Study on Assessing the Research Management Performance of Framework Programmes Projects

Final Report

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Abstract

This study explores the variety of research management structures, roles, tasks, responsibilities, activities and styles in relation to research management performance (RMP) and project success in the FP6 and FP7 research funding programmes of the European Commission. The key findings indicate six enabling factors of high RMP. The effects on RMP and project success of six management styles have been studied. Interestingly, management tools do not appear to influence project success. In about one third of the projects, the composition of the consortium changes along the way.

The Commission would do well to focus on personal interaction with Project Coordinators rather than the administrative side of projects and create more flexibility, if it wants to improve the success of FP projects. Also, currently offered EC-provided project management tools and matchmaking instruments should be critically reviewed, as these do not work as intended. Finally, the Commission is cautioned that current frameworks for intellectual property are out of sync with international standards, such as those of the WTO.

We make recommendations to the Commission (for implementation in the Horizon 2020 programme) and to Project Coordinators. We also provide suggestions for further research based on the findings of this exploratory study.

Résumé

Cette étude porte sur la variété des structures de gestion de la recherche, des rôles, tâches, responsabilités, activités et types de gestion, quant à la performance de la gestion de la recherche (PGR) et le succès des projets sous programmes de financement PC6 et PC7 de la Commission Européenne. Les principaux résultats indiquent six facteurs permettant une gestion performante. Les effets sur la PGR sous six types de gestion ont été étudiés. L'étude démontre que les outils de gestion n'influencent pas la réussite du projet. Pour environ un tiers des projets, la composition du consortium est modifiée lors du projet.

La Commission devrait davantage se concentrer sur les interactions personnelles avec les coordinateurs de projets que sur leur côté administratif, et encourager sa flexibilité. Les outils de gestion de projet et instruments de rapprochement proposés devraient être soumis à un examen critique, puisqu'ils n'ont pas les effets prévus. Enfin, le système actuel de propriété intellectuelle n'est pas adapté aux normes internationales comme celles de l'OMC.

Des recommandations pour la mise en œuvre d' Horizon2020 sont développées pour la Commission et les coordinateurs de projet, ainsi que des suggestions pour de nouvelles recherches sur base des résultats de cette étude exploratoire.

Executive Summary

In October 2013 the European Commission, DG RTD mandated PwC EU Services EEIG ("PwC") and Technopolis Group to assess the research management performance of collaborative projects in Framework Programme (FP) 6 and 7. It was expected that a better understanding of management processes within these projects will benefit the performance of research management in Horizon 2020, and can contribute to more successful projects in Horizon 2020.

The report at hand presents the most important findings of PwC and Technopolis Group. In section 6 we present our conclusions and recommendations to respectively the European Commission, and to those responsible for the management of collaborative projects under Horizon 2020.

Research management is a people business

FP6 and FP7 consortia come in many different shapes and sizes. They are formed in a process that is largely based on existing networks and relationships of researchers, followed by the search for the types of organisations or competencies in a consortium that are still missing in comparison with the Commission's call for proposals. A clear tendency exists to form sequential consortia with (mostly) the same partners. This tendency comes at a risk, as consortia that do not include new partners tend to perform worse than those that do.

Existing inter-personal networks play a significant role in the formation of FP consortia

The Project Coordinator is not necessarily the one researcher that took the initiative to form a consortium and respond to a call for proposals. Consortium initiators are usually experienced researchers, most commonly working for universities or RTOs. The vast majority originates from Western Europe.

In his search for participants, the project initiator is fully aware that the call text, designed by the European Commission, roughly dictates the framework within which the size and composition of the consortium is defined. In particular, the need for specific skills, competencies, areas of expertise or specialities recognised through analysis of a project's aim in the light of the call texts, drives the search for suitable collaboration partners.

The initiators use their existing inter-personal networks and some second-tier relations to compose a consortium. They prefer to use their own personal networks. Yet, relatively early on in the process, they start seeking for 'friends-of-friends' as well. Excellence in the field concerned is however the main criterion for selection as potential consortium partner. In the third instance, the consortium initiators start discovering new networks. PubMed, ScienceDirect, and Scopus are typical sources. EU supported sources (NCPs; CORDIS) are hardly used and are associated with underperforming participants.

Project Coordinators spend considerable time on research management tasks

After a proposal has been successful and the grant has been awarded, the real work in terms of research management starts. For the Project Coordinator, this implies that several management tasks will start consuming considerable amounts of his time. Consensus-based decision-making is usually the main paradigm. Internal communication in the consortium, meeting project milestones and quality control of deliverables take up most of the time of the Project Coordinator. One of the reasons

that Project Coordinators put so much effort in these tasks is that they consider them to be of crucial importance for the success of the project.

The Project Coordinator does not necessarily conduct all these tasks himself. Often, a certain division and delegation of tasks can be observed. The division of tasks in projects is often established during the proposal phase of the project. The division and delegation is usually based on merit. Being responsible for a supportive management task in an FP project is considered a good learning trajectory for ambitious junior researchers. Tasks and responsibilities regarding quality assurance, evaluation, and validation are often decentralised to the level of the WP leaders. They often set up a variety of formal and informal monitoring processes. Other tasks typically stay at the central level of the Project Coordinator.

Financial management is typically a task that shows a mixed picture in terms of centralisation versus putting things at arm's length. The most straightforward mode of financial management has the formal Project Coordinator handling all financial management by himself, compiling information received from consortium partners and reviewing overall finances (which need to be reported on to the EC), using Microsoft Excel-based tools and trying not to burden consortium partners too much with financial matters. As a second mode, the Project Coordinator may be supported by an internal team of administrative and finance experts. The third mode of financial management features a financial expert alongside the formal Project Coordinator, who handles all financial aspects of the project.

Decision-making processes that build trust and focus on consensus appear to work best in FP research management

In most FP6 and FP7 projects with a high performance rating, the coordinator tried to share information with other consortium members in a timely fashion, trusting them to deliver as needed, and discussing any issues person to person. Referencing contractual obligations and discussing individual accountability played a small role in these consortia.

On the other hand, FP7 projects with a low performance score show more emphasis on top-down decision making and less on a consensus-oriented decision-making style. Contractual obligations and discussing individual accountability are important tools for research management in such projects. FP6 projects with a low average performance score emphasise a consensus orientation, with coordinators relying on trust and timely sharing of information to allow consortium partners to get their job done

The use of professional project management tools is very limited

For research management, several tools are being used. These include document sharing tools, several types of communication tools, and financial monitoring tools. Document sharing tools are used most often – by a little more than 50% of all Project Coordinators– whereas about one third of FP project managers use EC-provided tools. This is closely followed by communication tools other than phone and e-mail, examples of which named in case study interviews are conference call systems and Skype. The selection of specific project management tools does little to affect research management performance, or project success. No good practices emerge that set high performance projects apart from their low performance counterparts with regard to the tools they do or do not use.

Furthermore, the extent to which tools provided by the European Commission are used is limited. Also, a majority of the project managers have recommendations for improving the tools. The tools provided by the European Commission are clear to more experienced FP coordinators, but require relatively high efforts for less experienced coordinators to master. Online systems are considered too rigid by Project

Coordinators, and the writing style of EC documentation is perceived to be less comprehensible than it could be.

> ***We recommend that the European Commission reviews the tools it currently provides, to focus on the mandatory tools that really matter, and to improve them to such an extent that they start adding value to projects.*** *When doing so, the European Commission should be aware that most tools can already be found on the market and are already widely used by consortia. It should therefore not design something separate (stand-alone) if this is not absolutely necessary. The European Commission should also be aware of the low numbers of Project Coordinators who consider themselves proficient in working with mandatory EC-provided tools. The EC should require that project coordinators are proficient in the use of the (improved) mandatory EC tools. Development of proper instructional materials should be taken into account when considering a more intensive account management approach and when revising the current European Commission-provided tools.*

What is good research management and what is not?

Our data show that good research management performance and project success go hand in hand. This makes it important to have a close look at what constitutes good research management.

Research management performance is enabled by a high frequency of contact, involvement of key partners in substantial decision-making and certain management styles. Involvement of partners in substantial decisions about the project is good for management performance and thus for project success. Alignment of the interests of consortium partners with the project objectives also adds to RMP. It is particularly important for Project Coordinators to pay attention to this aspect in projects where consortium partners' interests may diverge in relation to the utilisation of intellectual property developed in the FP project.

Moreover, certain management styles contribute to successful project management and thus to project success. A Project Coordinator who wants to be successful should consider managing by continuously building relationships and high trust levels, and invest in one-to-one communication. Management styles that should be avoided are: depending on contractual agreements and holding partners responsible for implementing agreed-upon tasks by holding them accountable; relying on established relationships and high trust levels; and using network power such as positions in other consortia and in high-level committees.

Several research management practices that were encountered are particularly effective. These practices are aimed at three major goals of research management:

1. increasing trust and building relationships between consortium partners;
2. ensuring frequent communication between the Project Coordinator and consortium partners, while involving at least all main consortium partners in important decisions;
3. facilitating the work that is to be performed by consortium partners, by providing structure and information.

> ***Project coordinators should build a consortium based on merits rather than on existing relationships.*** *As a result, at the beginning of the project trust may be low as partners need to get used to each other.*

This is absolutely fine, as long as the project manager invests in trust throughout the project life-cycle to achieve high trust levels at the end of the project.

Project coordinators should favour a consensus-based decision making model, rather than a hierarchical or formal management style. *This should be complemented with an all-inclusive approach. In addition to the abovementioned consensus-based decision-making, this also requires frequent communication with the consortium. Frequency of communication is much more important than mode or intensity. These activities serve to align consortium partners' interests and contribute with project success.*

FP consortia have an inherent variety and dynamism; structures and interventions imposed on consortia should respect this

About one third of consortia experience changes in their composition (i.e. consortium partners leaving or joining the consortium). In FP6 and FP7 projects, project managers experienced a lot of difficulty in having such changes accepted and administratively processed by the Commission's project officers. Changes in consortium composition are associated with lower project success.

Size does matter; larger projects are more difficult to manage. The "basic" management structure (i.e. the simplest appropriate structure respective to size and complexity of the research tasks at hand) increases research management performance.

It was also found that consortia that have made use of EC-provided matchmaking instruments, such as the CORDIS database or matchmaking events organised by the Commission, are generally not among the highest performing projects.

The European Commission and its agencies should increase their capacity in terms of the number and capabilities of project officers and set up a structured 'account management' approach. *This could help assist the consortia in several ways, including coping with inevitable changes in their composition. It would also enable the European Commission and its agencies to simplify the administrative requirements associated with consortium composition and/or project course amendments that are now too high.*

The European Commission should critically review currently offered matchmaking instruments, like the CORDIS partner search function and matchmaking events, as these do not contribute to better performing FP consortia. *Instead the European Commission and its agencies should focus on developing other instruments to achieve the objective of creating high-performing consortia, such as networking events at conferences and social media-based communication.*

Project Coordinators should avoid overly complex management structures, and clearly define roles and responsibilities. *Roles and responsibilities in the project should be awarded based on proven competencies for the role, not because of status or hierarchical reasons.*

Project Coordinators should communicate pro-actively to the Commission's project officer about all aspects of their project, including about expected or upcoming changes in the composition of the consortium. *Such communication would not only*

result in clear benefits on the part of the Commission. Our study clearly shows that informing the project officer well in advanced and in an informal manner – instead of waiting until the deadline of a progress report a couple of months later – allows the project officer room for a more flexible and tailored approach that decreases administrative burdens on the part of the consortium.

FP7 and Horizon 2020 better facilitate effective research management structures then previous FPs…

Several EC instruments have been changed for the better at the start of FP7 and Horizon 2020 respectively. One example is letting go of the 7 per cent maximum budget for research management costs at the start of FP7. Another is putting less emphasis on the management structure of consortia in evaluating project proposals under Horizon 2020, thereby creating fewer incentives for consortia to propose overly complex management and governance structures. However, some evaluators have not yet adopted this new practice.

The European Commission should communicate to reviewers and project coordinators that overly complex management models should be avoided. *As the Horizon 2020 evaluation procedure tends to puts less emphasis on management of the project, incentives for overly complex management structures may already have been diminished. Nevertheless, reviewers should be instructed to evaluate management structures against their simplicity, clarity and efficiency, to favour the more basic management structure relative to the complexity of the project.*

…but intellectual property rights and performance measurement remain an issue

Intellectual property rights (IPRs) have been a problem area in a large number of FP projects. Our expert interviews indicate that in a large majority of the collaborative FP projects, IPRs are of no relevance. In those consortia where IPRs are relevant, the project participants and coordinators find the rules too complex. Also clear misalignments with anti-competition law and WTO rules have been reported in our expert interviews. It is not clear whether the current IPRs regulations in Horizon 2020 help solve the problems or whether they sometimes exacerbate or even create them.

The European Commission should explore the possibilities of simplifying the IP rules in Horizon 2020 and ensure a better alignment with WTO/TRIPS and anti-trust rules. *It could be considered to have a structure in place that would only work as checklist of points to be considered and leave actual contract wording and drafting with respect to IPRs to the parties involved. However, these are very general recommendations. We warn against taking a quick shot at this complex and – in its important details – not well-understood topic.*

The European Commission should develop better indicators for project officers to monitor and assess projects. *This could help to draw a more consistent line in project reviewing by project officers. Changes in project officers and especially the manner in which they assess projects (different aims and attitudes) are detrimental to project management, and success. These indicators should be made available for future studies as more objective measurements of project performance.*

This exploratory study is only a first step towards a better understanding of the management of collaborative FP projects

This study is the first attempt to come to a clear empirical understanding of the management of collaborative research projects under FP6 and FP7 and to differentiate empirically between all aspects of these heterogeneous projects. As a consequence, the study is exploratory in nature. This implies that we have looked for common patterns and the rationale behind them. We draw preliminary conclusions about these patterns, but we do so with caution. We recommend to the European Commission to further investigate several patterns that we have identified.

