a	50.0%	50.0%
		13.5%	**13.5%**	**14.5%**	**14.2%**	**11.5%**	**16.2%**	**16.9%**

Overall, EC contributions to Norwegian participations in H2020 ICT projects accounted for 1.3% of total EC contributions to relevant projects. However, there are four sub-programmes where Norway achieved a higher proportion of the total – and in particular the ENERGY programme, where Norway secured nearly 4% of the €540m in EC contributions awarded to ICT projects.

Table 108 Participations in ICT projects – proportion of total EC contributions within sub-programme, H2020

Sub-programme		All	NO	SE	DK	FI	AT	NL
ENERGY	Secure, clean and efficient energy	€ 540	3.9%	4.4%	3.8%	1.7%	4.3%	6.1%
ENV	Climate action, environment, resource efficiency and raw materials	€ 69	1.9%	2.7%	0.7%	1.0%	3.9%	9.1%
ICT	Information & Communication Technologies	€ 2,545	1.6%	2.9%	1.9%	2.4%	3.4%	7.3%
TPT	Smart, green and integrated transport	€ 194	1.4%	5.9%	0.9%	0.5%	1.6%	10.4%
MSCA	Marie Sklodowska-Curie actions	€ 1,255	1.2%	3.3%	3.6%	1.2%	2.2%	7.4%
HEALTH	Health, demographic change and wellbeing	€ 395	1.0%	4.6%	3.6%	1.5%	1.0%	10.9%
INFRA	Research infrastructures	€ 322	0.8%	2.1%	1.8%	2.3%	1.0%	8.3%
FET	Future and Emerging Technologies	€ 129	0.5%	4.2%	1.3%	0.7%	3.3%	3.8%
ERC	European Research Council	€ 1,945	0.5%	2.5%	2.1%	2.2%	2.3%	9.8%
SECURITY	Secure societies - Protecting freedom and security of Europe and its citizens	€ 155	0.5%	2.1%	1.0%	1.4%	4.9%	3.5%
SOCIETY	Europe in a changing world - inclusive, innovative and reflective Societies	€ 68	0.3%	2.6%	1.3%	0.9%	4.0%	3.5%
ADVMANU	Advanced manufacturing and processing	€ 49	0.0%	8.1%	0.0%	3.0%	0.5%	4.0%
GOV	Develop the governance for the advancement of responsible research and innovation	€ 1	0.0%	0.0%	0.0%	0.0%	16.2%	38.1%
		€ 7,667	1.3%	3.2%	2.4%	1.9%	2.8%	8.0%

D.6 Industry participation

D.6.1 Participation in proposals (FP7 & H2020)

Norwegian actors have contributed to the submission of 1,817 **Industry proposals** in H2020 (as of February 2017). This equates to 4.0% of all such proposals submitted to the programme during this period. This is much lower than the proportion of FP7 Industry proposals involving Norway (8.6%).

As is shown in the table below, all five comparator countries have participated in a greater number and proportion of Industry proposals than Norway, in both FP7 and H2020. However, when taking into account the relative number of R&D personnel in each country, the number of proposals involving Norway is higher than all comparator countries (except FI in H2020 and AT in FP7).

Table 109 FP7/H2020 Industry proposals involving Norway and comparator countries

H2020	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Number of proposals involving…	45,918	1,817	3,144	2,422	2,771	2,941	5,302
Proportion of all proposals involving…		4.0%	6.8%	5.3%	6.0%	6.4%	11.5%
Number of proposals per 1,000 researchers in…		45	38	41	53	44	43
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Number of proposals involving…	37,051	3,186	5,877	3,688	4,101	5,471	8,634
Proportion of all proposals involving…		8.6%	15.9%	10.0%	11.1%	14.8%	23.3%
Number of proposals per 1,000 researchers in…		87.6	74.8	65.9	74.3	91.3	81.8

In 43% of H2020 Industry proposals involving Norway, a Norwegian actor held the role of **coordinator**. This is much higher than in FP7, where 23% of Norwegian Industry proposals were led by a Norwegian coordinator (a trend reflected in other countries as well). Most comparator countries had a lower rate of coordination in both FP7 and H2020.

If we take account of the relative size of the researcher base in each country, the number of Industry proposal coordinators from Norway (19) in H2020 is above the rate for all comparator countries except FI. In FP7, the Norwegian rate (20 coordinators per 1,000 personnel) was above that of all comparators.

Table 110 FP7/H2020 Industry proposals with a "domestic" coordinator

H2020	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Number of proposals with domestic coordinator	45,918	773	1,105	965	1,282	778	1,793
% of country's proposals with domestic coordinator		43%	35%	40%	46%	26%	34%
Coordinators per 1,000 researchers		19	13	16	25	12	15
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Number of proposals with domestic coordinator	37,051	736	1,083	684	764	1,026	1,519
% of country's proposals with domestic coordinator		23%	18%	19%	19%	19%	18%
Coordinators per 1,000 researchers		20	14	12	14	17	14

Norway has participated in 1,328 **multi-partner H2020 Industry proposals**, of which it has served as the coordinator in 294 (22%). This is a higher rate than all comparator countries. The Norwegian rate of Industry proposal coordination in H2020 relative to the FTE researcher population (7), compares favourably most of the comparator countries.

Table 111 FP7/H2020 "multi-partner" (MP) Industry proposals with a "domestic" coordinator

H2020	All	NO	SE	DK	FI	AT	NL
Number of MP proposals involving…	15,552	1,328	2,340	1,771	1,874	2,548	4,235
Number of MP proposals with domestic coordinator	15,552	294	310	323	395	394	739
% of country's MP proposals with domestic coordinator		22%	13%	18%	21%	15%	17%
Coordinators of MP proposals per 1,000 researchers		7	4	5	8	6	6
FP7							
Number of MP proposals involving…	31,720	3,109	5,699	3,612	3,985	5,362	8,415
Number of MP proposals with domestic coordinator	31,720	665	913	615	656	923	1,310
% of country's MP proposals with domestic coordinator		21%	16%	17%	16%	17%	16%
Coordinators of MP proposals per 1,000 researchers		18.3	11.6	11.0	11.9	15.4	12.4

Because of multiple Norwegian participations in some proposals, the total number of Norwegian **participations** in H2020 Industry proposals (2,551) is higher than the number of unique Industry proposals in which Norway is involved (1,817). These Norwegian participations represent just 1.5% of all participations in H2020 Industry proposals, which is lower than for each of the comparator countries. However, when taking account of the size of the respective researcher populations, Norway has a higher number of participations in H2020 Industry proposals (63 per 1,000 R&D personnel) than most of the comparator countries.

Norway accounted for a similar proportion (1.7%) of all FP7 participations in Industry proposals. However, because of the longer time period covered, its participation rate (136 per 1,000 R&D personnel) was higher than in H2020.

Table 112 Participations in FP7/H2020 Industry proposals from Norway and comparator countries

H2020	All	NO	SE	DK	FI	AT	NL
Number of participations in proposals	169,634	2,551	4,397	3,354	4,076	4,137	8,257
Proportion of all participations in proposals		1.5%	2.6%	2.0%	2.4%	2.4%	4.9%
Number of participations in proposals per 1,000 researchers in…		63	53	57	78	62	67
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Number of participations in proposals	296,944	4,954	8,936	5,396	6,229	7,971	13,616
Proportion of all participations in proposals		1.7%	3.0%	1.8%	2.1%	2.7%	4.6%
Number of participations in proposals per 1,000 researchers in…		136	114	97	113	133	129

The table below shows the distribution of H2020 Health proposal participations between different types of actor (categorisations as used in eCorda). For Norway, it shows that one **organisation type** (PRC) accounts for half (48%) of participations in Industry proposals, with REC organisations accounting for a further 28%. Compared to other countries, the proportion of Norway's Industry proposal participations accounted for by REC is relatively high, while the proportion accounted for by HES organisations is relatively low.

The table also shows the proportion of PRC participations that are **SMEs**[276]. For Norway, the rate is 84%, which is higher than the overall average, and also higher than most of the comparator countries.

[276] Across all countries, information on whether a PRC participation is from an SME or not is only available in 78% of cases. For the percentages shown in the table, the denominator is the total population of PRCs where the status is known (i.e. SME or not).

There are 42 participations in H2020 Industry proposals from Norwegian **Hospital Trusts**[277] (2% of all participations).

Table 113 Distribution of participations in H2020 Industry proposals by organisational type

H2020	All	NO	SE	DK	FI	AT	NL
PRC – Private for profit (excl. education)	54%	48%	49%	51%	51%	49%	53%
REC – Research organisations	16%	28%	11%	9%	19%	21%	15%
HES – Higher or secondary education	22%	17%	33%	29%	24%	23%	24%
PUB – Public body (excl. REC/HES)	4%	4%	5%	6%	3%	2%	3%
OTH - Others	5%	2%	2%	4%	3%	5%	5%
Total	**169,634**	**2,551**	**4,397**	**3,354**	**4,076**	**4,137**	**8,257**
SMEs as a % of PRC	*81%*	*84%*	*81%*	*89%*	*89%*	*76%*	*81%*

The average **EC funding request** per Norwegian participation in H2020 Industry proposals was around €525k, which is higher than in most of the comparator countries.

Table 114 EC contributions requested in H2020 Industry proposals

H2020	All	NO	SE	DK	FI	AT	NL
Selected participations in proposals (those with financial data)	160,526	2,408	4,178	3,215	3,903	3,939	7,877
Total EC contribution requested (€m)	€ 167,728	€ 1,264	€ 2,207	€ 1,680	€ 2,068	€ 1,729	€ 3,826
Average EC contribution requested per participation	€ 1,044,865	€ 524,800	€ 528,340	€ 522,527	€ 529,866	€ 438,958	€ 485,758

Below we compare the distribution of Industry proposal participations at the **sub-programme** level. Overall, Norway accounts for 4% of all participations in H2020 Industry proposals. However, it is more active (relatively) in six sub-programmes, and in particular INFRA, where it accounts for 13% of all participations. It also accounts for a relatively high proportion of participations (compared with comparator countries) in relevant parts of the FOOD programme. By comparison, Norway only accounts for 2% of participations in Industry proposals within the NMP and SOCIETY sub-programmes.

277 RCN provided a list of Norwegian H2020 proposal participants, with Hospital Trusts (Helseforetak) tagged. Based on unique organisation PIC numbers this information has been matched with eCorda data.

Table 115 Participation rate of Norway in H2020 Industry proposals – by sub-programme

Sub-programme		All participation	NO %	SE %	DK %	FI %	AT %	NL %
INFRA	Research infrastructures	254	13%	21%	12%	16%	22%	52%
ADVMANU	Advanced manufacturing and processing	1,033	8%	17%	11%	14%	20%	28%
FOOD	Food security, sustainable agriculture and forestry, marine and maritime and inland water research	3,989	7%	6%	8%	6%	5%	13%
ADVMAT	Advanced materials	840	6%	10%	7%	8%	8%	12%
HEALTH	Health, demographic change and wellbeing	3,034	5%	11%	8%	9%	8%	19%
ENERGY	Secure, clean and efficient energy	5,738	5%	7%	7%	6%	7%	11%
SECURITY	Secure societies - Protecting freedom and security of Europe and its citizens	1,281	4%	5%	3%	5%	5%	9%
SME	Innovation in SMEs	445	4%	6%	8%	6%	8%	6%
BIOTECH	Biotechnology	1,065	4%	7%	5%	2%	5%	10%
ICT	Information and Communication Technologies	12,900	4%	7%	4%	7%	7%	12%
TPT	Smart, green and integrated transport	4,268	3%	7%	4%	4%	5%	9%
SPACE	Space	908	3%	4%	3%	4%	8%	11%
ENV	Climate action, environment, resource efficiency and raw materials	3,921	3%	6%	3%	6%	4%	9%
NMP	Nanotechnologies, Advanced Materials and Production	3,814	2%	6%	4%	4%	3%	8%
SOCIETY	Europe in a changing world - inclusive, innovative and reflective Societies	2,424	2%	3%	4%	4%	5%	7%
GOV	Develop the governance for the advancement of responsible research and innovation	4	0%	0%	25%	0%	50%	75%
		45,918	**4%**	**7%**	**5%**	**6%**	**6%**	**12%**

D.6.2 Success rates and participation in Industry projects

To February 2017, 300 H2020 grants had been awarded to Industry **projects** involving Norway. This represents 7.2% of all H2020 Industry projects, which is lower than any of the comparator countries (each of which accounts for between 9% and 20%). Norway compares much better when one adjusts for the size of the research base in each country. Norway has been awarded 7.4 H2020 Industry projects for every 1,000 R&D personnel in the country, which is higher than any of the comparator countries.

Table 116 Industry Projects (per 1,000 R&D personnel) – Norway and comparator countries

H2020	All	NO	SE	DK	FI	AT	NL
Projects	4,195	300	503	386	368	467	840
Projects per 1,000 researchers		7.4	6.0	6.6	7.1	7.0	6.8
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Projects	6,023	754	1,326	903	856	1,112	2,015
Projects per 1,000 researchers		20.7	16.9	16.1	15.5	18.6	19.1

The 300 H2020 Industry projects involving Norway came from 1,817 proposals. This equates to a **proposal success rate** of 16.5% - which is above the overall success rate of H2020 Industry proposals (9.1%), as well as above the rate achieved in all comparator countries. Norwegian success rates in FP7 Industry proposals were even higher (23.7%) than in H2020, but this partly reflects higher success rates seen in FP7 overall.

Table 117 Success rate of Industry proposals – Norway and comparator countries

H2020	All	NO	SE	DK	FI	AT	NL
Proposals	45,918	1,817	3,144	2,422	2,771	2,941	5,302
Projects	4,195	300	503	386	368	467	840
Success rate	9.1%	16.5%	16.0%	15.9%	13.3%	15.9%	15.8%
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Proposals	37,051	3,186	5,877	3,688	4,101	5,471	8,634
Projects	6,023	754	1,326	903	856	1,112	2,015
Success rate	16.3%	23.7%	22.6%	24.5%	20.9%	20.3%	23.3%

H2020 grants have been awarded to 93 Industry projects with a Norwegian **coordinator**. The equates to 2.3 projects for every 1,000 R&D personnel in the country. This rate is above that of all comparator countries. The rate (4.2 coordinators per 1,000 personnel) for Norway in FP7 also compared favourably with comparators.

Table 118 Coordinators of Industry projects (per 1,000 R&D personnel) – Norway and comparator countries

H2020	All	NO	SE	DK	FI	AT	NL
Coordinators	4,195	93	117	122	110	114	198
Coordinators per 1,000 researchers		2.3	1.4	2.1	2.1	1.7	1.6
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Coordinators	6,023	153	165	130	123	189	320
Coordinators per 1,000 researchers		4.2	2.1	2.3	2.2	3.2	3.0

The **success rate of Norwegian-coordinated** Industry proposals is 12.0% - which is much lower than the rate of success for Industry proposals where Norway is only a partner (19.8%). However, it is higher than the overall H2020 figure (9.1%), and above the rates of coordinator success achieved in all comparator countries (except AT). In FP7, Norway's success rate for coordinators was better (20.8%).

Table 119 Success rate of Industry proposals with/without domestic coordinator – Norway and comparator countries

H2020 success rates	All	NO	SE	DK	FI	AT	NL
Proposal with domestic coordinator	9.1%	12.0%	10.6%	12.6%	8.6%	14.7%	11.0%
Proposal without domestic coordinator		19.8%	18.9%	18.1%	17.3%	16.3%	18.3%
FP7 success rates	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Proposal with domestic coordinator	16.3%	20.8%	15.2%	19.0%	16.1%	18.4%	21.1%
Proposal without domestic coordinator		24.5%	24.2%	25.7%	22.0%	20.8%	23.8%

If we look only at those H2020 Industry proposals/**projects with multiple participants** (i.e. excluding those where the coordinator is the only partner), the success rate for NO coordinators increases from 12% to 18%. This compares favourably with all comparator countries except AT.

Table 120 Success rate of multi-partner Industry proposals with domestic coordinator

H2020 – multi partner	All	NO	SE	DK	FI	AT	NL
Proposals	15,552	294	310	323	395	394	739
Projects	2,204	52	44	50	40	75	130
Success rate	14.2%	17.7%	14.2%	15.5%	10.1%	19.0%	17.6%

The 300 Industry grants awarded to Norway in H2020 involve 429 individual Norwegian **participations.** This represents 1.7% of all participations in H2020 Industry projects, which is lower than any of the comparator countries. Even taking account of the size of the researcher base, Norway does not compare favourably with most of these countries. The 10.6 Industry participations per 1,000 R&D personnel in Norway is below that achieved in FI, AT or NL.

Table 121 Participations in Industry projects (per 1,000 R&D personnel) – Norway and comparator countries

H2020	All	NO	SE	DK	FI	AT	NL
Participations in projects	25,704	429	773	575	562	740	1,509
Participations per 1,000 researchers		10.6	9.3	9.8	10.8	11.0	12.3
FP7	**All**	**NO**	**SE**	**DK**	**FI**	**AT**	**NL**
Participations in projects	63,414	1,234	2,117	1,394	1,395	1,716	3,515
Participations per 1,000 researchers		33.9	26.9	24.9	25.3	28.6	33.3

The 429 Norwegian participations in successful H2020 Industry projects, from an original 2,551 participations in proposals, represents a **participation success rate** of 16.8% in H2020 so far. This is above the overall rate of success for all participations in Industry proposals (15.2%), but below that achieved in all-but-one of the comparator countries (FI).

Table 122 Success rate of Industry participations – Norway and comparator countries

Participation success rate	All	NO	SE	DK	FI	AT	NL
H2020	15.2%	16.8%	17.6%	17.1%	13.8%	17.9%	18.3%
FP7	21.4%	24.9%	23.7%	25.8%	22.4%	21.5%	25.8%

Comparing across different **organisation types** for FP7, success rates for Industry participations were highest amongst Norwegian PUB (40%). Rates here were much higher than the overall average (26%) and than nearly all of the comparator countries. . Norwegian PRC and REC success rates also compare favourably with the overall average and with most of the comparator countries, while Norwegian HES success rates are relatively low.

The table also shows the success rate of **SME**-PRC participations in FP7 Industry proposals[278]. For Norway, the rate is 26%, which is the above FP7 average (22%), as well as above that of all comparator countries.

Table 123 Success rate of Industry participations, by organisation type – Norway and comparator countries (FP7)

Participation success rate	All	NO	SE	DK	FI	AT	NL
HES – Higher or secondary education	19%	18%	23%	25%	18%	20%	22%
PRC – Private for profit (excl. education)	25%	31%	27%	30%	25%	26%	28%
REC – Research organisations	25%	28%	26%	27%	26%	23%	36%
PUB – Public body	26%	40%	37%	41%	40%	29%	30%
OTH - Others	7%	4%	3%	6%	7%	4%	8%
PRC-SMEs	*22%*	*26%*	*24%*	*26%*	*21%*	*22%*	*25%*

Comparing across different **organisation types** for H2020, success rates for Industry participations were highest amongst Norwegian public bodies (43%). Rates here were much higher than the overall average (29%) and than most of the comparator countries. The success rates of Norwegian participations from PRC and REC organisation types also tends to compare well with other countries.

The table also shows the success rate of **SME**-PRC participations in Industry proposals. For Norway, the rate is 13%, which is above the H2020 average (11%), but below that achieved in most comparator countries.

There are no participations in H2020 Industry projects from **Hospital Trusts**, despite the 42 participations in proposals from these organisations.

278 As mentioned previously, information on whether a PRC participant is an SME or not is only available for 78% of proposal participations and 80% of project participations. Success rates are calculated based only on those that are known.

Table 124 Success rate of Industry participations, by organisation type – Norway and comparator countries (H2020)

Participation success rate	All	NO	SE	DK	FI	AT	NL
HES – Higher or secondary education	13%	12%	16%	16%	10%	14%	15%
PRC – Private for profit (excl. education)	13%	15%	17%	15%	13%	18%	17%
REC – Research organisations	19%	19%	20%	18%	18%	17%	24%
PUB – Public body (excl. research and education)	29%	43%	29%	28%	26%	45%	32%
OTH - Others	22%	21%	24%	28%	24%	23%	22%
PRC-SMEs	11%	13%	14%	14%	11%	15%	15%
Hospital Trusts		0%					

EC contributions to Norwegian participations in H2020 Industry projects totalled €223m, which equates to 2.3% of all funding to Industry participations to date (slightly above the country's overall 2% drawdown target). This is below the proportion realised by each of the other comparator countries. The average contribution to each Norwegian Industry participation (at €531k) is however above that achieved by all comparator countries.