Our findings are based on more than 100 interviews, 30 case studies and a large scale survey (N = 7,980) of FP participants

Our complete methodological approach consists of:

- a literature review and 25 exploratory interviews;
- a large-scale survey of project managers and participants in a large number of FP6 and FP7 projects;
- 30 mixed-method case studies at the level of individual FP6 and FP7 projects;
- additional expert interviews, interviews with serial FP participants and interviews with coordinators of projects with a low number of responses in the survey;
- a round table with experts in the field, to critically assess, validate and enrich our findings, conclusions and recommendations.

Further research is proposed on four topics

We suggest a study on the institutional and practical structures of the FP programmes in comparison with those in other parts of the world to gain broader insights beyond the European realm. There are differences between the FPs and research funding programmes in third countries, such as the United States and Japan, for example in the governance structures of projects and the requirements on IPRs. Study of research funding programmes in other countries would shed more light on the relative effectiveness and efficiency of research management in the context of the FPs.

The performance of FP projects would benefit from further study into the relationship between changes in consortium composition and project performance. Not only the full range of trajectories between the two phenomena bears further investigation, also the potential for mitigating measures clearly warrants more study, as adequate solutions in these cases will increase the likelihood of greater success of these projects under Horizon 2020.

A study should be performed on the relationship between the importance of intellectual property (IP) in FP projects and RMP, as IP is becoming more important in Horizon 2020 and is crucial in reaping the societal benefits of EU-funded research. Our findings indicate that the interests of researchers are at risk of not being aligned with the interests of industry partners when it comes to IP. The proposed study should be targeted at identifying those project and consortium characteristics in which aligning interests around IP becomes particularly challenging for research managers. We would not recommend a purely legal review, as this would leave again much of the topic and its actual economic significance as a black box.

Research management performance appears to be negatively influenced when less than 20 per cent of the consortium partners do not have an existing relationship with other partners. **A final topic for further study is whether this effect applies in specific types of projects, what causes this relationship, and what it might imply for future call texts.**

Résumé opérationnel

En octobre 2013, la Direction Générale RTD de la Commission Européenne (CE) a mandaté PwC EU Services EEIG (PwC) et Technopolis Group pour évaluer la performance de la gestion de la recherche (PGR) de projets collaboratifs sous les Programmes Cadres (PC) 6 et 7. Cette étude devait permettre une meilleure compréhension des processus de gestion des projets, afin d'accroître la performance de la gestion de la recherche (PGR) et la réussite des projets sous Horizon 2020.

Ce rapport présente les résultats les plus importants de PwC et Technopolis Group. Dans la section 6, nous présentons nos conclusions et recommandations à la CE, ainsi qu'aux responsables de la gestion de projets collaboratifs sous Horizon 2020.

La gestion de la recherche repose sur les personnes qui la mènent

Les consortia des PC6 et PC7 s'articulent sous différentes formes et tailles. Ils se forment selon un processus basé sur des réseaux de chercheurs déjà mis en place et leurs interactions. S'ensuit alors une recherche pour les organisations ou compétences qui manquent au consortium en comparaison aux appels à propositions de la CE. Une tendance nette existe qui consiste à former des consortia dont la plupart des partenaires sont similaires. Cependant, ceci présente certains risques, puisque les consortia qui n'intègrent pas de nouveaux partenaires ont tendance à être moins performants.

Les réseaux interpersonnels déjà mis en place jouent un rôle significatif dans la formation des consortia sous PC

Le Coordinateur de Projet n'est pas nécessairement le chercheur qui prend l'initiative de former un consortium et de répondre aux appels d'offres. Les personnes qui forment un consortium sont généralement des chercheurs expérimentés, issus d'universités ou d'OTR, la plupart d'Europe de l'Ouest.

Dans sa recherche de participants, l'initiateur du consortium est conscient du texte de l'appel, rédigé par la CE, et définit approximativement la taille et la composition du consortium. La recherche de collaborateurs adéquats se base en particulier sur le besoin d'aptitudes particulières, de compétences, de domaines d'expertise reconnus importants suite à l'analyse des objectifs d'un projet.

Les initiateurs du projet ont recours à leur propre réseau interpersonnel existant et à leurs relations de second niveau pour composer le consortium. Assez tôt dans le processus, ils commencent notamment à contacter les « amis d'amis ». Le critère principal à la sélection d'un partenaire potentiel au consortium reste l'excellence dans le domaine considéré. En troisième lieu, les initiateurs du consortium ont recours à de nouveaux réseaux. Des sources classiques sont PubMed, ScienceDirect et Scopus. Les sources Européennes (NCPs; CORDIS) sont rarement utilisées et associées à des participants peu performants.

Les Coordinateurs de Projets passent un temps considérable sur les tâches de gestion de la recherche

Une fois le projet attribué, le véritable travail de gestion de la recherche peut commencer. Pour le Coordinateur, ceci implique que diverses tâches de gestion vont commencer à prendre un temps considérable. Ce travail repose généralement sur la prise de décision par consensus. La plupart du temps du Coordinateur est allouée à la communication interne au consortium, à la réalisation des étapes importantes du projet et au contrôle de qualité des éléments livrables. Les Coordinateurs réservent un

effort important à ces tâches puisqu'ils les considèrent comme cruciales à la réussite du projet.

Le Coordinateur ne conduit pas nécessairement toutes ces tâches lui-même. En général, la division et la délégation des tâches sont prévues. La division des tâches du projet est souvent établie lors de la phase d'offre et se base souvent sur le mérite. Pour les jeunes chercheurs ambitieux, être responsable du soutien d'une tâche de gestion est considéré comme un bon moyen d'apprentissage. Les tâches et responsabilités concernant le contrôle de qualité, l'évaluation et la validation sont souvent décentralisées au niveau des leaders. Ceux-ci établissent une variété de processus de contrôle formels et informels. Les autres tâches restent d'habitude au niveau central du Coordinateur.

La gestion financière est une tâche particulière car elle peut être centralisée ou non. Selon la gestion financière la plus évidente, le Coordinateur de Projet s'occupe de toute la gestion financière par lui-même, en regroupant l'information soumise par ses partenaires du consortium ainsi qu'en révisant l'ensemble des finances (ensuite rapportées à la CE), au moyen d'outils tels que Microsoft Excel, en essayant de ne pas trop charger les partenaires du consortium au sujet des questions financières. Une autre façon de réaliser la gestion financière consiste à recourir à une équipe interne d'experts administratifs et financiers, en support au Coordinateur. Finalement, une dernière méthode est d'avoir à disposition un expert financier, qui s'occupe de tous les aspects financiers du projet.

Les processus de prise de décision qui instaurent la confiance et s'opèrent par consensus semblent mieux fonctionner pour la gestion de la recherche sous PC

Dans la plupart des projets performants de PC6 et PC7, le Coordinateur essaie de partager les informations avec les autres membres du consortium en temps voulu, avec l'espoir qu'ils remettent leur travail suivant le timing prévu et en abordant les problèmes en personne. Les obligations contractuelles de référencement ainsi que les discussions se rapportant aux responsabilités individuelles de chacun ne jouent qu'un petit rôle dans ces consortia.

Les projets peu performants du PC7 ont davantage recours à un processus de prise de décision par les supérieurs, et peu axé sur le consensus. Les obligations contractuelles et les discussions sur les responsabilités individuelles sont un instrument important. Les projets sous PC6 avec une performance moyenne peu élevée s'opèrent par consensus, et leur Coordinateur base leur travail sur la confiance et le partage d'information suivant un timing raisonnable pour permettre aux partenaires du consortium d'effectuer leurs tâches.

L'utilisation d'outils professionnels de gestion de projet est très limitée

De multiples instruments sont utilisés pour la gestion de la recherche, à savoir des instruments de partage de documents, différents types d'outils de communication ainsi que des instruments de suivi financier. Les outils de partage de documents sont utilisés la plupart du temps – par un peu plus de 50% des Coordinateurs de Projet – tandis qu'un tiers des managers de PC ont recours aux instruments fournis par la CE. A ceux-ci suivent les outils de communication, autres que téléphone et e-mail, comme par exemple les systèmes de téléconférence et Skype. La sélection d'outils spécifiques n'affecte que peu la performance la réussite d'un projet. Aucune bonne pratique n'émerge pour définir des standards de haute performance quant aux outils utilisés.

De plus, la CE ne fournit des outils que de manière très limitée et la plupart des managers de projets recommandent de les améliorer. En effet, les outils de la CE sont clairs pour les Coordinateurs les plus expérimentés mais demandent des efforts

relativement importants pour leur maitrise par des Coordinateurs moins expérimentés. Les systèmes en ligne sont souvent considérés comme trop rigides, et le style d'écriture de la documentation de la CE est perçue comme rendant la compréhension difficile.

> ***Nous recommandons que la Commission Européenne revoie avec critique les outils qu'elle propose, qu'elle se concentre sur les outils qui sont véritablement indispensables, et qu'elle les améliore afin qu'ils apportent de la valeur ajoutée aux projets.*** *En agissant de la sorte, la CE doit être consciente que la plupart de ces outils se trouvent déjà sur les marchés et sont largement utilisés par les consortia. Ainsi, elle ne devrait pas élaborer de produits autonomes, si cela n'est pas perçu comme absolument nécessaire. La CE devrait notamment exiger que les Coordinateurs de Projet soient tous compétents quant à l'utilisation de ces instruments (améliorés) obligatoires de la CE. La rédaction d'instructions appropriées devrait être envisagée pour une approche de la gestion plus intensive.*

Les éléments qui rendent la gestion de la recherche performante ou non

Nos données indiquent que la bonne gestion de la recherche et la réussite de projets vont de paire. Des éléments tels que la haute fréquence de contact, l'implication des partenaires clés dans les prises de décision importantes, et certains styles de management stimulent la performance de la gestion de la recherche. L'alignement des intérêts au sein du consortium sur les objectifs du projet influence aussi la PGR de manière positive et est particulièrement important lorsque les intérêts des différents acteurs du consortium divergent quant à l'utilisation de la propriété intellectuelle développée dans les projets.

De plus, certains styles de gestion contribuent davantage à la réussite d'un projet. Un Coordinateur de Projet doit envisagée sa gestion en construisant des relations et niveaux de confiance élevés de manière continue, et doit investir dans la communication individuelle et personnalisée. Les styles de gestion qui doivent être évités sont les suivants : dépendre d'accords contractuels et tenir ses partenaires pour responsables de l'implémentation de tâches convenues par avant, se reposer sur des relations déjà établies et sur de haut niveaux de confiance, ainsi qu'utiliser le pouvoir de réseaux tels des positions dans d'autres consortia ou des comités de haut-niveau.

De nombreuses pratiques de gestion rencontrées lors de l'étude sont particulièrement efficaces et mènent à trois objectifs :

1. Augmenter la confiance et instaurer des relations entre les partenaires du consortium ;
2. Assurer une communication fréquente entre le Coordinateur du Projet et les partenaires du consortium, tout en impliquant les principaux membres du consortium dans les décisions importantes ;
3. Faciliter le travail fourni par les partenaires du consortium en fournissant la structure et l'information.

> ***Les Coordinateurs de Projet doivent établir un consortium basé sur le mérite plutôt que sur des relations existantes.*** *Ainsi, lors des débuts de projets, la confiance peut s'avérer faible, le temps que les partenaires s'adaptent les uns aux autres. Ceci est considéré comme absolument normal, tant que le manager du projet investit dans cette confiance à travers tout le cycle du projet afin d'atteindre des niveaux de confiance élevés à la fin du projet.*

Les Coordinateurs de Projet devraient favoriser une approche de consensus dans leur modèle de prise de décision, plutôt qu'un style de gestion formel ou hiérarchique. *Ceci doit être complété par une approche globale, ainsi qu'une communication fréquente avec le consortium. La fréquence de communication est beaucoup plus importante que son mode ou son intensité. Ces activités servent à aligner les intérêts des partenaires et contribuent à la réussite du projet.*

Les structures et interventions imposées aux consortia doivent respecter la variété inhérente de ceux-ci ainsi que leur dynamisme

Environ un tiers des consortia altère leur composition (par exemple, des partenaires du consortium qui le quittent ou en rejoignent un autre). Dans les projets sous PC6 et PC7, les managers de projets ont rencontré beaucoup de difficultés pour accepter ces changements et dans leur traitement administratif par les agents du projet issus de la Commission. Des changements dans la composition des consortia sont associés avec une moindre réussite de projet.

La taille de ces consortia est importante : les projets les plus larges sont les plus difficiles à gérer. La structure de gestion « basique » (la structure la plus simple et appropriée quant à la taille et la complexité de la recherche) augmente la performance de la gestion de la recherche.

Les résultats indiquent notamment que les consortia qui ont recours aux instruments de rapprochement de la CE, comme la base de données CORDIS ou les évènements de rapprochement organisés par la Commission, ne sont généralement pas parmi les projets les plus performants.

La CE et ses agences devraient augmenter le nombre et la capacité des agents sur les projets et devraient établir une approche structurée de la gestion. *Ceci devrait venir en assistance aux consortia sous de nombreuses manières, entre autre pour gérer les changements inévitables dans leur composition. Cela permettrait notamment à la Commission et ses agences de simplifier les exigences administratives associées à la composition du consortium et/ou les changements en cours de projets qui sont trop fréquents.*

La CE devrait revoir de manière critique les instruments actuels de rapprochement, comme la fonction de recherche partenaire CORDIS ou les évènements de rencontre, puisqu'ils ne contribuent pas à la meilleure performance des consortia sous PC. *La CE et ses agences devraient développer d'autres instruments pour atteindre les objectifs de créer des consortia très performants, comme des évènements de réseautage aux conférences et une communication orientée médias.*

Les Coordinateurs de Projets devraient éviter les structures de gestion trop complexes et clairement définir les rôles et responsabilités. *Les rôles et responsabilités doivent être définis en fonction des compétences assurées, et non pour des raisons de statuts ou hiérarchiques.*

Les Coordinateurs de Projets devraient communiquer de manière proactive aux agents de la Commission à propos des aspects de leur projet, notamment quant aux changements attendus ou à venir dans la composition des consortia. *Une telle communication*

servirait à la Commission. De plus, informer les agents de la CE en avance et d'une manière informelle – au lieu d'attendre la date limite d'un compte-rendu quelques mois plus tard – permettrait d'augmenter la flexibilité des agents de la CE sur le projet ainsi qu'une approche personnalisée qui réduirait les charges administratives du côté du consortium.

Le PC7 et Horizon 2020 facilitent davantage les structures efficaces de gestion de la recherche que les PC précédents…

Plusieurs instruments de la CE ont été améliorés au début du PC7 et d'Horizon 2020. Par exemple, la limite de 7% des coûts de gestion de la recherche a été abandonnée au début du PC7 et moins d'importance est donnée á la structure de la gestion des consortia lors de l'évaluation des offres sous Horizon 2020, ce qui permet aux consortia d'éviter des structures de gestion et gouvernance trop complexes. Cependant, certains évaluateurs n'ont pas encore adopté cette nouvelle pratique.

La CE devrait communiquer aux réviseurs et aux coordinateurs de projets que des modèles de gestion trop complexes doivent être évités. *Ces structures compliquées devraient déjà être réduites puisque la procédure d'évaluation d'Horizon 2020 accorde moins d'importance à la gestion de ces projets. Cependant, les réviseurs devraient être formés à l'évaluation des structures de gestion pour stimuler leur simplicité, clarté et efficience, et favoriser une structure plus basique.*

… mais les droits de propriété intellectuelle et la mesure de la performance restent problématiques

Les droits de propriété intellectuelle (PI) sont un domaine problématique dans un grand nombre de projets sous PC. Les experts interviewés indiquent que dans une majorité des projets sous PC, les droits de PI ne sont pas importants. Mais pour ces consortia pour lesquels les droits de PI sont pertinents, les participants au projet et les coordinateurs trouvent les règles trop complexes.

La CE devrait explorer les possibilités de simplifier les règles de PI sous Horizon 2020 et assurer un meilleur alignement avec l'OMC/ADPIC et les règles anti-trust. *Une liste de vérification devrait être mise en place avec les points à considérer et la formulation et la rédaction du contrat devraient être laissées aux parties impliquées. Il s'agit de recommandations générales. Nous mettons donc en garde contre ce sujet complexe et peu compris.*

La CE devrait développer de meilleurs indicateurs pour ses agents pour suivre et évaluer les projets. *Ceux-ci pourraient rendre la révision des projets plus consistante. Des changements d'agents et plus particulièrement la manière dont ils évaluent les projets (avec différents objectifs et attitudes) viennent au détriment de la gestion du projet et de sa réussite. Ces indicateurs devraient être disponibles pour de futures études comme étant des outils de mesure objectifs de la performance d'un projet.*

Cette étude exploratoire est une première étape vers une meilleure compréhension de la gestion de projets sous PC

Cette étude tente pour la première fois d'aboutir à une meilleure compréhension de la gestion de projets de recherche collaboratifs sous les PC6 et 7 et de différencier de manière empirique les aspects de ces projets hétérogènes. Ainsi, cette étude peut être considérée comme exploratoire. Nous avons donc cherché des modèles communs et leurs raisonnements. Nous avons émis avec prudence des conclusions préliminaires sur base de ces modèles. Nous recommandons à la CE d'investiguer davantage plusieurs de ces modèles identifiés.

Nos résultats sont basés sur plus de 100 interviews, 30 études de cas et une enquête à grande échelle (N=7,980) de participants sous PC

Notre méthodologie complète est la suivante:

- Une revue de la littérature et 25 interviews exploratoires;
- Une enquête à grande échelle de managers de projets et de participants aux PC 6 et 7;
- 30 études de cas à méthode mixe sur des projets individuels de PC6 et PC7;
- Des interviews additionnelles avec experts, plusieurs participants de PC et Coordinateurs de Projet qui ont obtenu un faible taux de réponse lors de l'enquête;
- Une table ronde avec des experts dans le domaine, pour évaluer de manière critique, valider et enrichir nos résultats, conclusions et recommandations.

Davantage de recherche doit être menée sur quatre sujets

Nous suggérons une étude sur les structures institutionnelles et pratiques des PC en comparaison avec le reste du monde pour obtenir une vision plus large au-delà des réalités européennes. Il existe des différences entre les PC et les programmes de financement de la recherche dans des pays tiers, comme les Etats-Unis et le Japon, par exemple pour les structures de gouvernance des projets et des exigences en termes de droits de PI. Cette étude pourrait être nécessaire pour évaluer l'efficacité et l'efficience de la gestion de la recherche dans le contexte des PC.

L'étude des rapports entre la composition d'un consortium et la performance d'un projet pourrait être bénéfique á la performance de ces projets. Les différentes relations entre ces deux phénomènes devraient être analysées ainsi que le potentiel de mesures atténuées comme solution adéquate, permettant une plus grande réussite parmi ces projets sous Horizon 2020.

Une étude devrait être menée sur la relation entre l'importance de la PI au sein des projets sous PC et de la performance de la gestion de la recherche, puisque la PI est un élément primordial pour récolter les bénéfices de la recherche financée par l'UE. Nos résultats indiquent que les intérêts des chercheurs risquent de ne pas être alignés avec ceux des partenaires de l'industrie quant à la PI. L'étude suggérée devrait identifier les caractéristiques des projets pour lesquels aligner les intérêts qui touchent à la PI devient une tâche particulièrement compliquée pour les managers en recherche. Nous ne recommandons pas une étude purement légale, car celle-ci ne prendrait pas en compte la plupart des aspects du sujet et sa véritable importance économique.

La performance de la gestion de la recherche semble influencée de manière négative lorsque nous constatons que moins de 20% des partenaires en consortium sont en relation avec des autres partenaires. **Analyser si cet effet s'applique dans certains types de projets spécifiques, quelles sont les causes de ces relations et leurs implications pour les appels d'offres à venir est un autre sujet susceptible de requérir davantage de recherche.**

List of abbreviations and acronyms used

171	Article 171 of the Treaty
BSG	Research for the Benefit of Specific Groups
CA	Coordination Action
CLR	Collective Research Projects
CRAFT	Cooperative Research Projects
CP	Collaborative Project
CSA	Coordination and Support Action
CP-CSA	Combination of CP & CSA
DG	Development group
DG RTD	The Research and Innovation Directorate-General of the European Commission
E-CORDA	External Common Research DAta Warehouse (containing data on FP projects)
EC	European Commission
ECGA	European Commission Grant Agreement
ERA	European Research Area
ERC	Support for Frontier Research
EU	European Union
FP	EU Framework Programme for research
FP HRC Study	Study on the impact of Framework Programmes on Human Research Capacity
FP6	The Sixth EU Framework Programme for Research and Technological Development
FP7	The Seventh Framework Programme for EU Research
GA	General Assembly
HES	Higher or secondary education organisation (participating in FP)
HRM	Human resource management
I3	Integrated Infrastructure Initiative
IP	Integrated Project
IP(R)	Intellectual property (rights)
JRC	The European Commission's Joint Research Centre
MCA	Marie Skłodowska-Curie Action
NCP	National Contact Point
NoE	Network of Excellence
OTH	Other type of organisation (participating in FP)
PRC	Private for profit (excluding education) (participating in FP)
PUB	Public body (excluding research and education) (participating in FP)
REC	Research organisation (participating in FP)
RMP	Research management performance
RTO	Research and technology organisation
SME	Small or medium-sized enterprise
SSA	Specific Support Action
STReP	Specific Targeted Research Project
TRL	Technology Readiness Level
UK	United Kingdom
WP	Work package
7.A.SP1	Cooperation programme of FP7
7.A.SP2	IDEAS programme of FP7, implemented through ERC
7.A.SP3	PEOPLE programme of FP7, implemented through Marie Skłodowska-Curie
7.A.SP4	CAPACITIES programme of FP7
7.B.SP5	FP7 Euratom Fission and Fusion programmes

List of tables and figures

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1. Introduction

This report is the final deliverable of the study by PwC EU Services EEIG (in the remainder of this report referred to as "PwC") and Technopolis Group on Assessing the research management performance of EU Framework Programmes projects. Assignor of the study is the European Commission, DG Research and Innovation (DG RTD).

In this section we provide a short introduction to the study. First we present a theoretical overview of the main differences between the management of conventional (i.e. non research, yet collaborative) projects and the management of research projects. In section 1.1 we show the main consequences of this difference: the management of large research projects comes with substantial and specific challenges. In section 1.2 we present the aims of the study. The authors of the study are presented in section 1.3. Finally section 1.4 introduces the structure of this report.

1.1. Management of collaborative research projects versus management of conventional projects

From a management point of view, one should be aware of a fundamental difference between research projects on the one hand, and implementation projects, deployment projects and other types of projects on the other hand. Project management has traditionally been thought of in the context of business and industry, and has generally followed Fordist (and Taylorist) approaches. This paradigm has been labelled the technical-rational model of project management and is based on a set of assumptions e.g. that projects are repetitive, that projects can be easily divided into distinct phases and sub-tasks, that projects can be planned rationally, that clear goals can be set, that the environment can be controlled, that there is a customer relation or clear impression of end user of the result, and – moreover – that the project manager often knows what to do and gives professional advice and instructions concerning the concrete work. This paradigm has later been further developed by a large population of scholars.[1]

1.1.1. The traditional project management paradigm

Table 1-1 gives us a first impression that collaborative research projects show some characteristics that differ significantly from traditional project characteristics. This implies that the management of these projects might require some different tools and skills.

The two different ends of the spectrum are made relatively explicit since we interpret the Fordist paradigm in its most conventional sense. It more or less neglects the fact that the traditional approach has been taken along the road, and was further developed to allow for the explanation of phenomena that we see in many aspects of our networked and dynamic society.

[1] E.g. Das, Tarun K., and Bing-Sheng Teng. "Between trust and control: developing confidence in partner cooperation in alliances." *Academy of management review* 23.3 (1998): 491-512;

Table 1-1: Comparison of conventional Fordist project management and basic characteristics of research projects[2]

Basic assumptions in the Fordist way of managing a project	Basic characteristics of research projects
Set clear goals	Goals may be abstract and subject to change
Projects are intra-organisational	Collaborative research projects are inter-organisational and usually international
Project participants work (almost) full-time on the project	Most researchers have many competing and conflicting obligations on their time, e.g. teaching, administration or other projects
Plan and control (rational actor model)	Planning and control is difficult (bounded rationality)
Project manager knows what to do and gives professional advice and instructions	Research manager often lacks the required professional knowledge
Commercial or efficiency-driven orientation	Curiosity-driven orientation
Presence of a customer relation and a clear impression of end user of the result	Lack of customers other than the researchers' peers and a vague impression of potential end-user
Limit uncertainty; safety first	Uncertainty is part of research
Management (plan and control; emphasis on the producer and administrator management roles)	Leadership (innovation and integration; emphasis on the entrepreneur and integrator management roles)
Evaluation: purpose is to efficiently reach planned result (plan and control)	Evaluation: purpose is learning and reaching optimum result; pre-planned result may prove second-best or even unrealistic

However, Table 1-1 also shows that the traditional paradigm in project management theory might not be the most useful paradigm for addressing the challenges of research management. We are fully aware that the table sketches a dichotomy. To some extent, recent management literature does address the technological uncertainties and risks of unique projects[3], and the increased importance of collaboration with external actors.[4]

Nonetheless, it is clear that the management of large international collaborative research projects is significantly different from conventional project management. It requires a different approach, different tools, and different skills. Moreover, managers of research projects face different management challenges than those who manage conventional projects. Also, the application of a uniform project management approach throughout the project life-cycle is inappropriate, as has been established in recent studies of FP-financed collaborative research projects in the area of information systems.[5] These same studies also indicate that successful research management of collaborative projects needs to overcome three paradoxes:[6]

[2] Based on: Ernø-Kjølhede, A. (2000), *Project Management Theory and the Management of Research Projects*. MMP Working Paper No. 3/2000, Copenhagen Business School.
[3] Shenhar, A.J. and Dvir, D. (2007), Reinventing Project Management: The Diamond Approach to Successful Growth and Innovation, Harvard Business School Press.
[4] Chesbrough, H. (2003), Open Innovation: The New Imperative for Creating and Profiting from Technology, Harvard Business School Press.
[5] Lippe, S., Vom Brocke, J. and Stanoevska-Slabeva, K. (2013), A conceptualisation of management situations relevant for collaborative IS research projects. 34th International Conference on Information Systems (ICIS2013). Milan, Italy.
[6] Vom Brocke, J. and Lippe, S. (forthcoming), Managing collaborative research projects: A synthesis of project management literature and directives for future research, International Journal of Project Management.

- Generating innovative results requires freedom and flexibility, while firm structures are needed to deliver widely usable project outcomes.
- Heterogeneity of partners is required to achieve excellence, but also results in challenges of inter-cultural, inter-organisational, and inter-disciplinary management.
- Research partners require autonomy, but research management requires a certain amount of consensus.