Table 125 EC contributions to Industry participations as a proportion of requested funding – Norway and comparator countries

H2020	All	NO	SE	DK	FI	AT	NL
Selected participations in projects (those with financial data)	25,014	420	749	557	550	718	1,473
Total EC contribution (€m)	€ 9,562	€ 223	€ 338	€ 244	€ 245	€ 300	€ 668
% of total EC contributions		2.3%	3.5%	2.6%	2.6%	3.1%	7.0%
Average EC contribution per participation	€ 382,250	€ 531,176	€ 451,788	€ 438,689	€ 446,333	€ 417,989	€ 453,433

There were 7 **sub-programmes** of FP7 where Norwegian participation success rates were above average (i.e. above the 24.9% success rate of all Norwegian participations in FP7 Industry proposals). This included the JTI, Infra, Energy and Env sub-programmes, where Norwegian success rates were also above average and above that achieved in most comparator countries. Norwegian success rates in TPT, NMP and Health were above the Norwegian average, but tended to be below the rates seen in comparator countries.

Norwegian success rates in the other sub-programmes of relevance were lower (i.e. below the 24.9% success rate of all Norwegian participations in FP7 industry proposals). However, in certain areas (e.g. SME, KBBE and SEC sub-programmes), these rates still compared favourably with comparator countries.

Table 126 Industry participation success rates in FP7 by sub-programme

Sub-programme		All	NO	SE	DK	FI	AT	NL
SP1-JTI	Joint Technology Initiatives (Annex IV-SP1)	37.6%	60.9%	48.7%	56.5%	32.8%	38.6%	29.9%
INFRA	Research Infrastructures	36.4%	52.4%	38.1%	64.5%	46.7%	26.9%	36.4%
ENERGY	Energy	26.7%	37.6%	28.1%	34.4%	28.8%	25.6%	31.7%
ENV	Environment (including Climate Change)	20.9%	37.3%	20.6%	25.2%	15.3%	20.6%	29.4%
TPT	Transport (including Aeronautics)	31.6%	31.2%	39.4%	37.4%	33.1%	33.6%	36.7%
NMP	Nanosciences, Nanotechnologies, Materials and new Production Technologies	28.3%	28.1%	27.8%	33.0%	29.7%	29.1%	33.6%
HEALTH	Health	22.8%	25.0%	25.3%	29.0%	33.0%	25.2%	23.6%
SME	Research for the benefit of SMEs	18.3%	24.7%	21.0%	20.0%	18.3%	14.9%	19.4%
KBBE	Food, Agriculture, and Biotechnology	22.3%	24.3%	22.2%	27.1%	21.6%	22.0%	30.2%
ICT	Information and Communication Technologies	16.8%	15.6%	17.6%	17.4%	17.7%	18.4%	20.3%
SEC	Security	12.5%	14.3%	11.4%	14.3%	0.0%	17.9%	17.1%
SSH	Socio-economic sciences and Humanities	9.4%	0.0%	0.0%	0.0%	14.3%	40.0%	0.0%
		21.4%	24.9%	23.7%	25.8%	22.4%	21.5%	25.8%

Overall, EC contributions to Norwegian participations in FP7 Industry projects accounted for 2.1% of total EC contributions to relevant projects. However, there are six sub-programmes where Norway achieved a higher proportion of the total – and in particular the ENV programme, where Norway secured nearly 8% of the €365m in EC contributions awarded to Industry projects. Funding secured by Norway in the SEC, SME and Energy programmes was also greater than in most comparator countries. In the three sub-programmes awarding most funding to Industry projects (ICT, NMP and KBBE), Norway's share of contributions was below that achieved in most comparator countries.

Table 127 Participations in Industry projects – proportion of total EC contributions within sub-programme, FP7

Sub-programme		All	NO	SE	DK	FI	AT	NL
ENV	Environment (including Climate Change)	€ 365	7.8%	2.2%	3.6%	1.1%	1.8%	8.4%
SEC	Security	€ 44	4.5%	3.7%	2.0%	0.0%	2.6%	5.0%
SME	Research for the benefit of SMEs	€ 1,249	4.3%	2.5%	3.0%	1.6%	1.7%	3.8%
ENERGY	Energy	€ 1,707	3.6%	3.4%	5.4%	2.5%	3.2%	6.6%
SP1-JTI	Joint Technology Initiatives (Annex IV-SP1)	€ 709	2.7%	3.0%	4.8%	2.6%	3.0%	5.2%
KBBE	Food, Agriculture, and Biotechnology	€ 1,825	2.3%	3.0%	4.6%	2.5%	2.2%	10.6%
TPT	Transport (including Aeronautics)	€ 1,183	2.1%	6.0%	2.0%	2.1%	3.3%	6.1%
NMP	Nanosciences, Nanotechnologies, Materials and new Production Technologies	€ 3,189	1.5%	4.2%	2.5%	3.1%	2.3%	5.6%
ICT	Information and Communication Technologies	€ 7,213	1.4%	3.4%	1.3%	2.3%	3.5%	5.4%
HEALTH	Health	€ 624	1.0%	5.6%	3.4%	1.9%	2.6%	9.9%
INFRA	Research Infrastructures	€ 436	0.5%	1.6%	2.9%	2.0%	0.7%	7.6%
SSH	Socio-economic sciences and Humanities	€ 2	0.0%	0.0%	0.0%	4.6%	9.0%	0.0%
		€ 18,546	2.1%	3.6%	2.7%	2.4%	2.9%	6.2%

There are 9 **sub-programmes** of H2020 where Norwegian participation success rates were above average (i.e. above the 16.8% success rate of all Norwegian participations in H2020 Industry proposals). In particular, success rates above 20% were seen in the SME, ENV, FOOD, INFRA, BIOTECH and TPT sub-programmes. In other sub-programmes (especially SECURITY, HEALTH and SOCIETY) success rates were much lower (<10%).

In the ENV, FOOD, BIOTECH, ADVMAT, ICT and ENERGY programme, the success rates of Norway compare well with the majority of comparator countries. By comparison, Norwegian success rates were below that of all comparator countries in TPT, SPACE, SECURITY, HEALTH and SOCIETY.

Table 128 Industry participation success rates in H2020 by sub-programme

Sub-programme		All	NO	SE	DK	FI	AT	NL
SME	Innovation in SMEs	55.1%	34.8%	54.8%	33.3%	25.0%	44.8%	34.8%
ENV	Climate action, environment, resource efficiency and raw materials	18.7%	22.2%	18.6%	27.9%	16.2%	20.3%	21.3%
FOOD	Food security, sustainable agriculture and forestry, marine and maritime and inland water research	18.4%	21.7%	25.3%	19.1%	20.3%	18.3%	23.9%
INFRA	Research infrastructures	25.4%	21.6%	31.4%	12.8%	26.5%	17.1%	28.6%
BIOTECH	Biotechnology	11.1%	21.6%	8.8%	14.7%	10.0%	11.3%	14.6%
TPT	Smart, green and integrated transport	24.0%	21.0%	26.3%	30.3%	25.1%	32.2%	30.1%
ADVMAT	Advanced materials	17.6%	20.3%	22.0%	16.9%	14.3%	14.0%	20.6%
ICT	Information and Communication Technologies	13.6%	17.8%	15.2%	16.0%	13.2%	17.5%	16.8%
ENERGY	Secure, clean and efficient energy	16.1%	17.4%	20.4%	18.9%	13.3%	20.5%	18.6%
NMP	Nanotechnologies, Advanced Materials and Production	10.1%	14.3%	9.2%	12.0%	9.0%	17.6%	14.5%
SPACE	Space	17.4%	12.5%	15.6%	17.2%	13.2%	14.4%	15.5%
ADVMANU	Advanced manufacturing and processing	14.2%	12.3%	17.3%	8.4%	14.0%	13.8%	14.7%
SECURITY	Secure societies - Protecting freedom and security of Europe and its citizens	13.8%	7.5%	15.8%	27.3%	15.3%	21.4%	12.8%
HEALTH	Health, demographic change and wellbeing	8.1%	3.0%	9.5%	10.8%	5.7%	5.2%	11.2%
SOCIETY	Europe in a changing world - inclusive, innovative and reflective Societies	4.9%	1.8%	5.6%	2.6%	5.6%	6.9%	6.8%
GOV	Develop the governance for the advancement of responsible research and innovation	32.1%	n/a	n/a	0.0%	n/a	50.0%	50.0%
		15.2%	**16.8%**	**17.6%**	**17.1%**	**13.8%**	**17.9%**	**18.3%**

Overall, EC contributions to Norwegian participations in H2020 Industry projects accounted for 2.3% of total EC contributions to relevant projects. However, there are five sub-programmes where Norway achieved a higher proportion of the total – and in particular the SME and FOOD sub-programmes where Norway secured nearly 7% of €74m and €830m (respectively in EC contributions awarded to Industry projects. In the three sub-programmes awarding most funding to Industry projects (ENERGY, ICT and TPT), Norway's share of contributions was below that achieved in most comparator countries.

Table 129 Participations in Industry projects – proportion of total EC contributions within sub-programme, H2020

Sub-programme		All	NO	SE	DK	FI	AT	NL
SME	Innovation in SMEs	€ 74	7.0%	1.9%	1.1%	0.5%	2.0%	3.4%
FOOD	Food security, sustainable agriculture and forestry, marine and maritime and inland water research	€ 830	6.6%	4.0%	3.2%	2.4%	1.4%	8.9%
BIOTECH	Biotechnology	€ 148	4.3%	3.6%	4.3%	2.3%	2.5%	9.5%
ENERGY	Secure, clean and efficient energy	€ 1,670	2.7%	4.0%	4.2%	2.7%	4.0%	6.4%
ADVMAT	Advanced materials	€ 335	2.6%	4.4%	1.4%	2.5%	2.8%	2.4%
ENV	Climate action, environment, resource efficiency and raw materials	€ 620	2.1%	3.0%	2.1%	3.5%	2.4%	7.8%
ADVMANU	Advanced manufacturing and processing	€ 639	2.0%	3.8%	0.9%	3.2%	3.2%	5.9%
NMP	Nanotechnologies, Advanced Materials and Production	€ 374	1.8%	3.0%	2.4%	1.4%	3.9%	6.7%
ICT	Information and Communication Technologies	€ 2,630	1.6%	2.8%	1.8%	2.5%	3.4%	7.1%
TPT	Smart, green and integrated transport	€ 1,131	1.6%	4.1%	3.0%	2.5%	4.1%	6.4%
INFRA	Research infrastructures	€ 228	1.1%	3.0%	0.6%	3.3%	1.4%	9.1%
SPACE	Space	€ 142	0.9%	1.1%	0.9%	2.6%	2.5%	3.0%
HEALTH	Health, demographic change and wellbeing	€ 450	0.9%	5.6%	4.0%	1.3%	0.9%	11.3%
SECURITY	Secure societies - Protecting freedom and security of Europe and its citizens	€ 197	0.5%	3.0%	1.7%	2.9%	3.9%	3.9%
SOCIETY	Europe in a changing world - inclusive, innovative and reflective Societies	€ 92	0.2%	1.9%	1.0%	3.3%	3.4%	7.3%
GOV	Develop the governance for the advancement of responsible research and innovation	€ 1	0.0%	0.0%	0.0%	0.0%	16.2%	38.1%
		€ 9,562	**2.3%**	**3.5%**	**2.6%**	**2.6%**	**3.1%**	**7.0%**

D.6.3 Data on additional EU funding for industry: Eurostars

Based on discussion with NCPs we have identified several other programmes with Norwegian participation, beyond that identifiable within eCorda. These are the Eurostars programme (for innovative projects led by R&D performing SMEs) and three Joint Programming Initiatives relating to Health (AAL, JPND and AMR). We present below a brief analysis of available Norwegian participation data for these programmes, to complement the main FP/H2020 analysis.