1.1.2. A first introduction to aspects of the management of collaborative research projects

Within the context of this study we define research management as the management of collaborative research projects. Hence when we refer to research managers and research management within the context of this study, this refers to management of collaborative research projects in Sixth and Seventh Framework Programmes (FP6 and FP7, respectively). The challenges for the managers of large collaborative research projects, including FP6, FP7, and Horizon 2020[7] projects, are manifold.

Leadership is an important challenge for research managers. This is due in part to the limited value of managing research projects by traditional planning and control approaches. Leadership skills for research management purposes may include scientific or technological expertise, skills needed to integrate technology and business, and entrepreneurial skills. As a consequence, managers of research projects may include professional managers that lack the in-depth scientific or professional knowledge of project participants. The other way around, managers may possess the in-depth knowledge, being a research professional, but lacking professional management skills. This raises challenges for managers as well as those that are managed.

Challenges in terms of leadership increase because of the intrinsic uncertainty in research projects. Such uncertainty requires a high level of autonomy of project participants with specific expertise on specialist domains. They know best how to find or develop the most relevant theories, technologies and solutions within their specialist domain. One of the first challenges for a research manager is to find the right balance between controlling participants (e.g. steering and instructing), facilitating individual participants (e.g. informing and assisting) and stimulating them to collaborate.

At the same time, research managers face challenges in terms of organisational design and planning of projects. Phases are overlapping, and non-linear. Tasks are interdependent, and the need for managing two-way interaction between researchers working on different tasks is clear. As such, interaction and collaboration are important features of collaborative research projects, which impose substantial challenges on research managers. The nature of collaborative project teams is another complicating factor. Because research projects are often inter-organisational and inter-disciplinary, challenges arise in finding partners, developing consortia, finding effective and efficient ways of collaboration, and ensuring that the results are relevant for all partners involved. In EU Framework Programmes, these challenges may be more substantial, due to requirements (or expectations) in terms of involving actors from different countries, sectors and disciplines, and involving actors from industry (Small and Medium Enterprises (SMEs) and large firms), academia, public sector, etc. As researchers in general have tight time schedules including many competing and conflicting obligations, an important aspect of research management is to ensure that

[7] Horizon 2020 is the eighth consecutive Framework Programme and, as such, the successor of FP7.

participants are sufficiently devoted to a project and that the project benefits from synergies with other projects.

Indeed, ambiguous goals impose another challenge to the research manager. Goals of large research projects may be abstract (curiosity-driven) or change during the project. This underscores the importance of flexibility within the boundaries of any contractual obligations. Another challenge lies in combining commercial and non-commercial interests. This challenge includes combining an orientation to applied technology and non-applied technology. For basic research, it may be difficult to clearly define end-users, e.g. direct customers such as a product division in a firm. The challenge for research managers is to gather information about the knowledge needs and commercial opportunities of researchers' peers, potential customers, funding agencies and other stakeholders.

1.2. Key objectives of the study

Our study was based on DG RTD's Call for tenders 2013/S 010-011411. Based on the Tender Specifications our study aimed at reaching the following three objectives:

- provide an in-depth insight in all aspects of the management of Framework Programmes projects;
- identify "enablers for success" and best practices in research management;
- develop a methodology for the investigation and analysis of research management of FP projects of multiple types (knowledge, organisation, innovation).

DG RTD has made these three objectives operational through a set of research questions that are included in Annex A, which also contains a reference to the specific section in which each research question is addressed.

1.3. The authors of this report

This study was conducted by a consortium of PwC Advisory and Technopolis Group. Wouter Jansen was overall project leader on behalf of PwC. Bas Warmenhoven (PwC) was responsible for day-to-day management of the consortium. Derek Jan Fikkers and Martijn Poel managed the Technopolis Group part of the consortium.

PwC consultants who contributed to the project include Jan-Hendrik Schretlen (reviewer and responsible partner for the project), Diederik Verzijl, Fabian Nagtegaal, Mark Lengton and Elco Rouwmaat.

Technopolis Group consultants who worked on this project include Rebecca Allinson, Erik Arnold, Michaela Gigli, Barbara Good, Peter Kolarz, Viola Peter, Lorena Rivera Leon, Amy Shifflette, and Stijn Zegel.

1.4. The content of this report

This report follows the structure of the questions posed to us by the European Commission. In the second section we present our research methodology. The third section presents the description, organisation and typology of teams involved in FP research projects. In the fourth section we present our findings regarding the internal management processes and supporting instruments. In the fifth section we discuss performance and efficiency of research management. In the sixth section we present our overall conclusions and recommendations. Finally, the seventh section contains some recommendations we make for further research based on what we found in the current, exploratory study. The annexes contain information on data and methods.

2. Research methodology

This section describes our approach to conducting the study. This approach is based on the proposal submitted by PwC and Technopolis Group in response to the Commission's call for tenders. This approach was further refined in a first work package that included a literature review and exploratory interviews with stakeholders and experts on the management of collaborative research projects.

The complete methodological approach consists of:

1. literature review and exploratory interviews, to explore the topic of research management in FP projects;
2. a large-scale survey of project managers and participants of FP6 and FP7 projects, which resulted in 7,980 completed questionnaires returned[8];
3. 30 mixed-method case studies at the level of individual FP6 and FP7 projects, including up to two interviews per case;
4. 15 additional expert interviews;
5. a round table with experts in the field, to critically assess and enrich the study's findings, conclusions and recommendations;
6. synthesis of the findings of steps 1 to 5 into this Final Report.

Section 2.1 below sets out to describe the scope of the study that lies at the basis of the approach. The details of the steps 1 through 5 mentioned above are provided in Annexes C through L to this report. The details of the synthesis of findings are provided in section 2.2. The approach described above has clear benefits, but also some limitations. These are mainly related to measurements of performance. We describe these methodological limitations, and our mitigation measures, in section 2.3 of this report.

2.1. Scope and focus of the study

Below, we discuss the scope of the study and the primary unit of analysis: a collaborative research project financed by FP6 or FP7. The study has a broad scope and focuses on the project level of analysis.

2.1.1. Scope of the study

Although this study is of broader relevance, the focus is on management of collaborative projects in FP6 and FP7. These programmes encompass various instruments (FP6 terminology) or funding schemes (FP7 terminology). The instrument/funding scheme of research projects or research and technological development (RTD) projects influences the characteristics of these projects and, hence, the challenges for research management.

Among the set of instruments in FP6, three instruments represented one third of the total number of projects and 75 per cent of all funding: Specific Targeted Research Projects (STREPS), Networks of Excellence (NoE) and Integrated Projects (IP). While STREPS were a well-established instrument already, NoEs and IPs were introduced in FP6.

A new structure was designed to capture the broad range of research activities funded by FP7. For each category of objectives, there is a specific programme corresponding to the main areas of EU research policy. The programmes are: Cooperation, Ideas,

[8] The details of the survey methodology and the response rates are provided in Annex C.

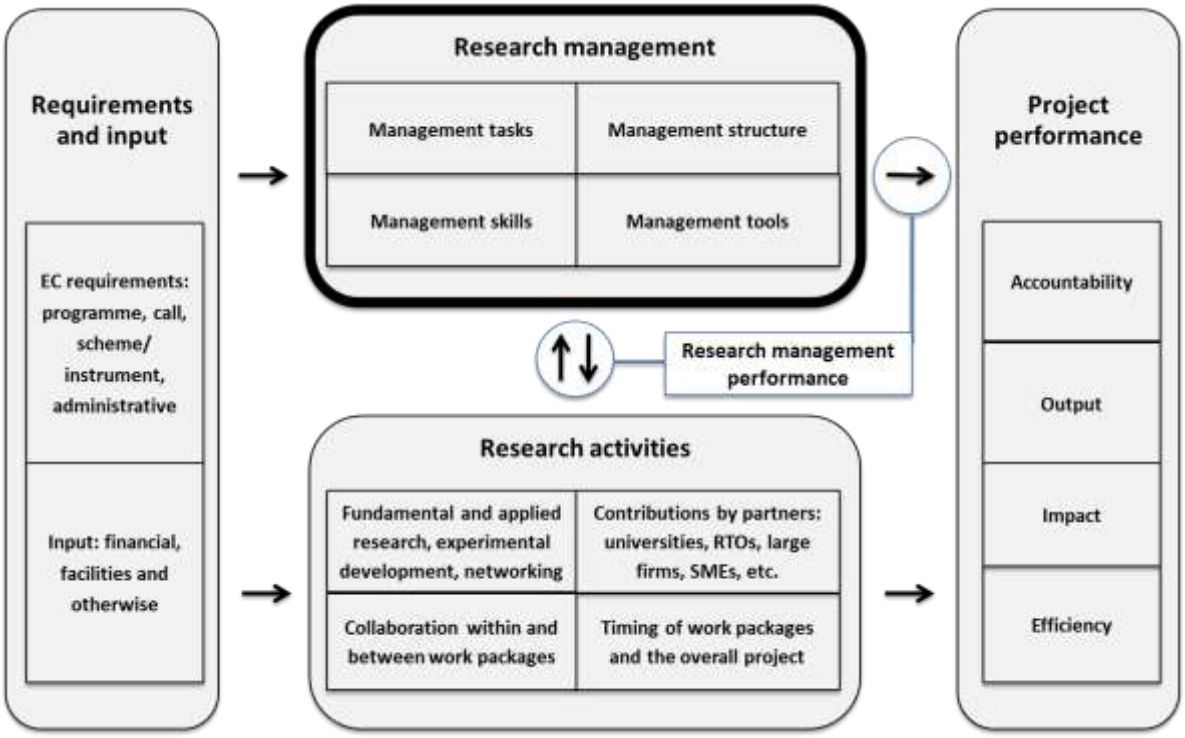
People and Capacities. In addition, the Joint Research Centre's (JRC) direct actions relating to non-nuclear research are grouped under a specific programme with its own budget allocation. In the context of collaborative research projects, the Cooperation programme is most relevant, as it encompasses more collaborative projects with three or more consortium partners than the other programmes under FP7. The main funding schemes are the Collaborative Research Projects; the Networks of Excellence; and Coordination and Support Actions.

2.1.2. Level of analysis of the study

The study design focuses on the project level. This implies that while the management of research organisations and project portfolios influences research management, the study is designed to observe research management at the project level. Thus, we have not explored research management at the level of businesses, universities or research and technology organisations.

In our survey, case studies and interviews, we have applied a frame of reference that allowed respondents to answer questions from the perspective of FP project manager and/or participant. We have used the same frame of reference when analysing documents and when discussing our findings with the Commission's Steering Group and the experts at the round table. Figure 2-1 displays this conceptual model which resulted from our desk research and exploratory interviews that were performed as the first step of the study.

Figure 2-1: Conceptual framework



First, Figure 2-1 presents the four main aspects of research management. In short, the study explores specific management tasks, the management model/structure for allocating and coordinating these tasks (e.g. by the Project Coordinator and technical project managers), the skills that are needed and the tools that are used for executing management tasks. Within each of these four aspects of research management, the study will examine the most relevant elements (e.g. crucial tasks and skills). As the four aspects are linked, for example specific tasks require specific skills – our study will also explore relations between these different aspects.

Second, Figure 2-1 illustrates that research management is influenced by the requirements and inputs of a project. These concern for example requirements in terms of the technical content and societal issues to be addressed by a project (as laid down in work programmes and calls), administrative requirements, the number of partners required or recommended, project-specific requirements resulting from the negotiation phase, the EU contribution and total project budget.

Third, whereas research management affects the characteristics of projects, project characteristics may also determine what constitutes the most appropriate project management. The influence is two-way. For instance, decisions on the management model and the management tools can be adapted to (or aligned with) a project with: an emphasis on experimental development (such as technical pilots, living labs and demonstrators); a large consortium; work packages that are highly interdependent; and total project duration of four years. There are indications that experimental development projects require research management with a focus on planning and practical matters, i.e. a research management approach that partly fits the technical-rational model of project management.[9]

Fourth, the requirements of FP projects may in some cases strongly affect the way the project is being designed and executed. For example, specific calls and funding schemes may trigger the interest of specific types of actors, and may strongly influence consortium creation and the timing of activities. These aspects may thus in some cases be rather independent from research management. More in general, Figure 2-1 allows for a nuanced analysis of the influence of research management.

Fifth, research management has a direct and indirect influence on project performance. In general, the influence of research management may be stronger when concerning accountability and quantity of output (such as timely delivery of project deliverables and progress reports). Research management may have a more indirect (yet substantial) influence on the quality of output (by providing scientific leadership, reviewing deliverables, etc.) and on the impact of the project on participants and other actors (i.e. outcomes and impact). Along the same lines, research management influences efficiency (as this concerns input, output and impact).

Although our study will mainly focus on exploring the most relevant aspects of research management, it will also explore in more detail the above-mentioned five bullets on interactions between those research management aspects.

2.1.3. Exploratory nature of the study

As the study is the first of its kind, aimed at discovering what goes on in terms of research management within FP projects, it is exploratory in nature. While literature on project management exists, its assumptions do not allow for a direct application of its insights in the specific context of collaborative research projects conducted within the Framework Programmes, as was shown in section 1.1. As a result, the current study is not designed to test hypotheses on what works well in research management of FP projects. Rather, it should be seen as a collection of bottom-up insights and an inventory of current practices.

In some cases, we consider the evidence available sufficient to identify enablers of success and best practice. In these cases the inventory we conducted culminates in the good practice recommendations made in section 6.

[9] EC (2007), FP7 In Brief – How to get Involved in the EU 7th Framework Programme for Research. Available at: http://ec.europa.eu/research/fp7/pdf/fp7-inbrief_en.pdf; Huljenic, D., Desic, S. and Matijasevic, M. (2005), Project Management in Research projects. 8th International conference on Telecommunications, June 2005, Zagreb.