The first additional data source lists **139 Norwegian participations in 135 EUROSTARS projects starting between 2008 and 2016** (this excludes one participation marked as "withdrawn"). On average, there have been **15-16 new participations each year**. However, there is quite some variability (from 3 new participations in 2008 to 31 new participations in 2016). While there is no consistent trend over the years, the four most recent years (2013-16) have seen an average of 21 participations started each year, compared to 11 in the first five years of the period. This suggests an **increase in Norwegian involvement in the programme** over time. However, we have no data on the number of proposal submitted, nor of the number of grants awarded overall, both of which would be useful to better understand possible trends.

The Norwegian projects **last for around 3 years on average**, meaning that most of those started in the last few years are yet to complete. In fact, just under half (49%) of the listed projects had completed at the time of data extraction, while the remainder were ongoing.

Budgets for Norwegian participations in EUROSTARS projects range from NOK71k to NOK21.2m, with an **average per participation budget of NOK3.7m** (six participations have budgets that are negative or zero and have therefore been excluded from this analysis).

There are just **107 separate Norwegian organisations** listed, meaning that some (n=16) appear more than once. Those with 4 or more entries are: Pubgene AS (6); Corticalis AS (4); Novelda AS (4); and Smerud Medical Research International AS (4).

Unsurprisingly, the participating organisations are **almost entirely from Industry** (93%), while just 10 participations are accounted for by other types of organisation: RCN (3); Technical-Industrial Institutes (3); Regional Health Authorities (2); Universities (1) and Other (1).

The following table shows the distribution of Norwegian participations and associated budgets by "area". This excludes the six zero/negative budget projects. It shows that the great majority of participations (84%) and budget (83%) is **concentrated in three areas: industry, information and communication and (particularly) professional, scientific and technical services**. More detailed sectoral breakdowns are also available, but not detailed here.

Table 130 Total number of Norwegian EUROSTARS participations and budget, 2008-16, by "area"

Industry Area of Participant	Participations	Total budget
Professional, scientific and technical services	57	233,705,800
Industry	32	92,693,903
Information and communication	23	85,361,000
Wholesale trade, repair of motor vehicles	10	29,352,100
Health and social services	6	22,441,533
Public administration and defence, and social security schemes	1	8,649,957
Mining and extraction	1	8,510,000
Agriculture, forestry and fishing	2	7,598,000
Electricity, gas, steam and hot water supply	1	7,315,000
Instruction	1	1,376,000
Total	**134**	**497,003,293**

D.7 Analysis of proposal score and ranking

The eCorda H2020 proposals database includes an overall score and ranking for each proposal, as well as a separate classification that indicates the outcome of the proposal evaluation process ("EC Decision Status"). This classifies proposals into three main groups:

1. **Mainlisted** – Likely to be funded
2. **Reserve** (or No-money) – Above threshold, but unlikely to be funded
3. **Rejected** (or Ineligible/Inadmissible) – Below threshold and will not be funded

Within a given call, the split of proposals between these three groups largely follows the ranked order of scores (i.e. the highest scored proposals tend to be in group 1 and the lowest scored in group 3) – however, there are many cases where this is not true. In fact, for the majority of calls, the highest score achieved amongst reserve list proposals is greater than the lowest score achieved amongst those that are mainlisted. Given these inconsistencies, there is little to be gained from analysing the scores of those proposals that are not mainlisted, to understand how close (or how far) they were from being funded (given that many score better than some of those that have been mainlisted).

Instead, we have limited our analysis to the three broad categorisations in an effort to understand whether unsuccessful Norwegian proposals (those not mainlisted) have still scored reasonably well (reserve list) and therefore with enhanced advisory/support services, might have been honed to be successful. Or whether they have not scored well (rejected) and arguably should not have been written/submitted at all.

Overall, 15.2% of Norwegian proposal participations were mainlisted (a slightly lower proportion than NL and AT, but above that seen in SE, DK or FI). Of the remainder, 44% were above threshold ("reserve") and 56% were below threshold ("rejected"). Compared with most comparator countries, Norwegian proposal participations were more likely to fall within the latter category, suggesting that on average

their non-mainlisted proposals tended to score less well than in the comparators. However, the differences between the countries are often not very large.

More generally, it is interesting to note the high proportion of proposal participations (in Norway, and to a lesser extent in the comparator countries) are rejected. Overall in H2020, 52% of Norwegian proposal participations (or 56% of those not mainlisted) are "rejected", meaning that their score was "below threshold" and therefore insufficient to be considered for funding.

Table 131 Proportion of non-mainlisted H2020 proposal participations classified as "reserve" or "rejected".

Status	NO	SE	DK	FI	NL	AT
% reserve	44.4%	46.1%	49.1%	40.0%	49.0%	44.6%
% rejected	55.6%	53.9%	50.9%	60.0%	51.0%	55.4%

The following table shows the same data, but only for proposal coordinators. Overall (across all countries shown) the proportion of non-mainlisted participations that are rejected is greater according to this measure (than when including non-coordinators as well). This is likely to be a reflection of the high rejection rate in the ERC programme (see later), which accounts for a high proportion of coordinators (of single partner projects). Despite this, the overall pattern is similar to all proposal participations, with Norway seeing a higher rate of rejection (64%) than four out of five comparator countries (again, suggesting its non-mainlisted proposals tend to score less well than comparators).

Table 132 Proportion of non-mainlisted H2020 proposal participations classified as "reserve" or "rejected" – coordinators only.

Status	NO	SE	DK	FI	NL	AT
% reserve	36.2%	39.3%	48.6%	32.4%	43.5%	38.5%
% rejected	63.8%	60.7%	51.4%	67.6%	56.5%	61.5%

The following table looks at even more specific group; HEI coordinators. Again, the pattern is similar, although Norway also does slightly better than Austria on this measure.

Table 133 Proportion of non-mainlisted H2020 proposal participations classified as "reserve" or "rejected" – HEI coordinators only.

Status	NO	SE	DK	FI	NL	AT
% reserve	47.9%	48.0%	60.4%	36.9%	52.8%	46.9%
% rejected	52.1%	52.0%	39.6%	63.1%	47.2%	53.1%

Where the real differences lie is at the sub-programme level. Here, Norway's rejection:reserve rate varies between 12%:88% (Genderdereq) and 100%:0% (Riskfinance). There are also some clear differences between Norway's experience and that of comparator countries.

The following table shows the proportion of Norwegian non-mainlisted proposal participations that are in the "reserve list", as well as the same figure for the five comparator countries (combined). The final column then indicates the (percentage point) difference between the two.

Where there is a positive difference (those at the top of the table), Norway's non-mainlisted proposals are more likely to be on the reserve list than is the case across the comparator countries. This is an indication that Norway's unsuccessful proposals tend to be stronger (on average) than those of the comparators in these areas.

Where there is a negative difference (e.g. in the ICT and Health programmes), Norway's non-mainlisted proposals are less likely to be on the reserve list than is the case in comparator countries. This suggests that the unsuccessful Norwegian proposals (on average) tend to be weaker in these areas.

Table 134 Proportion of non-mainlisted H2020 proposal participations classified as "reserve" - by sub-programme.

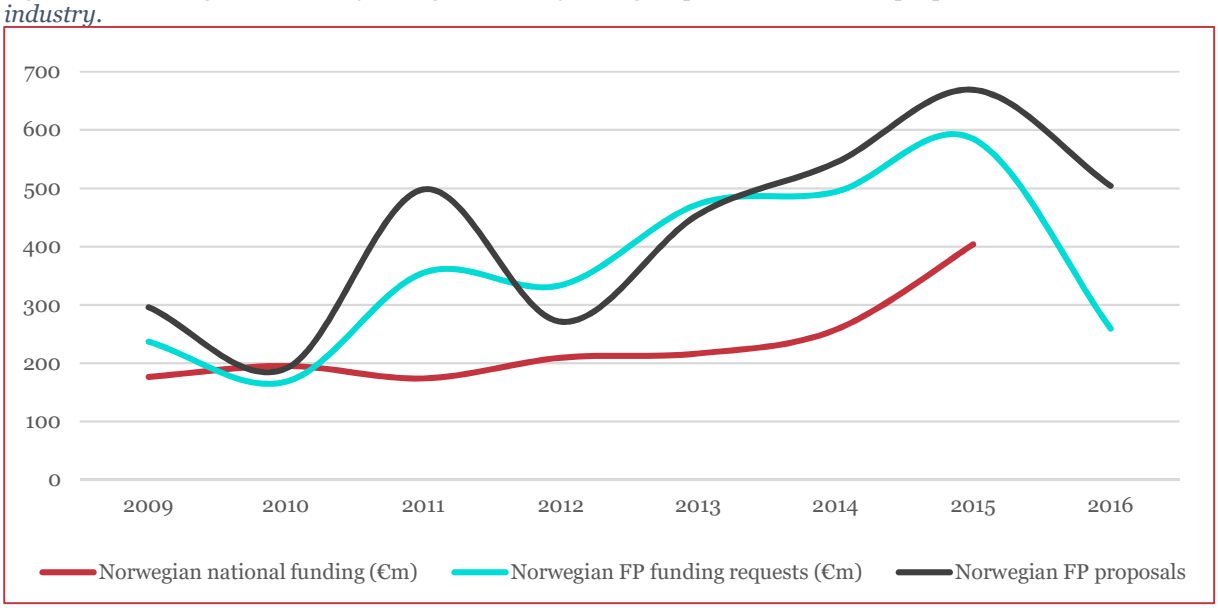
	Norway	Five comparator countries	% point Difference
GENDEREQ	88%	59%	28%
SCIENCE	75%	49%	26%
GOV	65%	46%	19%
INEGSOC	64%	55%	9%
ENV	50%	41%	9%
SPACE	67%	60%	7%
INFRA	82%	75%	7%
TPT	38%	31%	6%
NMP	24%	20%	4%
SOCIETY	58%	54%	4%
CAREER	70%	67%	3%
ADVMANU	16%	12%	3%
SECURITY	53%	52%	2%
ENERGY	23%	24%	-1%
FOOD	46%	49%	-2%
MSCA	81%	84%	-2%
HEALTH	22%	26%	-4%
ICT	40%	45%	-6%
WIDESPREAD	44%	50%	-6%
BIOTECH	17%	23%	-6%
CROSST	18%	24%	-6%
ERC	15%	23%	-8%
FET	37%	46%	-9%
SME	42%	54%	-12%
ADVMAT	6%	19%	-14%
TWINING	39%	56%	-17%
EURATOM	60%	78%	-18%
RISKFINANCE	0%	69%	-69%