2.2. Synthesis, triangulation and reporting

In this study we used different data sources that we describe in Annexes C to L. These include desk research and exploratory interviews, a large-scale survey of FP6 and FP7 project participants (including those participants with a project management role), case studies of the research management in 30 FP6 and FP7 projects, in-depth interviews with 15 experts and the round table with experts to critically assess the findings, conclusions and recommendations. The case study characteristics are presented in Annex C.

These data sources were used to cross-validate and enrich findings. In general, our survey data provide broad information on **what** are the features of research management in a project, and **which** relationships exist between them, whereas our 30 case studies were designed to provide more insight in **how** research management is implemented in actual practice, and what challenges are met by coordinators, and participants. Finally, the interviews performed within the case studies and with experts answered questions about **why** certain choices are made in research management, in addition to answering any questions that remain after studying the survey results and the documents available for this study.

In a small number of instances, different data sources have shown real or apparent contradictory results in some aspects. In general, any contradictory results obtained through the different data collection methods have been addressed as follows:

1. Survey results were placed in a higher hierarchical order than the other data sources when concerning descriptive data, as they were more structured, and based on a far larger number of observations.
2. Case studies were placed in a higher hierarchical order than the other data sources when concerning more complex issues that would require an in-depth qualitative approach rather than a quantitative one.
3. The in-depth expert interviews and the round table were used to gain insight into the nature and cause of any (real or apparent) conflicting results.

2.3. Limitations

The approach to the study has three inherent limitations. First, as the study is exploratory in nature, the approach has been designed to cover the full breadth of research management in FP6 and FP7 projects. In some cases, striving to be comprehensive in addressing all aspects of research management as set out in the Commission's Tender Specifications (from which the research questions are presented in Annex A) has limited the possibility to study all phenomena encountered in-depth. The approach does allow some room for deepening the investigation, and so several topics encountered in the literature review and inventoried in the survey have been addressed by collecting rich data from the multi-method case studies. However, this was not possible for all aspects of research management. Therefore we will make several suggestions for future research in section 7 of this report, regarding topics that could not be fully explored within the given scope.

Second, the exploratory character of the study implies that almost all data used in the analysis are primary data, which have been collected specifically for the purpose of this study. Although basic project-level data were available from the Commission's E-CORDA database and some project-specific records with regard to the projects selected as case studies, most of the data used were collected from the total of more than 100 interviews and the survey to which participants from more than 8,000 FP6 and FP7 projects responded. This includes the measurement of two key variables, i.e.

project success and research management performance (RMP), which could not be retrieved from existing sources. Although these variables were based on project participants' self-assessments in the survey, we did find that these self-assessments aligned with the opinion of the responsible EC project officers in the 30 case studies. This 30 case study sample is a clear representation of our survey sample (and thus of the FP projects population) in terms of e.g. project size, country representation, industry representation, FP6 and FP7 themes and schemes. Responsible EC project officers' judgements (as reported in periodic review reports) on RMP in these 30 cases correlate with the self-assessments of project participants. Thus, for the purpose of this project we consider the self-reported values of RMP to be methodologically valid, and to give a clear impression of actual management performance.

Third, the study has been limited to the Framework Programmes of the European Commission and does not include a complete comparison with similar research funding programmes in other territories of the world. We have been able to explore some aspects of this comparison, but only to a very limited extent. As a result our findings and recommendations are based on the "inside" perspective of the FP ecosystem.

3. Description, organisation and typology of teams involved in FP research projects

In this section, we answer the study research questions that address the description, organisation and typology of teams involved in FP research projects. The answers are formulated based on the findings from the survey, the case studies or both, depending on the data and results obtained by using these two methods availability from either source.[10]

When we refer to "low performance" and "high performance" in the case study descriptions, this concerns research management performance as rated on a scale of 1-10 by the survey respondents in question #63 of the survey questionnaire (see Annex E). "Low performance" refers to projects with an average score of 5 or lower in the survey, while "high performance" refers to an average score of 8 or higher. In a similar vein, we occasionally refer to "high performing projects" or "low performing projects".

3.1. Functions and roles in FP project teams

This section answers the question "What are the different functions and roles within a team involved in FP research projects?" The sub-sections below describe the findings of the case studies and interviews. All of the functions and roles found in the case studies were also found in multiple FP projects in the survey.

3.1.1. Functions, role divisions and descriptions

In all projects of which a case study has been conducted, we find a structure based on Work Packages (WPs) led by WP leaders, who are responsible for coordination and goal attainment related to the specific WPs. The WP leaders generally report to a scientific coordinator, who, together with the WP leader team, takes strategic scientific decisions in a body called the Executive Board or the steering committee. However, it can be observed that in smaller consortia the Executive Board function is often bypassed and strategic issues are discussed on a consortium level, for instance through the General Assembly (GA).

All projects make use of a project manager, often supported by a project office, who is responsible for administrative, financial and legal matters. The project management and scientific coordination role can be either fulfilled by different people or be combined by the Project Coordinator.

Depending on project characteristics, several specific function divisions and descriptions are observed. Functions like Intellectual Property Rights (IPR) manager, a technology implementation manager, advisory board members, a gender officer or a training coordinator were deemed relevant in projects with respectively highly

[10] The limited number of 30 case studies examined in the study allows for a qualitative analysis only. We have therefore avoided mentioning exact numbers of case studies when describing the manifestation of certain phenomena. When using "in general", "often", "most/mostly", "prevalent", "typically", "predominantly", "usually" and "clearly show the tendency", we refer to at least two-thirds of case studies within (within a certain group of case studies). When using "some" and "only a few" we refer to approximately one-third of the case studies (within a certain group), whereas "can also be" is used to indicate everything less than one-third up until one instance.

patentable project results, project results that were close to market or for instance project focused on training activities.

All consortia in the case studies have a General Assembly, as is required by EC regulation. The General Assembly is always chaired by the Project Coordinator and takes high-level decisions that affect the project's overall direction.

Given the relative size of our sample, specifically with respect to Project Coordinators, combined with the questions included in our survey (for practical reasons limited to a fixed set of project roles), we cannot ascertain a significant difference between FP6 and FP7 with regards to 'Functions, role divisions and descriptions'.

3.1.2. Division of work

All 30 case study projects in this project were structured around WPs. In projects structured around WPs, WP leaders are appointed to manage these WPs. The Project Coordinator is often the WP leader of the management WP. Some projects make use of a lower management level in the form of task leaders, or higher management level in the form of sub-project leaders. These sub-project leaders are hierarchically placed above the WP leaders but below respectively the Executive Board (if present) and the General Assembly.

In the case studies of FP6 and FP7 projects with a high average performance score, most coordinators are assisted by a formal project office with one or more people assisting the coordinator with administrative, legal or financial issues. On some occasions the project manager cannot rely on formal assistance (e.g. from within the coordinator's own organisation) but is supported by more senior individuals in the consortium. For example, in one of the projects, the Project Coordinator was not the most experienced FP participant. The unofficial management assistance that the Project Coordinator received from the more experienced individuals in the consortium was acknowledged as highly valuable.

Some consortia for these high-performing FP6 and FP7 projects also made use of a specialist external consultant to provide project management support or even take full responsibility for project coordination. These organisations could either fulfil the role of project manager, taking care of all financial and administrative matters, or even the role of Project Coordinator.

In some consortia in this set of projects, there was a formal function below that of WP leader, namely task managers (TM). The TMs were made responsible for WP sub-tasks. In contrast, in another project there was a formal role between that of the WP leaders and the (scientific) coordinator, namely that of Development Group (DG) leaders. The DG leaders were responsible for coordination of several WPs within their development line.

In case studies of FP6 and FP7 projects with a high average performance score, the functions of Project Coordinator, scientific coordinator and project manager are usually combined into one role, but can also be seen divided across two persons. In one of these projects there were three different individuals for scientific coordination, project management and official coordination. The exact division of work between these individuals differs substantially, although the official Project Coordinator is always responsible for external communication to the EC (as mandated) and adherence to the grant agreement. On some occasions the project manager unburdens the scientific coordinator in every possible way (e.g. even in deliverable development), whereas on other occasions the scientific coordinator also conducts administrative tasks himself.

3.1.3. Division of management functions and roles

In case study projects with a low performance rating, we see *additional* roles and functions related to the nature of the project. So-called hub leaders and sub-project

leaders were observed in larger projects in these case studies (e.g. in one instance a consortium consisted of 59 partners). In this instance, project management was partially conducted by a specialist management consulting firm within the respective field. In addition, specialist dedicated roles like dissemination and exploitation managers could be seen in projects closer to the market.

Findings on team functions and roles:

- Projects with a low performance rating appear to be more loosely structured than those with high ratings.
- Several functions and role divisions and descriptions are observed in nearly all case study projects.
- Our case studies suggest that project performance benefits from tight links between Work Packages.
- Our case studies show that low performing projects have a more complex division of management functions and roles.

3.2. The profile of Project Coordinators

This section answers the question "Who is the manager? What is her/his profile?". Below we present our findings from the survey, the case studies and the interviews on this topic.

3.2.1. According to our survey results, the average Project Coordinator is best described as a 47-year-old male with a Western European nationality, employed at a university or RTO

In order to answer this question, we first need to define "manager". In our survey, 81.6 per cent of the respondents answered that the Project Coordinator was appointed to conduct project management at FP level. We will therefore consider this group in more detail while considering this research question.

Of the Project Coordinators that filled in our survey, 78.85 per cent are male. Although Project Coordinators on average have about 15 years of experience in his field of expertise, distributional analysis shows interestingly high concentrations around 10, 20, 25 and 30 years of experience. This implies that a considerable number of Project Coordinators have experience in excess of 15 years.

Our survey data show that the FP6 Project Coordinators on average are of higher age, had slightly more prior experience with FP projects and were slightly more experienced in the relevant field. However, given the overall number of Project Coordinators per programme in our sample, this is more likely to tell us something about the characteristics of the Project Coordinators included in our sample rather than suggest a general trend for FP6 and FP7.

Furthermore, as is shown in Figure 3-1 and Table 3-1, 53 per cent of the Project Coordinators in our survey came from a Western European country, followed by 26 per cent from Southern Europe, 9 per cent from Northern Europe and 4 per cent from Eastern Europe.[11] Of all Project Coordinators that took our survey, 18 per cent came from Germany, 13 per cent from Italy, 9 per cent from respectively the UK and France, and 8 per cent from Spain.

[11] The total adds up to 92%, as 8% of the respondents selected "other" as nationality and as such could not be classified according to European sub-regions. Our classification largely follows the United Nations Statistics Division- Standard Country and Area Codes Classifications (M49). It should be taken into account that some European countries that are not EU Member States are classified as "other". These include e.g. Norway.

Figure 3-1: Relative distribution of nationalities of Project Coordinators (by European sub-region or "other")

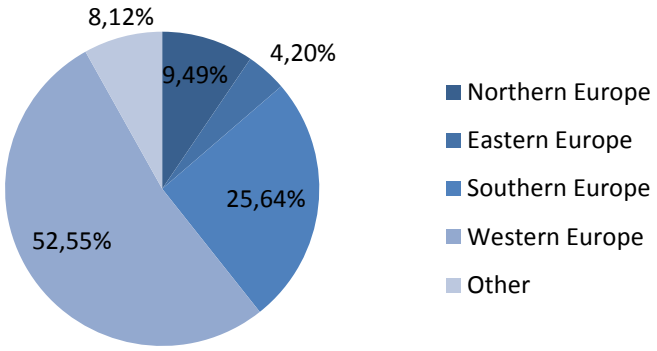
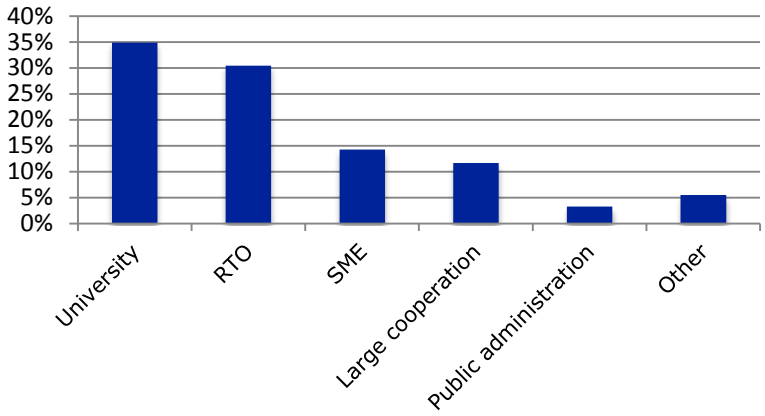


Table 3-1: Nationalities of Project Coordinators, in order of most to least prevalent among the survey respondents

Nationality	European sub-region	Frequency	Percentage
German	Western Europe	196	18%
Italian	Western Europe	138	13%
British	Western Europe	98	9%
French	Western Europe	97	9%
Other	N/A	89	8%
Spanish	Southern Europe	86	8%
Dutch	Western Europe	71	6%
Belgian	Western Europe	52	5%
Swedish	Northern Europe	44	4%
Austrian	Western Europe	42	4%
Greek	Southern Europe	37	3%
Finnish	Northern Europe	33	3%
Danish	Northern Europe	27	2%
Irish	Western Europe	16	1%
Polish	Eastern Europe	16	1%
Portuguese	Southern Europe	16	1%
Hungarian	Eastern Europe	7	1%
Slovak/Slovakian	Eastern Europe	6	1%
Cypriot	Southern Europe	4	0%
Luxembourgian	Western Europe	4	0%
Bulgarian	Eastern Europe	3	0%
Czech	Eastern Europe	3	0%
Lithuanian	Eastern Europe	3	0%
Estonian	Eastern Europe	2	0%
Latvian	Eastern Europe	2	0%
Romanian	Eastern Europe	2	0%
Slovenian/Slovene	Eastern Europe	2	0%
Croatian	Eastern Europe	0	0%
Maltese	Southern Europe	0	0%
Total		1096	100%

With respect to the type of organisation Project Coordinators tend to work for, over 65 per cent of the Project Coordinators work for either a university or a research institute. It is also interesting that relatively more Project Coordinators come from SMEs than from large corporations (14.26% vs. 11.70%).

Figure 3-2: Relative distribution of the type of organisations Project Coordinators work for



While we acknowledge that it would indeed be interesting to gain more insight into the difference between female Project Coordinators in FP6 versus FP7, unfortunately our sample of female Project Coordinators is too small to report relevant findings for the Framework Programmes as a whole. In total, 186 female Project Coordinators responded to our survey, of which 107 coordinated an FP6 project and 79 an FP7 project. Compared with the total number of FP projects (both FP6 and FP7), we are not confident that this is a representative group of observations to specifically characterise female Project Coordinators in Framework Programmes.

Having said that, the female Project Coordinators overall are only slightly different than their male counterparts in our sample. Although they are typically from the same regions as male Project Coordinators[12], they are on average slightly younger (45 years old) and slightly less experienced in the field (on average 13 years of experience). Moreover, whereas male Project Coordinators on average participated in 6.1 FP projects in their career, the female Project Coordinators participated in an average of 5.6 FP projects in their career.

In addition, a relatively higher share of female Project Coordinators responded to our survey for FP7 projects compared to FP6 projects. The share of female Project Coordinators in our sample rose from 18.01 per cent (FP6) to 21.82 per cent (FP7) in our sample. It would be interesting for further research to establish whether such an increase can also be observed for the Framework Programmes as a whole, not just in our sample.

[12] I.e. most female Project Coordinators come from Western Europe, followed by respectively Southern Europe, Northern Europe, other countries and Eastern Europe.

Findings on the profile of Project Coordinators:

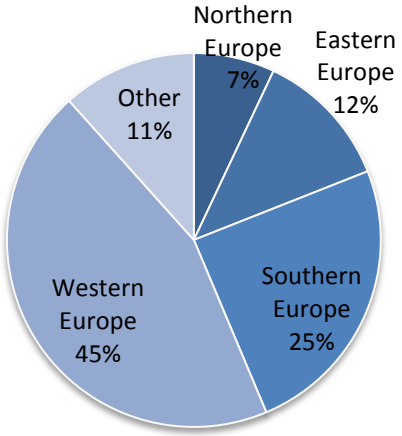
- Project coordinators are usually male, middle-aged university or research institute employees.
- According to our survey results, the average Project Coordinator is best described as a 47-year-old male.
- He is most likely to have a Western European nationality and to work at a university or a research institute.
- Female coordinators have backgrounds that are similar to those of their male counterparts; their age and years of experience are generally slightly lower.

3.3. The profile of FP participants

This section answers the question "Who are those managed? What are their profiles?". Below we present our findings from the survey, the case studies and the interviews on this topic.

Our survey shows that FP project participants as a group are strikingly similar to the group of organisations that coordinate FP projects, except for a relatively higher percentage of Eastern European and non-EU participants. According to our survey results, the average representative of an FP participant is hardly different from the average Project Coordinator. He[13] is best described as a 47-year-old male with approximately 16 years of experience in his field of expertise and most likely from a Western European country. Based on our sample, 77.02 per cent of the participants' representatives are male. Similar to the Project Coordinators, we note that although the average experience is approximately 16 years, there are interestingly high concentrations noticeable at around 10, 20, 25 and 30 years of experience. Perhaps surprisingly so, participants' representatives in our sample do not have significantly less experience than their managers.

Figure 3-3: Relative distribution of nationalities of project participants (by European sub-region or "other")



Again we see that the majority of participants' representatives come from Western Europe. Whereas 45 per cent have a Western European nationality, 25 per cent come

[13] We refer to Project Coordinator as "he" and "him" in this report, as the majority of Project Coordinators are in fact men. However, these references also include reference to female Project Coordinators.

from Southern Europe, 12 per cent from Eastern Europe and 7 per cent from Northern Europe.[14] We received no signals that the spread across nationalities of the organisations' representatives is very different from the spread across nationalities/countries of their organisations (e.g. because of the extent to which persons work abroad).

A noticeable change compared with the Project Coordinators, however, is that relatively more participant organisations than Project Coordinators are from Eastern Europe and non-EU countries. However, the top 5 nationalities of participants differ only slightly from the top 5 nationalities of Project Coordinators, with only Spain and France swapping places. This is shown in Table 3-2.

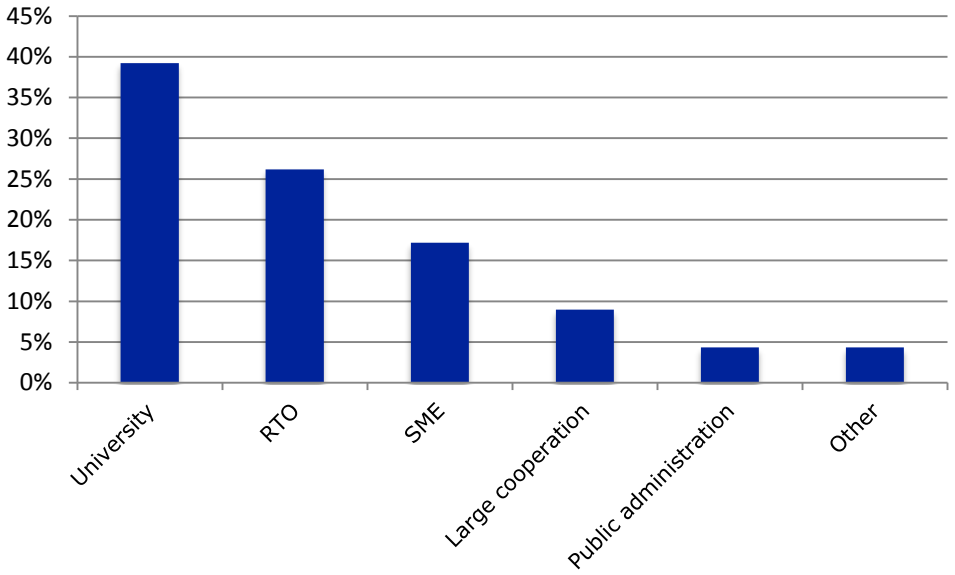
Table 3-2: Nationalities of project participants, in order of most to least prevalent among the survey respondents

Nationality	European sub-region	Frequency	Percentage
German	Western Europe	1230	16%
Other, namely	N/A	922	12%
Italian	Southern Europe	870	11%
British	Western Europe	749	9%
Spanish	Southern Europe	616	8%
French	Western Europe	551	7%
Dutch	Western Europe	422	5%
Belgian	Western Europe	253	3%
Greek	Southern Europe	245	3%
Austrian	Western Europe	245	3%
Swedish	Northern Europe	241	3%
Polish	Eastern Europe	214	3%
Portuguese	Southern Europe	184	2%
Finnish	Northern Europe	167	2%
Danish	Northern Europe	148	2%
Hungarian	Eastern Europe	145	2%
Czech	Eastern Europe	136	2%
Romanian	Eastern Europe	106	1%
Irish	Western Europe	87	1%
Slovenian/Slovene	Eastern Europe	76	1%
Bulgarian	Eastern Europe	57	1%
Slovak/Slovakian	Eastern Europe	56	1%
Lithuanian	Eastern Europe	52	1%
Croatian	Eastern Europe	41	1%
Estonian	Eastern Europe	37	0%
Latvian	Eastern Europe	31	0%
Cypriot	Southern Europe	27	0%
Maltese	Southern Europe	12	0%
Luxembourgian	Western Europe	7	0%
Total		7927	100%

[14] The total adds up to 88%, as 12% of the respondents selected "other" as nationality and as such could not be classified according to European sub-regions. It should be taken into account that some European countries that are not EU Member States are classified as "other". These include e.g. Norway and Switzerland.

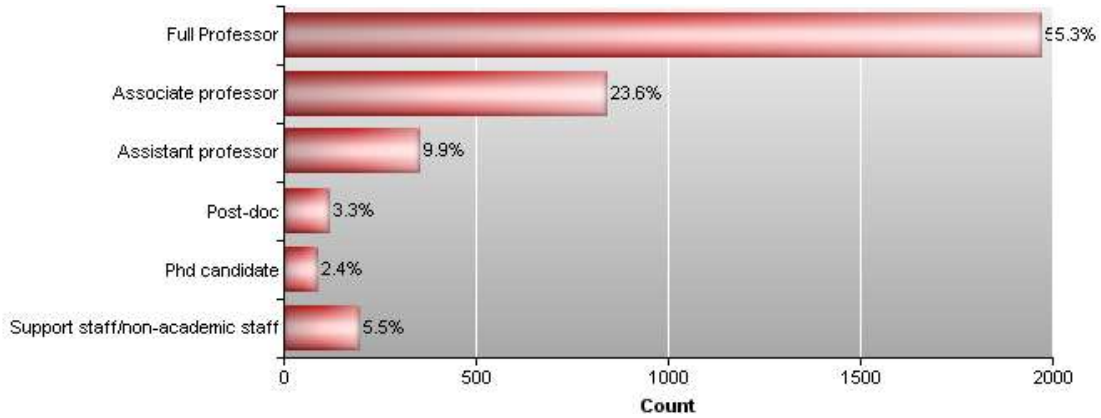
In terms of the type of participant organisation, we again see a strong presence of universities and research institutes (respectively 39.02% and 26.16%). As may have been expected, the comparison between Figure 3-2 and Figure 3-4 shows that SMEs are more prominent among participants than among Project Coordinators (17% vs 14%).

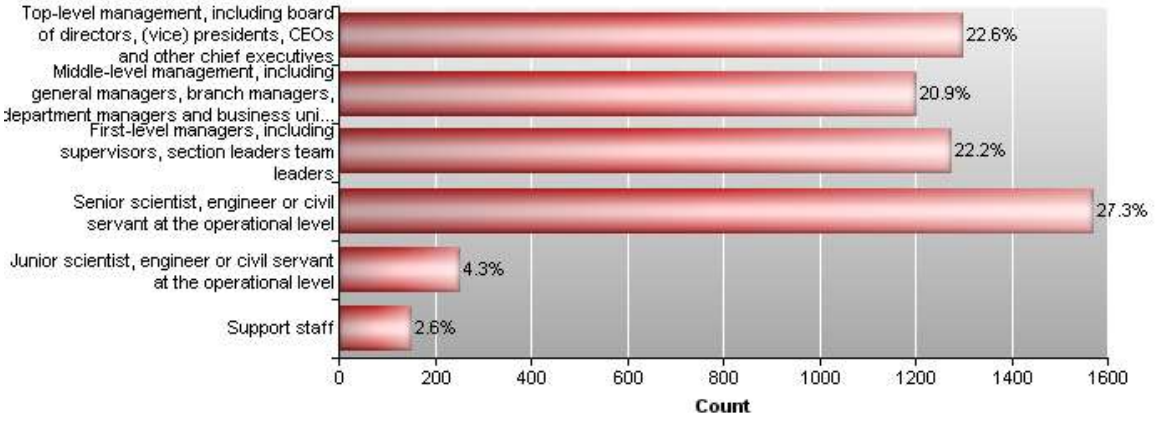
Figure 3-4: Relative distribution of the type of participant organisations



Finally, it can be observed that overall (within both coordinators and participants) beneficiaries from universities are more senior (functional level within the organisation) than their counterparts from industry (see Figure 3-5).

Figure 3-5: Relative distribution of functional levels across university participants and industry participants





Findings on the profile of project participants:

- FP project participants' characteristics do not seem to differ much from those of Project Coordinators except for a higher percentage of Eastern Europe, associated, and third countries.

3.4. Size and composition of consortia

This section answers the question "What are the factors that define the actual size and composition of a team or a consortium?". In this section we present the main factors that determine the actual size and the actual composition of an FP project consortium. The section is based on a set of 30 case study projects and 6 additional, non-case study interviews.

3.4.1. Role of the call texts

In the call texts the Commission sets the framework for any important decision on the exact size and composition of consortia that can be made at the participant level. In high performance case study projects this phase seems crucial: the consortia are built with the call texts closely in mind.

Our case study results show that in FP7 projects with a high average performance score, the size and composition of the consortium is typically defined based on firm adherence to the requirements of the call text. Especially the need for specific skills, competencies, areas of expertise or specialities recognised through analysis of the call texts drives the search for suitable collaboration partners. As the diversity of the required skills and expertise increases, so does the diversity in consortium partners. Experts in specific areas are included for different aspects of the envisaged project, and the need to cover specialised knowledge fields or technology areas is addressed by inviting world-leading researchers within these fields to join the consortium. Similarly, the need to cover specific geographic areas affects the composition of the consortium. When topics and call texts require participation of organisations from specific countries or regions, this is very much taken into account by the initiators when developing the consortium.

In other words, in high performing projects the initiators take few degrees of freedom vis-à-vis the call texts, and the call texts have a relatively significant impact on the size and composition of the consortium.