Appendix E Covariance between national R&I funding and FP participation

We have explored whether changes in Norwegian national funding have a behavioural effect on Norwegian organisations with respect to their level of participation in FP7/H2020 proposals. More specifically, we have analysed the extent to which there is a covariance between changes in national funding and changes in either: (i) the number of proposals submitted by Norwegian organisations to FP7/H2020; or (ii) the value of EC contributions requested in these proposals. The analysis focuses on proposal activity, rather than grants or funds awarded, as we are trying to examine the effect of national funding levels on Norwegian demand for European funding. Our analysis is based on two main sources: (1) data on national funding by type of organisation for each of the three priority areas: health, ICT and industry[279]; and (2) information provided by RCN on FP proposals, which is an augmented version of the eCorda data used elsewhere in this report[280].

Figure 134 shows total Norwegian national funding for health-, ICT- and industry-related research (combined) each year from 2009 to 2015[281], alongside the total number of Norwegian proposals to FP7/H2020 in these thematic areas and the total amount of funding requested by Norwegian participants in these proposals over the period to 2016. It shows that while national funding has seen a gradual increase throughout much of the period (rising by ~85% between 2009 and 2015), annual levels of Norwegian FP activity have been more variable – likely in part reflecting the variable nature of FP calls across the programme period. However, it is interesting to note that in the one year that there was a fall in total national funding (from €578m in 2010 to €550m in 2011) there was a spike in both FP proposals and total FP funding requests.

Figure 134 Norwegian national funding (€m), FP funding request (€m) and FP proposals in health, ICT and industry.



Source: Technopolis analysis of Norwegian funding and eCorda data.

279 RCN funding data is used for ICT- and industry-related research. For health-related research, we have combined RCN funding data with data from the Norwegian Cancer Society and information on competitive funding from Regional Health Authorities. National funding data and FP funding requests are reported in full the start year of the project/proposed project.

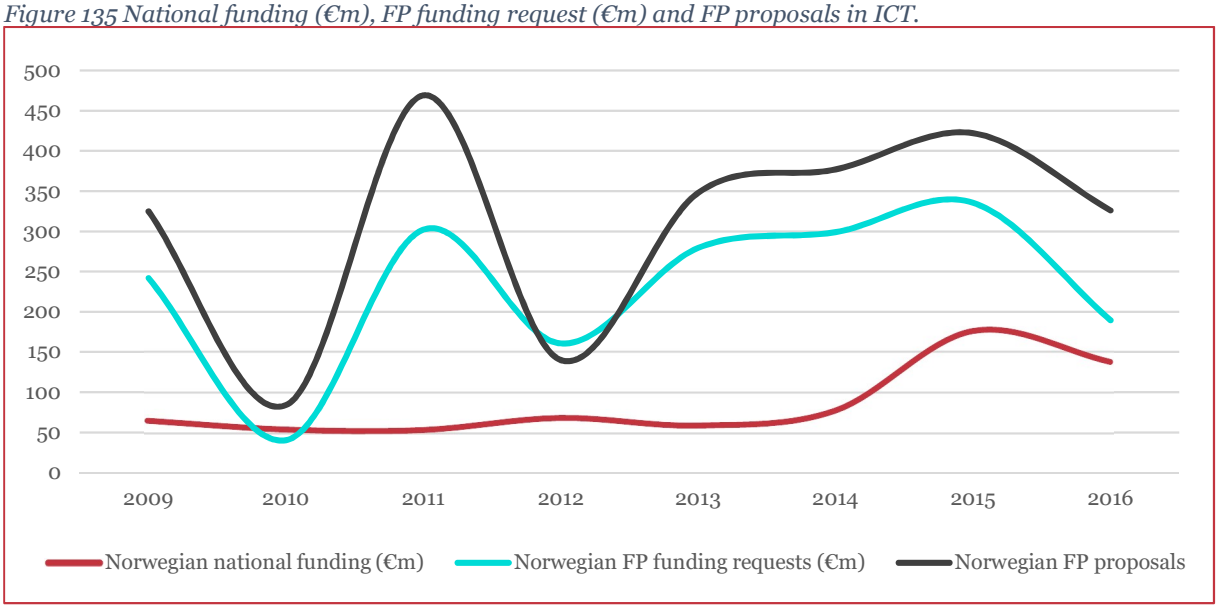
280 This source was used as it contains information on Norwegian organisations that is not contained within the main eCorda database used in our main analysis (e.g. on the type of organisations using the typology used in the Norwegian system).

281 2016 national funding data for the health area is incomplete and so domestic funding is only shown for 2009–2015.

In most years, the total Norwegian request for FP funding for health-, ICT- and industry-related research (combined) exceeded the value of national funding in these thematic areas, though obviously only a small proportion of the FP funding will eventually be realised, as only a minority of requests will be successful.

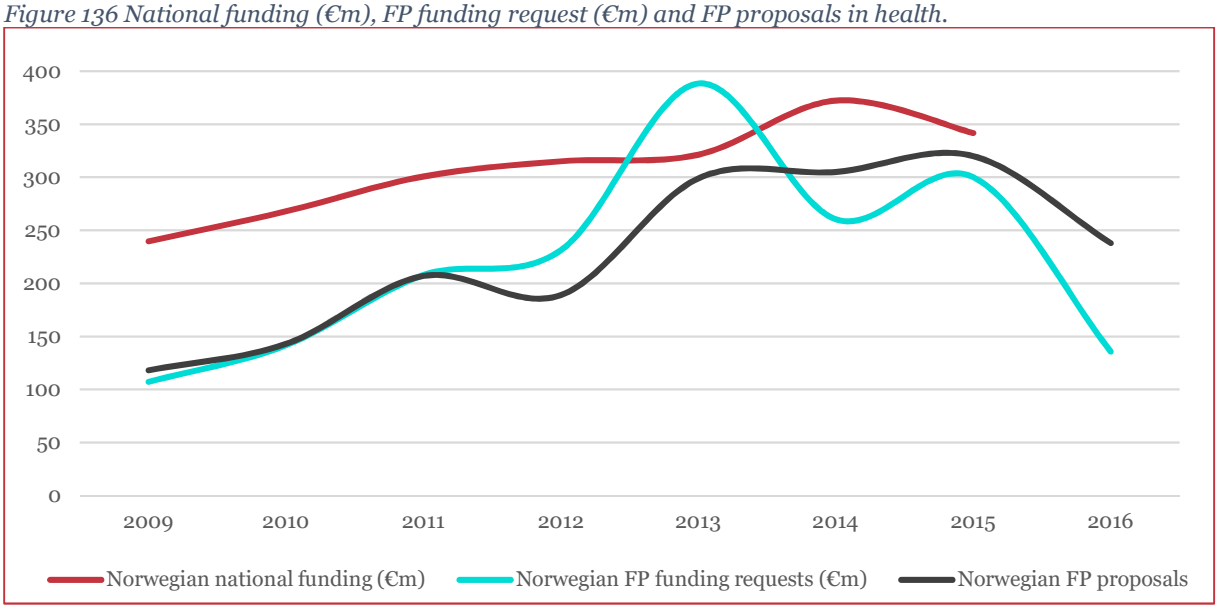
If we examine the same data split between health-, ICT- and industry-related research, there are some clear differences between the thematic areas, Figure 135–Figure 137. In particular, the overall scale of national funding for both health and industry research is much greater than for ICT across the period. Also, while FP funding requests in the health area tend to be much lower than total national funding in most years (three quarters of the national funding level on average across the period), FP funding requests in the ICT area tend to be much higher (twice the national funding level on average). These factors combined suggest that Norwegian ICT research is much more dependent on European, rather than national funding, when compared with Norwegian health research (although in both cases the final FP grant award is likely to be lower than overall national funding).

Figure 135 National funding (€m), FP funding request (€m) and FP proposals in ICT.



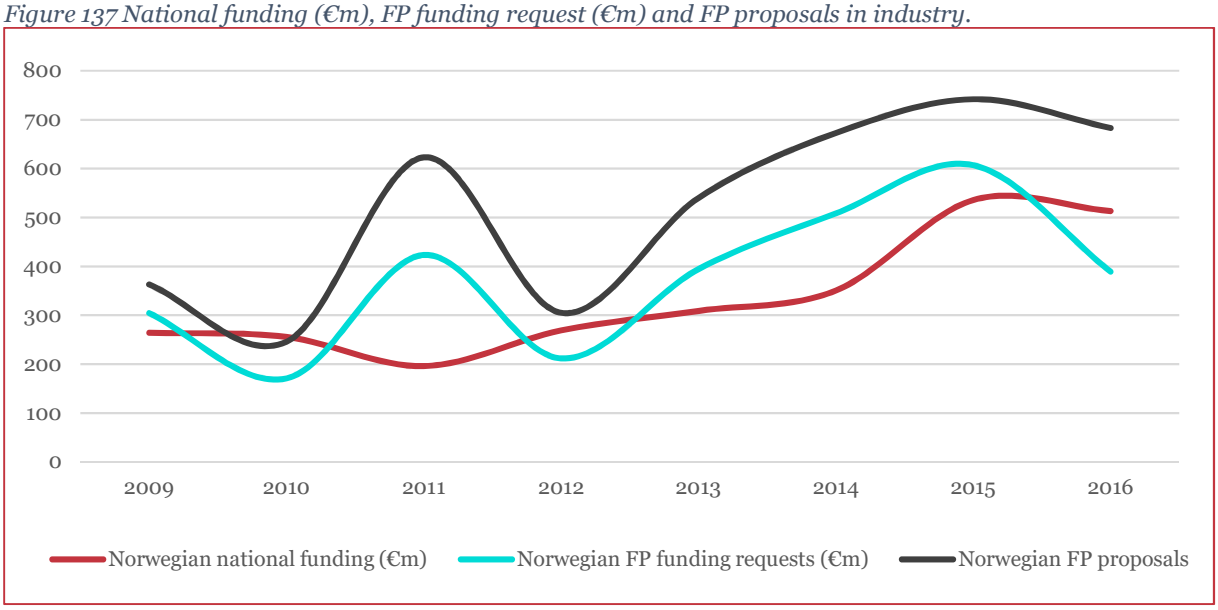
Source: Technopolis analysis of Norwegian funding and eCorda data.

Figure 136 National funding (€m), FP funding request (€m) and FP proposals in health.



Source: Technopolis analysis of Norwegian funding and eCorda data.

Figure 137 National funding (€m), FP funding request (€m) and FP proposals in industry.

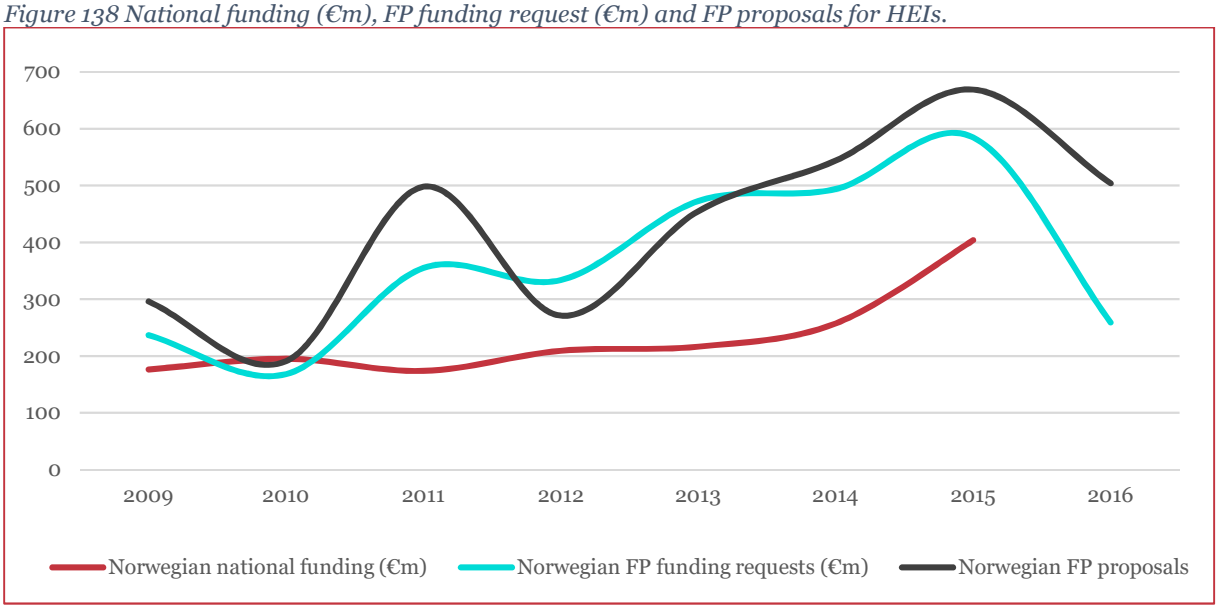


Source: Technopolis analysis of Norwegian funding and eCorda data.

In Figure 138–Figure 141, we show national funding in the three thematic areas (combined) by stakeholder category, alongside the FP activity in the same years. All stakeholder categories have seen an overall increase in national funding across the period as whole (between 2009 and 2015 national funding increased by 129% for HEIs, 78% for institutes, 86% for hospital trusts and 42% for industry,). However, the trend has not been continuous and each stakeholder category has also seen year on year declines at certain points in the period.[282]

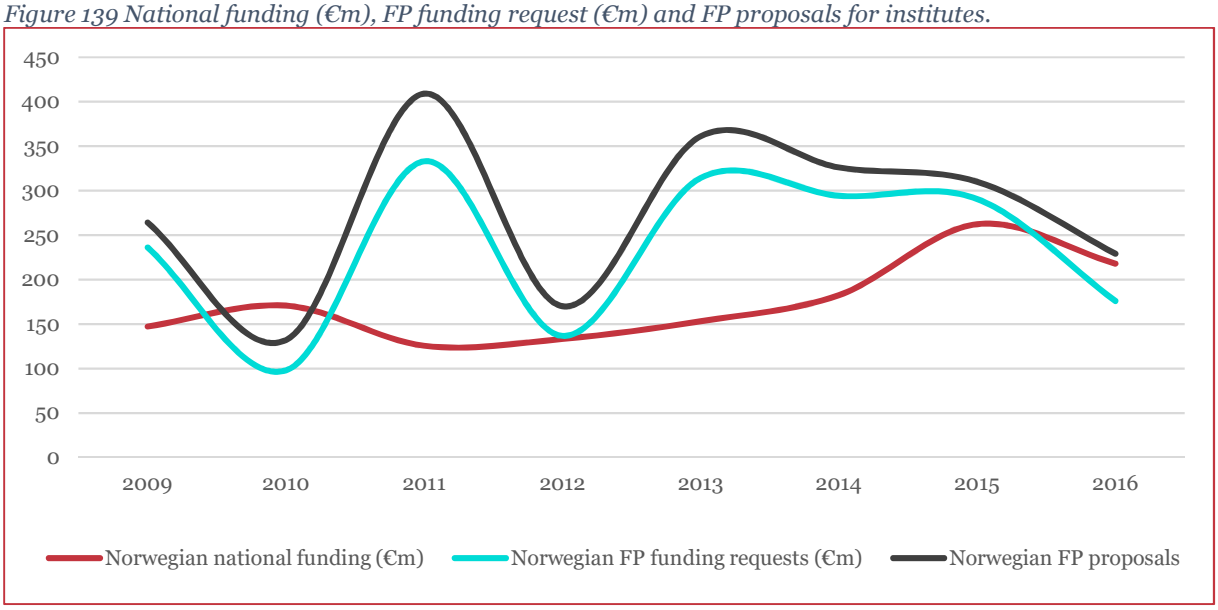
[282] The increase in national funding in 2015 is in large part explained by a third wave of 17 Competence Centres (SFI-III) that were awarded in 2015, ten hosted by HEIs, six by institutes and one by a hospital trust. Moreover, eight Centres for Environment-friendly Energy Research (FME) were awarded in 2016, three hosted by HEIs and five by institutes.

Figure 138 National funding (€m), FP funding request (€m) and FP proposals for HEIs.



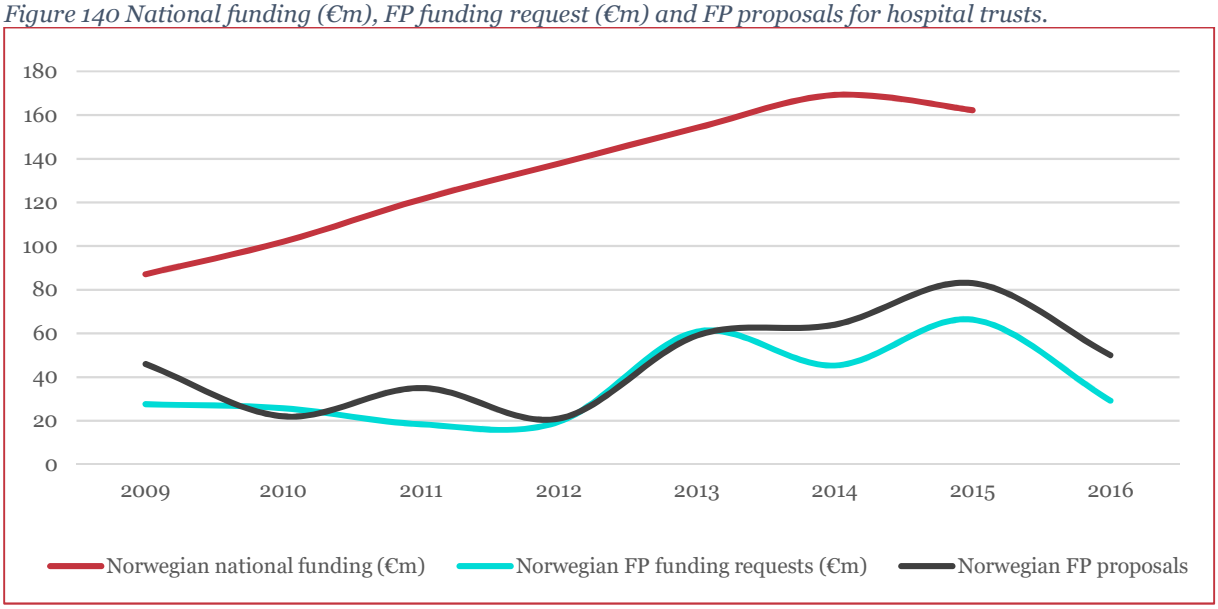
Source: Technopolis analysis of Norwegian funding and eCorda data.

Figure 139 National funding (€m), FP funding request (€m) and FP proposals for institutes.