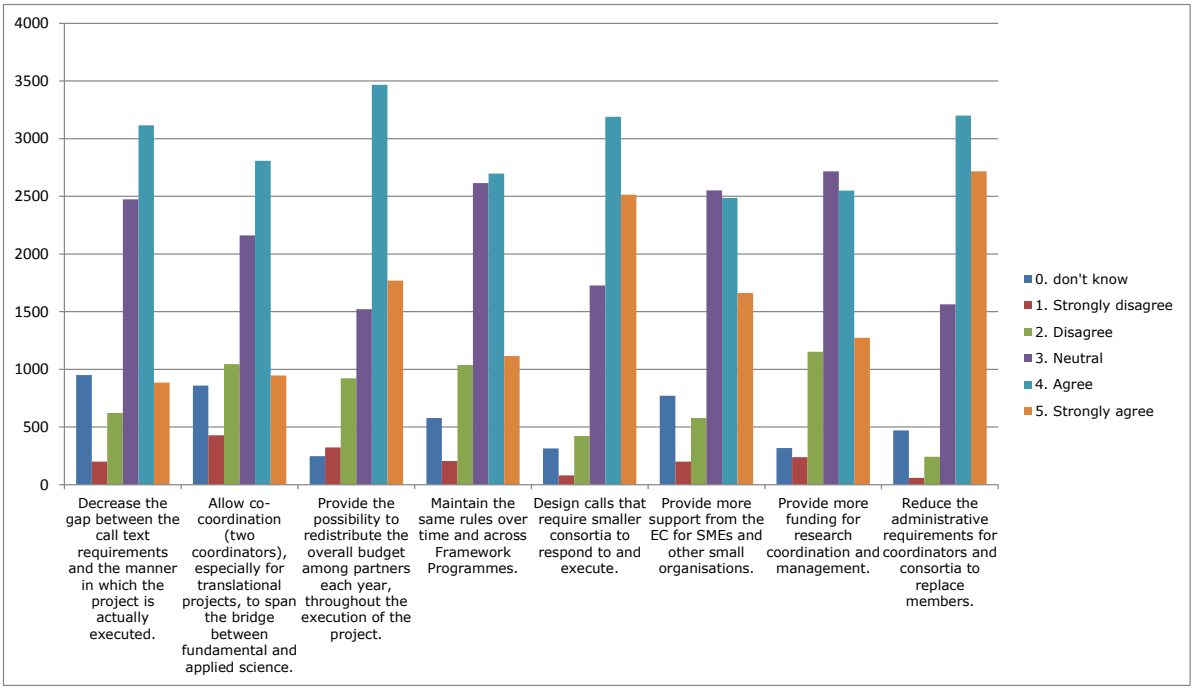
In FP7 projects with a low average performance score, the requirements that stem from the call text or topic play a smaller role in the determination of size and composition of the consortium than is the case for high performance projects. The search for partners seems to be focused on established contacts in comparison with

the high performance projects. Our case studies indicate that the composition of the consortium follows a less rational process than is the case with high performing projects. The process does not necessarily focus on finding the best partners in terms of knowledge or expertise, but rather follows the logic of existing social ties, often in professional and academic networks. Initiative takers use their own networks and their second-tier networks (friends of friends), but the discovery of new networks, e.g. through the use of search engines, seems less frequent. Collective norms and standards, as well as jointly created ways of working and monitoring seem to be considered important. However, if the project requires the participation of SMEs, the Enterprise Europe Network and the "Find a Partner" database are consulted.

In FP6 projects with a low average performance score, the case studies show a similar pattern. Although the requirements from the call text or topics provide a framework for which type of organisations should be included in the consortium, and what knowledge and expertise should be available within the consortium, social ties and existing networks are an important factor for how the consortium is composed. In some cases, the existing professional networks of several initiators are brought together in one consortium, while in other cases one initiator simply invites his or her professional contacts to join a consortium.

Finally, overall we can conclude that FP participants would welcome calls that are designed in such a manner that smaller consortia are able to respond and execute them. This pre-determined recommendation to the EC was ranked most positive amongst a selection of eight (see Figure 3-6).

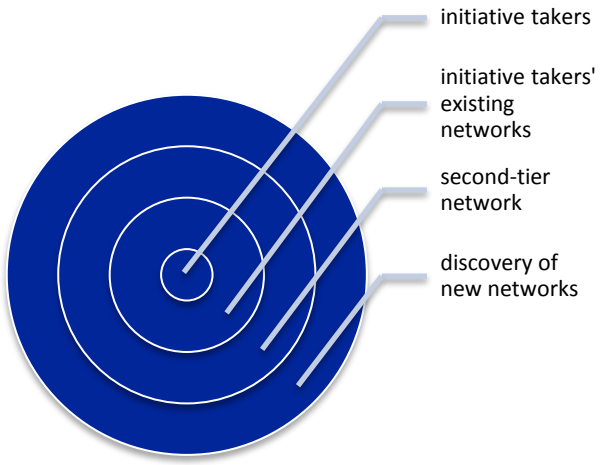
Figure 3-6: The degree to which participants agree with a selection of eight pre-defined recommendations toward the EC for enabling better research management



3.4.2. Process of forming an FP consortium

After the call texts have been released, the initiators operate in pragmatic ways. Within the frameworks set by the European Commission on size of the consortium, and types of participants required, potential participants are identified. Our case studies indicate that this is done in a more or less sequential process that is illustrated in Figure 3-7.

Figure 3-7: Second phase of the process: identifying consortium partners



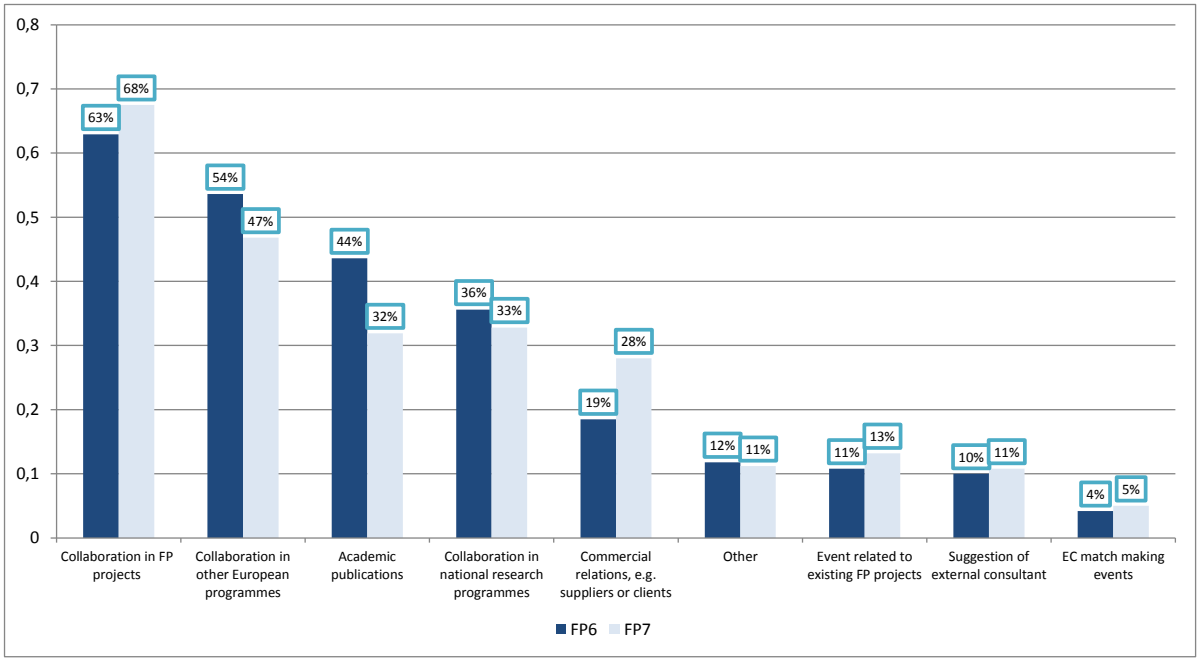
In the first place, interviewees in the case studies indicate that the existing networks of the initiators are used. It is important to note that this is done at an inter-personal level. These inter-personal networks of the initiators are the first important determinant of the size and composition of the consortium in the second phase.

Based on the survey, the following inter-personal relations were found, in order of frequency:

- former partners in previous FP projects (63%);
- former partners in other types or research projects, including Member States' programmes (50%);
- commercial relationships (21%).

When comparing FP6 with FP7 projects, FP7 project initiators rely even more heavily on inter-personal networks. This increase is caused by the shift from academic publications to commercial relationships (see Figure 3-8).

Figure 3-8: How consortia identified partners, both organisations and individuals



The reasons for the importance of existing networks are clear. Our case studies indicate that trust and goodwill between participants in research projects tend to develop strongly in cases of repeated collaborations. Usually, this group sits together and develops a first project outline. In some cases, this project outline is developed in a concept note or project outline paper of about three pages. This will inevitably impact on size and composition of the consortium. Our case studies indicate that based on this first project outline, other potential consortium partners are approached. This is done in a "friends-of-friends" process that we describe in section 3.5.

When the first outline is complete, second-tier relationships start having an impact on composition and size of the consortium as well. They are important in the composition phase, as they are considered as relatively trustworthy by the initiators. After both the initiators' networks and the second-tier networks have been deployed, the initiators usually expand their networks in a process that we refer to as the discovery of new networks. These new networks are used to fill the missing partners (often SMEs, but also industrial actors or end-user organisations) or the missing competencies in a consortium. This is done in a number of ways that we detail in section 3.5.2. These findings are confirmed by the interviews with serial participants in FP6 and FP7.

Our case studies show that in FP6 projects with a high performance score, the size and composition of the consortium are determined in a similar way as for FP7 projects with a high performance. However, less specific emphasis is placed on an analysis of the requirements that stem from the call text or topic. The case studies indicate that initiators assess the size of the grant or the project, and from that stipulate the size of the consortium, in some cases in consultation with Commission officials. Also, a larger role is reserved for the social network of the initiator, from which potential consortium partners are drawn. The discovery of new networks, e.g. through search engines and through matchmaking events, played a smaller role in FP6 than in FP7 projects.

Findings on the size and composition of FP project consortia:

- Size and composition of consortia, and also performance, are influenced by the call texts, but determined in a three step process that follows the release of the call texts:
  - existing inter-personal networks are used to develop a first outline of a proposal with a group of existing contacts;
  - second-tier relations are invited to join the consortium based on this first outline; and
  - the discovery of new networks to find the remaining partners serves to complete the composition of the consortium.
- The impacts of the call texts on project performance are significant.
- Low performance case study projects: the requirements that stem from the call text or topic play a lesser role in the development of the consortium; initiative takers take more freedom in terms of size and composition.
- After the release of the call texts initiative takers combine their existing inter-personal networks with second-tier relations and the discovery of new networks to compose a consortium.

3.5. The setting up of FP project consortia

This section answers the questions "How was the team/consortium set up? Who are the initiators? Which channels/networks are used to search for partners?". The section is based on our survey, the case studies and the interviews on this topic.

3.5.1. Initiators

As we expected, our case studies and our survey data show that the initiators of most consortia are usually experienced researchers. About two thirds of the initiators work for universities or Research and Technology Organisations (RTOs). About 11 per cent work for large corporations, and about 15 per cent work for SMEs. When the call text or topic requires a large consortium, the initiator is often a large and renowned organisation. The initiative for projects that involve (a large number of) SMEs is often taken by one of the RTOs.

The initiators usually originate from Western Europe (>50%). Only 4 per cent originate from Eastern Europe. Almost 80 per cent of the initiators are male. They have substantial experience in research; usually over 10 years, with an average of 15 years. Initiative takers have usually worked in FP projects before, either as a participant, or as a Project Coordinator.

3.5.2. Identification of partners

Our survey results show that initiators combine their existing inter-personal networks with second-tier relationships and the discovery of new networks to compose a consortium. We introduced this process in section 3.4.2. In the first place, existing networks of the initiators are used. It is important to note that this is done exclusively at an inter-personal level.

Commercial relationships are highly important for identifying potential SME partners for the consortium. Many SMEs in FP projects are university spin-offs set up by former PhD students, and post-docs of university professors or associate professors who take the initiative for an FP project.

Early on in the process, channels and networks in second-tier relations are used as well. Many coordinators and participants whom we interviewed refer to them as their "friends-of-friends". They are important in the composition phase, as they are considered as relatively trustworthy by the initiators. They are usually perceived as participants that are good, that will add value to the proposal, and that will add value to the project itself. Again, proximity is a relatively important factor.

After both the initiators' networks and the second-tier networks have been deployed, the initiators usually expand their networks in a process that we refer to as the discovery of new networks. These new networks are used to fill the missing partners (often SMEs, but also large firms or end-user organisations) for the missing competencies in a consortium. Our case studies and our interviews show several ways to discover new networks. These include:

- Non-EC search engines. Typically including PubMed, ScienceDirect, and Scopus. Initiative takers regularly hire external consultants to come up with e.g. "a top 10 of universities in the specific field *x* or *y*" and to use sophisticated non-EC search engines for that purpose. This was the case in several of the case study projects.
- Matchmaking Events. National Contact Points (NCPs) and the European Commission regularly organise matchmaking events for FP themes and calls. Our study however shows that their impact on the actual size and composition of a consortium is limited. Only one of the case studies shows that only few potential consortium members were found through networking events organised by the European Commission. This was the case in only 4 per cent of the FP projects assessed through our survey.
- The use of EC search engines. In theory particularly the Community Research and Development Information Service (CORDIS). CORDIS can provide initiators and other participants with a detailed overview of participants in previous

projects. It might give them an up-to-date insight in the state-of-the-art in a specific field. In none of the case studies was this instrument used.

3.5.3. Effect on project performance

Our case studies show no significant differences between FP6 and FP7 projects in terms of the way that a consortium is set up. There are no clear differences between the initiators' characteristics, nor are there significant differences in terms of the networks used to search for partners

Projects with a low average performance score were relatively often based on previously formed consortia. In some of these low performance cases, over 50 per cent of the consortium members had already worked together in an earlier project, while in other cases the consortium is a near-perfect copy of an earlier collaboration. That does not automatically imply that newly formed consortia automatically operate better. This is only the case under certain circumstances. For instance, our case studies of low-scoring FP projects feature several consortia that were new, but that were brought together based on open-invitation multi-day meetings organised by an industrial actor interested in developing a project proposal. Drawing from both its network in academia and its commercial relations with buyers and suppliers, the industrial actor hosts such a multi-day meeting to gauge interest, organise the rough composition of the consortium, and develop an initial project outline. Even though this is probably the most accessible form of matchmaking, it is not *per se* the best form to find the best participants and reach optimal project performance.