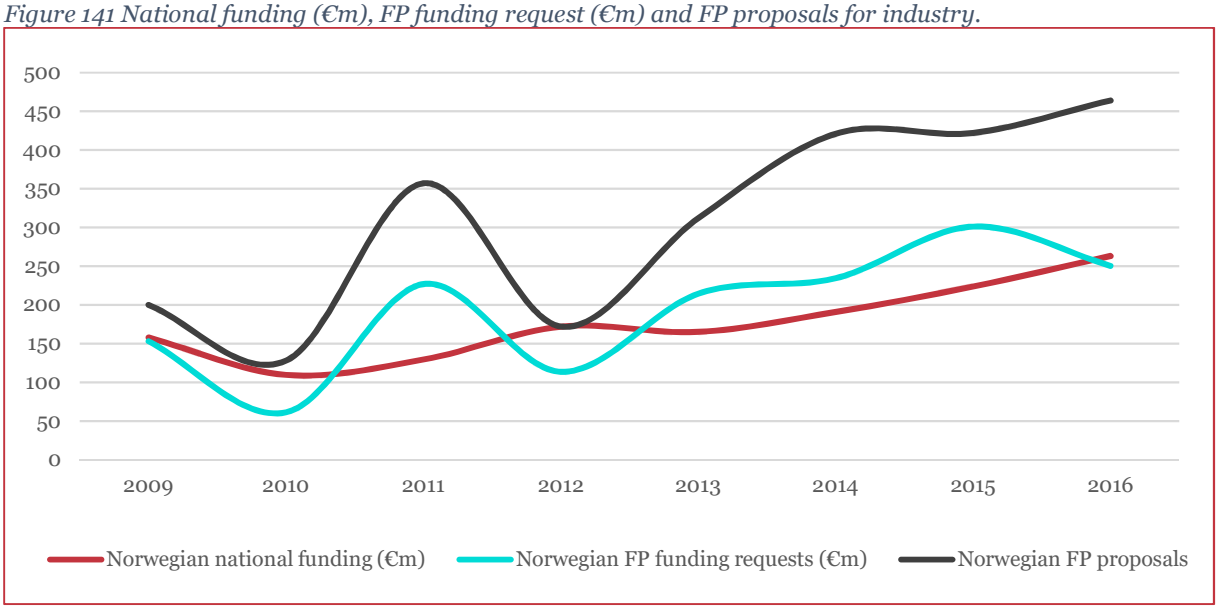
Source: Technopolis analysis of Norwegian funding and eCorda data.

Figure 140 National funding (€m), FP funding request (€m) and FP proposals for hospital trusts.



Source: Technopolis analysis of Norwegian funding and eCorda data.

Figure 141 National funding (€m), FP funding request (€m) and FP proposals for industry.



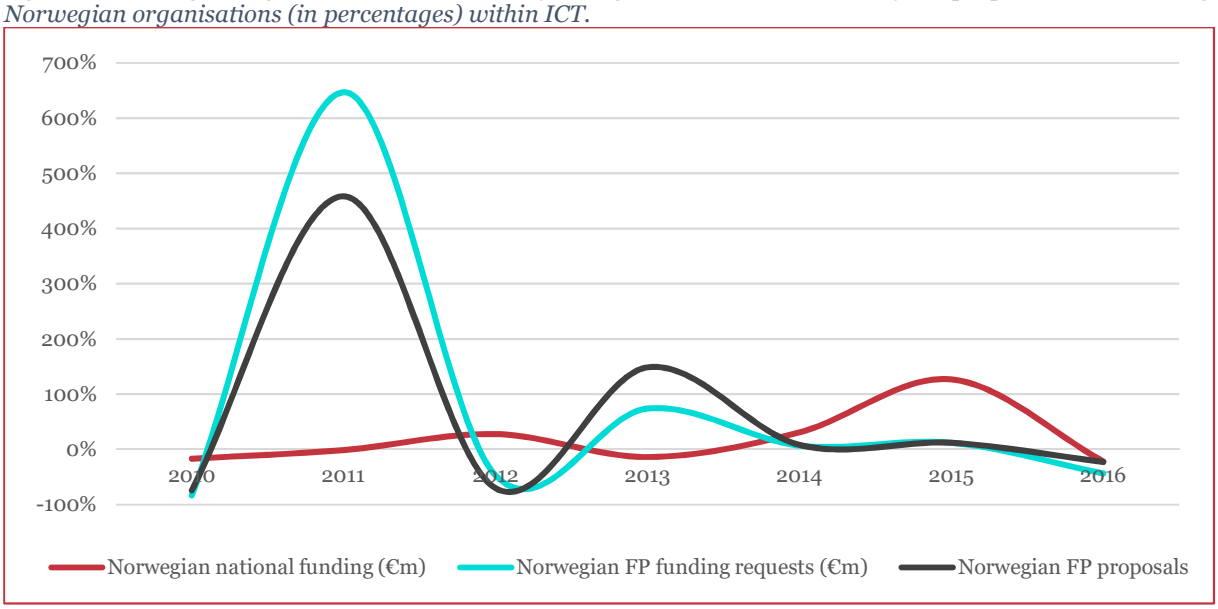
Source: Technopolis analysis of Norwegian funding and eCorda data.

To look for evidence of covariance between national funding and FP proposal activity, we have plotted annual changes in national funding (e.g. % increase/decrease from one year to the next), as well as annual changes in FP proposals and funding requests, for each of the three thematic areas, see Figure 142–Figure 144. In all three cases, there would appear to be a tendency for national funding and demand for European funding to often move counter to each other. So, when national funding in a thematic area increases in a year (or increases more rapidly than it did the year before), then FP proposals and EC contributions in this thematic area tend to decrease (or increase more slowly than they did the year before), and vice versa. One might have expected a time lag between a fall in national funding and an increase in FP activity, rather than this occurring in the same year. However, if a fall in national funding is anticipated (e.g. through absence of calls for proposals or budget announcements the preceding year)

then it is entirely feasible that Norwegian actors will be able to react with increased European proposal activity.

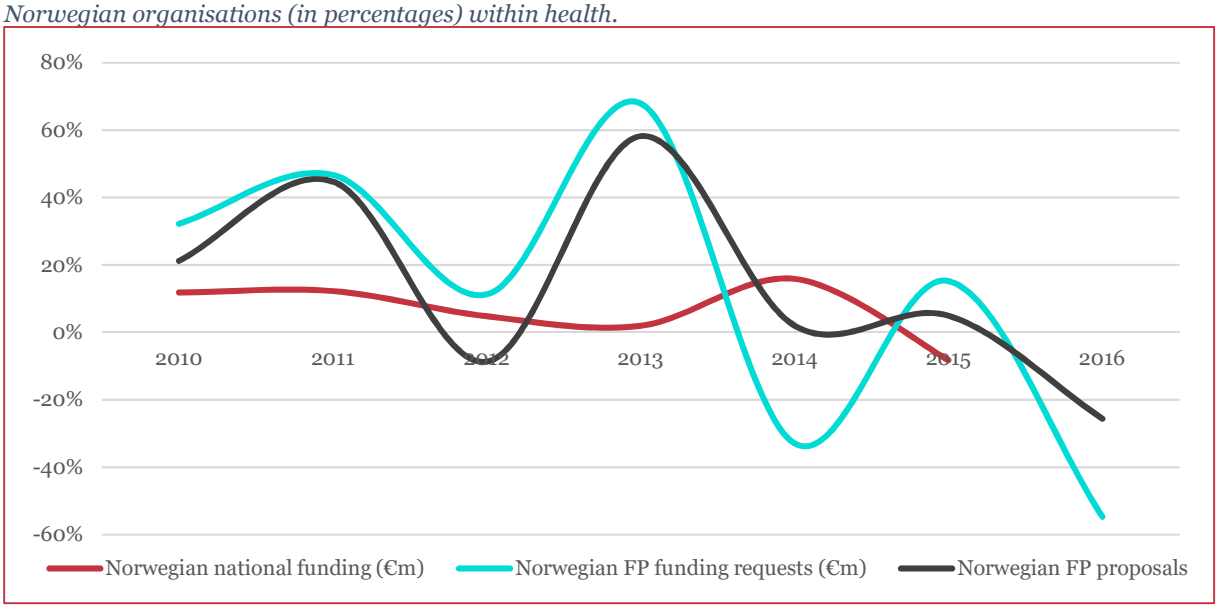
Statistical analysis (pair-wise correlation) confirms our visual assessment of a negative correlation between national funding and FP funding requests in all three thematic areas, and between national funding and FP proposals in the case of ICT and industry (but not health). However, there are not enough values to test the significance of this correlation at the thematic level.

Figure 142 Yearly change in the value national funding and in number/value of FP proposals submitted by Norwegian organisations (in percentages) within ICT.



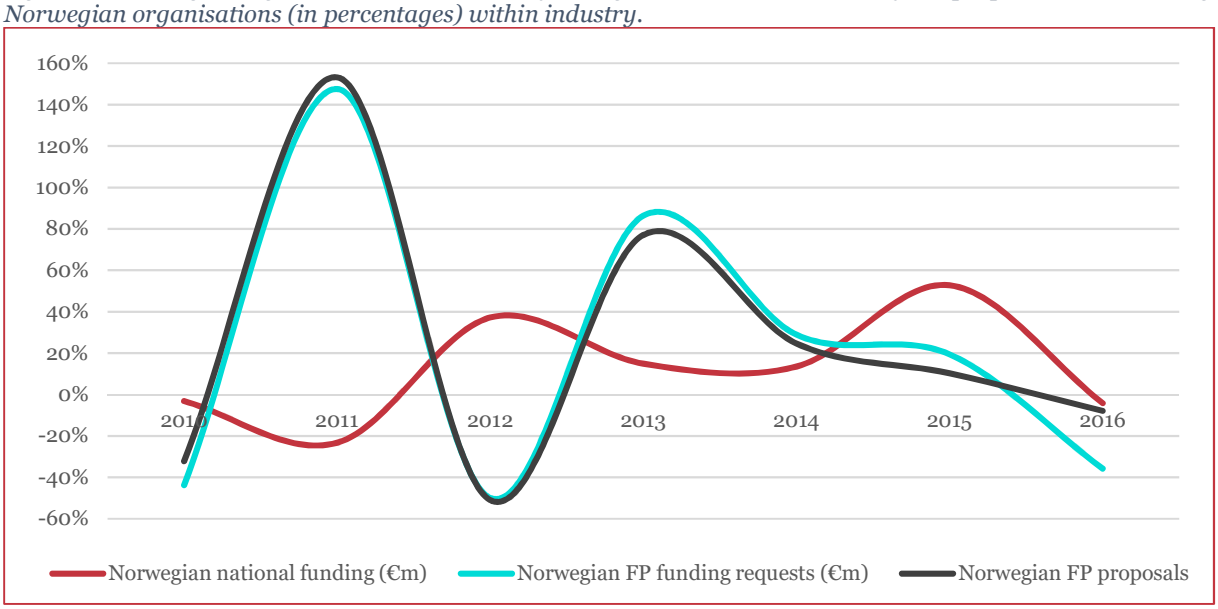
Source: Technopolis analysis of Norwegian funding and eCorda data.

Figure 143 Yearly change in the value national funding and in number/value of FP proposals submitted by Norwegian organisations (in percentages) within health.



Source: Technopolis analysis of Norwegian funding and eCorda data.

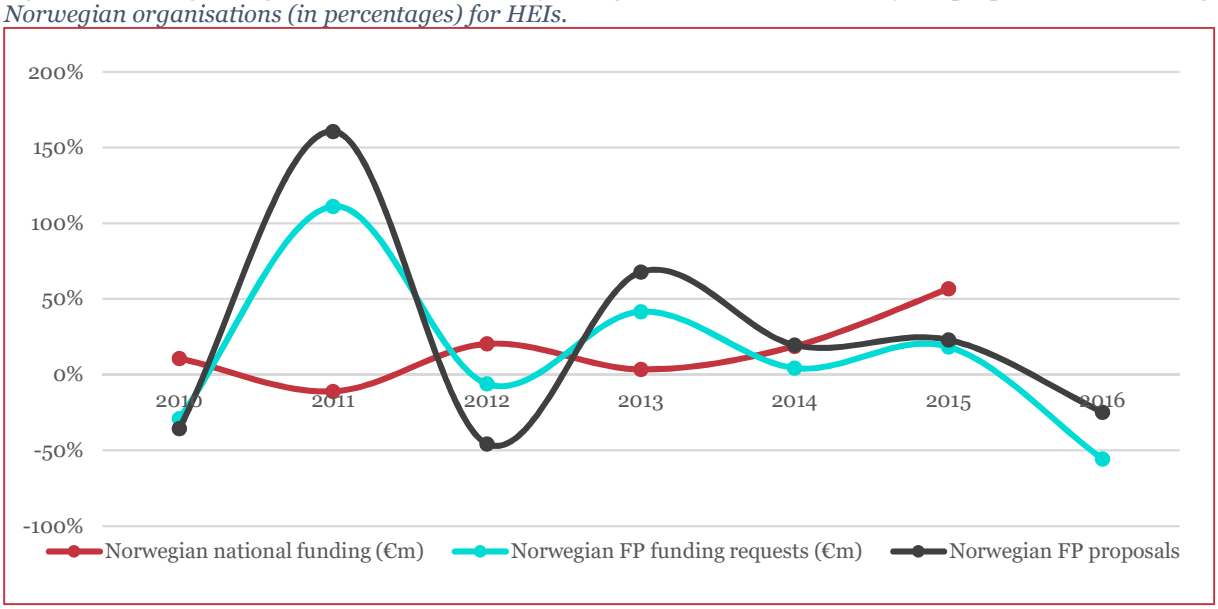
Figure 144 Yearly change in the value national funding and in number/value of FP proposals submitted by Norwegian organisations (in percentages) within industry.



Source: Technopolis analysis of Norwegian funding and eCorda data.

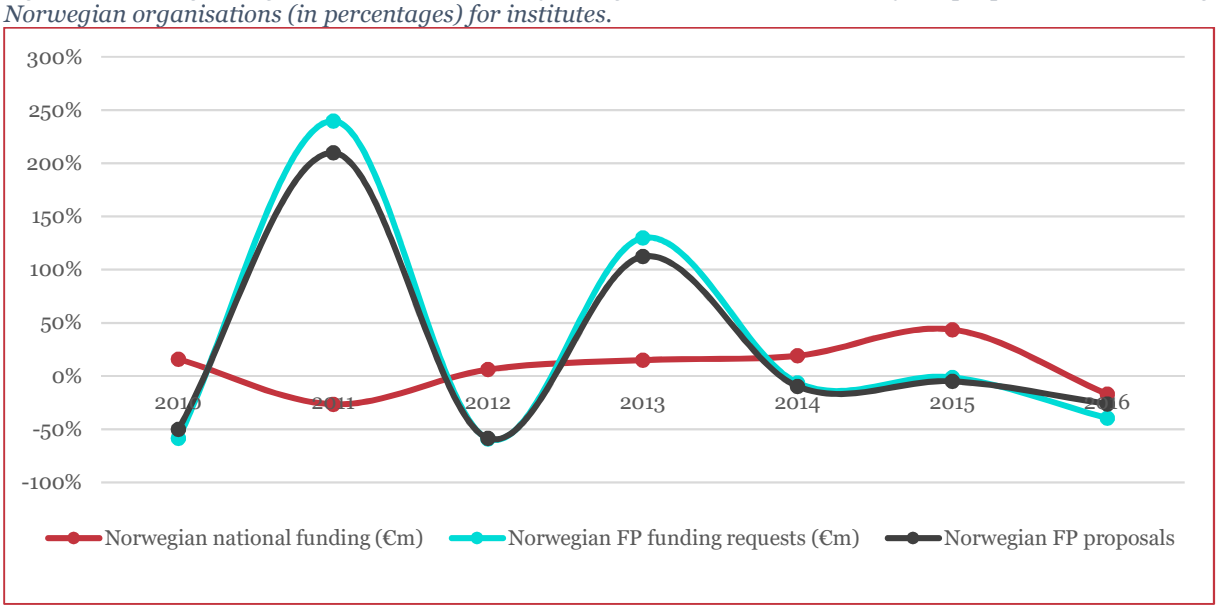
We also plotted annual changes for each of the four stakeholder categories, but found a less clear pattern of covariation between national funding and FP activity for these groups, see Figure 145–Figure 148.

Figure 145 Yearly change in the value national funding and in number/value of FP proposals submitted by Norwegian organisations (in percentages) for HEIs.



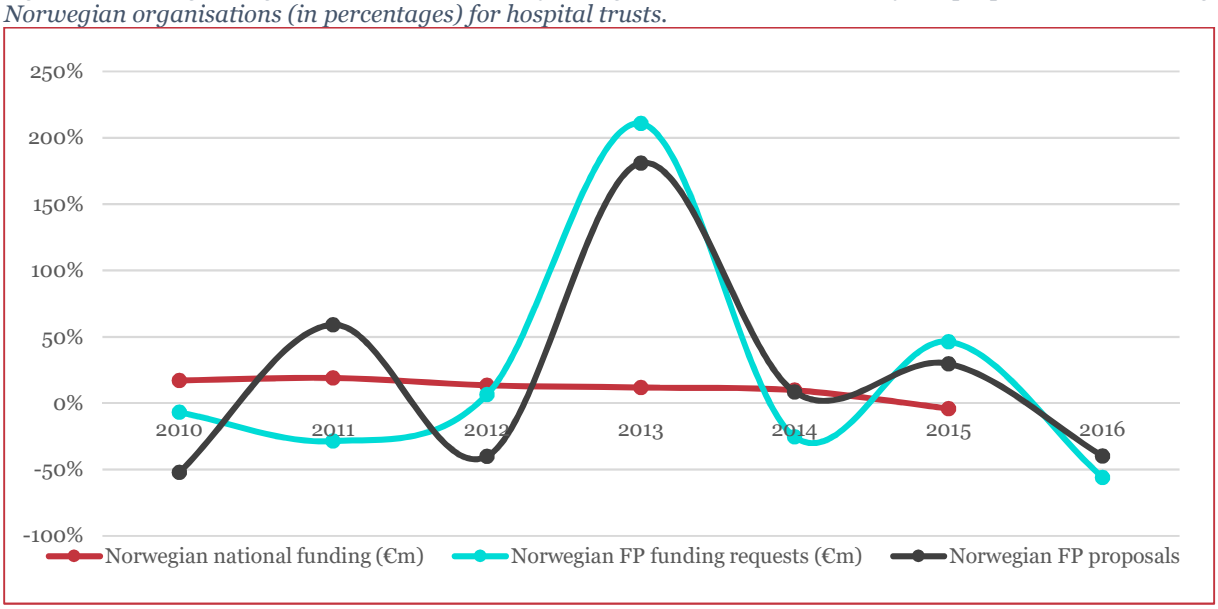
Source: Technopolis analysis of Norwegian funding and eCorda data.

Figure 146 Yearly change in the value national funding and in number/value of FP proposals submitted by Norwegian organisations (in percentages) for institutes.



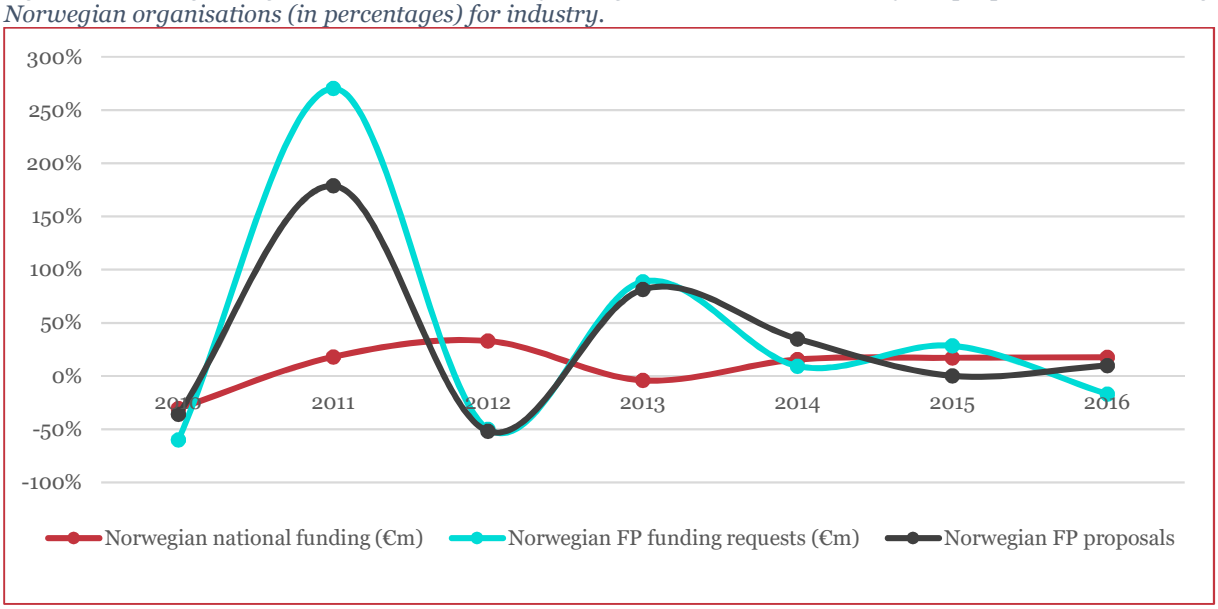
Source: Technopolis analysis of Norwegian funding and eCorda data.

Figure 147 Yearly change in the value national funding and in number/value of FP proposals submitted by Norwegian organisations (in percentages) for hospital trusts.



Source: Technopolis analysis of Norwegian funding and eCorda data.

Figure 148 Yearly change in the value national funding and in number/value of FP proposals submitted by Norwegian organisations (in percentages) for industry.



Source: Technopolis analysis of Norwegian funding and eCorda data.

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