Findings on the process of setting up FP project consortia:

- Often consortia are set up conservatively; the initiative takers usually have a substantial track in the field and use conventional ways to seek for partners.
- Initiative takers are usually middle-aged men from universities and RTOs with a substantial track in the field.
- Partners are usually identified in a three-step process that involves the use of own networks, the second-tier network, and the discovery of new networks.
- Our case studies suggest that project performance is influenced by the partner search process.

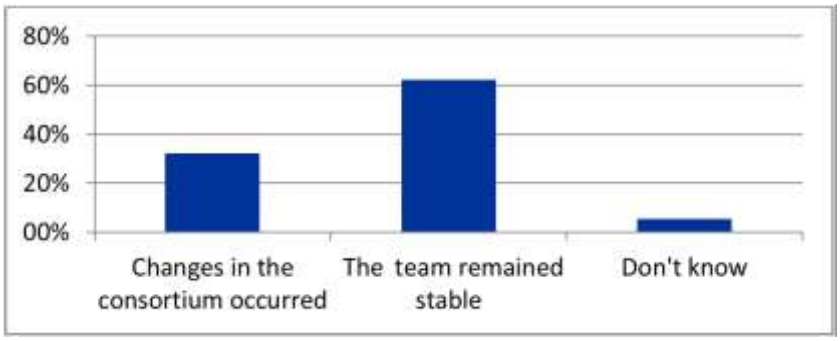
3.6. Stability of FP project teams

In this section we answer the question "To what extent has the team remained stable during the different phases of the project?". Our findings are based on the survey results, the case studies and the interviews on this topic.

3.6.1. Changes in project teams

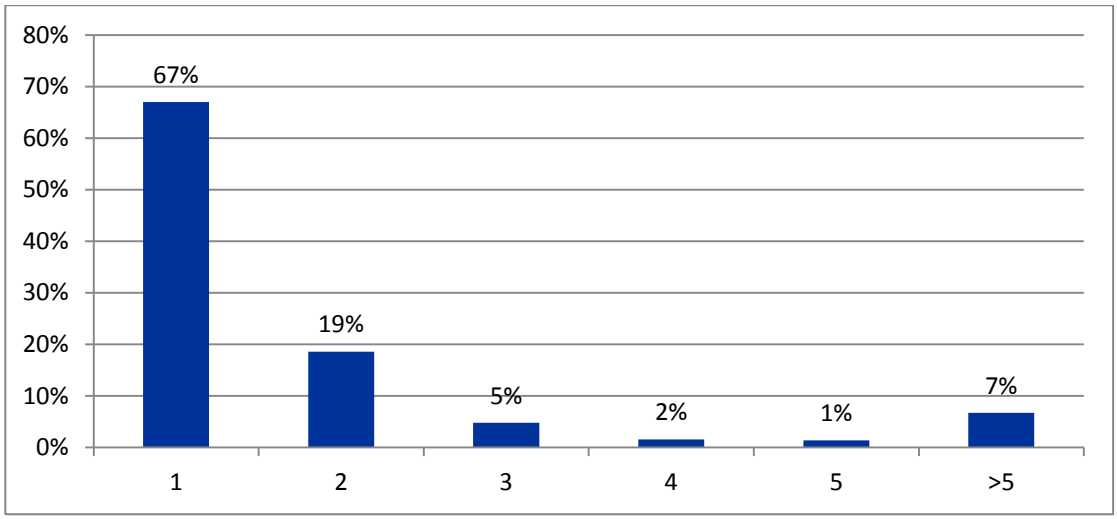
Figure 3-9 shows to what extent the consortia remain stable during the course of individual projects. Changes in the consortium at the entity level occur regularly. In 32 per cent of the projects, changes in the composition of the consortium were reported to us.

Figure 3-9: Frequency of changes in consortium composition (n=2,301)



The difference between changes in FP6 consortia (31.8%) on the one hand and changes in FP7 consortia (32.7%) on the other hand is small. Figure 3-10 shows that in most cases where changes in the consortium did occur, only one partner (67%) or two partners (19%) were replaced. Impacts on the total consortium composition were modest.

Figure 3-10: Number of partners that changed in project where changes in consortium composition occurred (n=2,301)



3.6.2. Effects on project performance

Projects with low performance ratings witness more changes in composition than projects with high performance ratings. This goes for both FP6 and FP7 projects. On average, the project performances of projects with changing consortia were rated as less successful by our survey respondents than the performances of the stable consortia. In other words: stable consortia perform better.

Our case studies also show that project performance and changes in the team composition seem to correlate negatively. The projects that are rated relatively poor in terms of project performance, often report changes in the consortium composition along the way.

In projects with a high average performance rating, consortia typically remained very stable, both in terms of formal partners within the consortium and in terms of individuals within the partner organisations. In some cases, changes were made within

the consortium, but these were considered by most interviewees as incidental, minor and with no impact on the progress of the project.[15] For projects with a high average performance rating, typically a similar story can be told. In cases where the consortium did undergo changes, this was either a deliberate decision based on the shifting scientific priorities of one of the work packages, or due to the bankruptcy of an SME partner towards the end of the project, both with very limited impact on the progress of the project. No differences were observed between FP6 projects and FP7 projects in this aspect.

Regarding projects with a low average performance rating, the case studies show less stability of the consortium and the individuals working on the project. Typically, some of the consortium partners drop out of the project. Typical reasons for dropping out are:

- large firms or SMEs reshaping their priorities after a merger or a restructuring;
- intrinsic loss of interest among industrial partners;
- large firms or SMEs going bankrupt;
- consortium partners failing to deliver on agreed work;
- industrial partners facing tax complications;
- internal restructuring of research organisations;
- scientific personnel changing institutes – requiring the consortium to adopt the newly employing institute.

In other cases, the formal Project Coordinator was replaced as he or she turned out to be too busy with other tasks or projects, negatively influencing the project by being not enough engaged. Also, personnel changes within the organisations of consortium partners negatively affected these projects, as each change at least partially resulted in a loss of knowledge and understanding of the project and the consortium. The changes in personnel were due to a wide variety of reasons that were not always clear, yet have negatively affected the progress of the project.

Finally, roughly 75 per cent of survey respondents indicate that they agree or strongly agree that the EC should reduce the administrative requirements for coordinators and consortia to replace consortium members if needed (as shown in figure 3-6).

Findings on the degree of stability in FP project teams:

- In about one third of the projects, changes in the consortium occur.
- Both our case studies and our survey statistics show that changes in consortium composition go hand in hand with lower project performance.

3.7. Forming sequential consortia with the same partners

In this section we answer the question "Is there a tendency to form more than once a consortium with the same partners?". Analyses are based on our survey results, the case studies and the interviews on this topic.

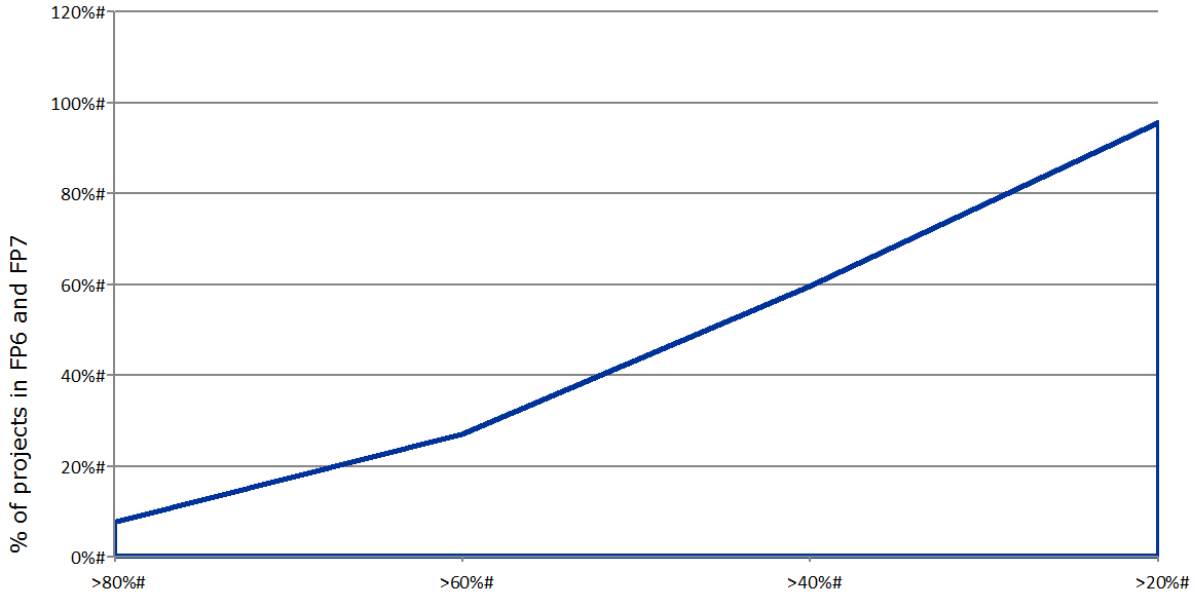
3.7.1. Role of personal acquaintances

In section 3.5 we described the process of consortium building. We noticed that initiators of FP projects show a clear tendency to use their own networks to set up FP consortia. We found that these inter-personal networks of the initiators are the most important determinant of the composition of the consortium in the second phase.

[15] For example, in one case, the replacement of the swamped Project Coordinator increased the management capacity within the consortium, while in another case an uncooperative consortium partner was informally sidelined without a formal contract amendment.

This results in a clear tendency to form consortia with acquainted researchers. This tendency is illustrated in Figure 3-11.

Figure 3-11: Degree of personal acquaintances found in consortia



The figure shows that in almost 60 per cent of the projects in our survey, a consortium was formed in which more than 40 per cent of the individual researchers already knew each other. For almost 27 per cent of these projects, this was in excess of 60 per cent and for a substantial percentage of projects (7.64%) even more than 80 per cent of the researchers already knew each other.

3.7.2. Reasons for continuous collaboration

Our case studies show similar results. The researchers in most consortia show a clear tendency to form sequential consortia with (mostly) the same partners, as the level of trust and commitment experienced in a consortium with partners that worked with each other before is crucial to success. This can be attributed to the appreciation of collective norms and standards, as well as jointly created ways of working and monitoring. However, when existing networks dominate this process and relatively few new partners are included, it creates the risk of low research management performance in the project. The underlying mechanism for this is not yet clear.

These continuous collaborations, according to many researchers, can contribute to the success of a new project, since the partners already know and understand each other's capabilities and working processes, and have had a positive experience in working together.

Findings on sequential consortia:

- There is a strong tendency to form sequential consortia with the same partners.
- Survey data show that at the level of the individual researchers, there is a clear tendency to form consortia with acquaintances.
- The case studies show that the reasons for these continuous collaborations are various.

3.8. Main models of partnerships

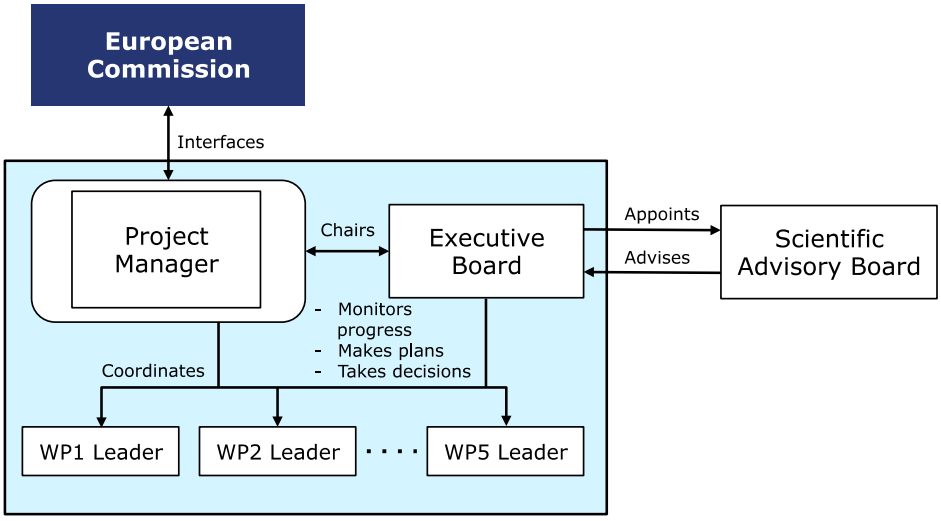
This section answers the question "Based on these findings, what are the main typical types or models of partnerships (i.e. typology of FP research teams)?". The section is based on our desk research, the case studies and the interviews on this topic.

3.8.1. Category 1, the basic, and the dominant model

Our case studies show the dominant management structure of an FP project consists of a body that coordinates the day-to-day management affairs within a project, often called an executive board or an executive committee, and which reports to a General Assembly in which each consortium partner has a voice on matters that are fundamental to the progress and direction of the project. The executive board coordinates the overall progress of the work packages, which are led by work package leaders that coordinate the work package teams responsible for carrying out the tasks within a work package. One or more advisory boards/panels offer insights and perspectives to the executive board, and the formal Project Coordinator interacts with the European Commission on behalf of the consortium and the executive board in particular.

Our study results indicate that on an aggregated level the use of this model correlates positively with successful projects and with research management performance. This model is depicted in Figure 3-12.

Figure 3-12: The "basic model" of an FP project's management structure



3.8.2. Category 2: the more complex, less frequent models

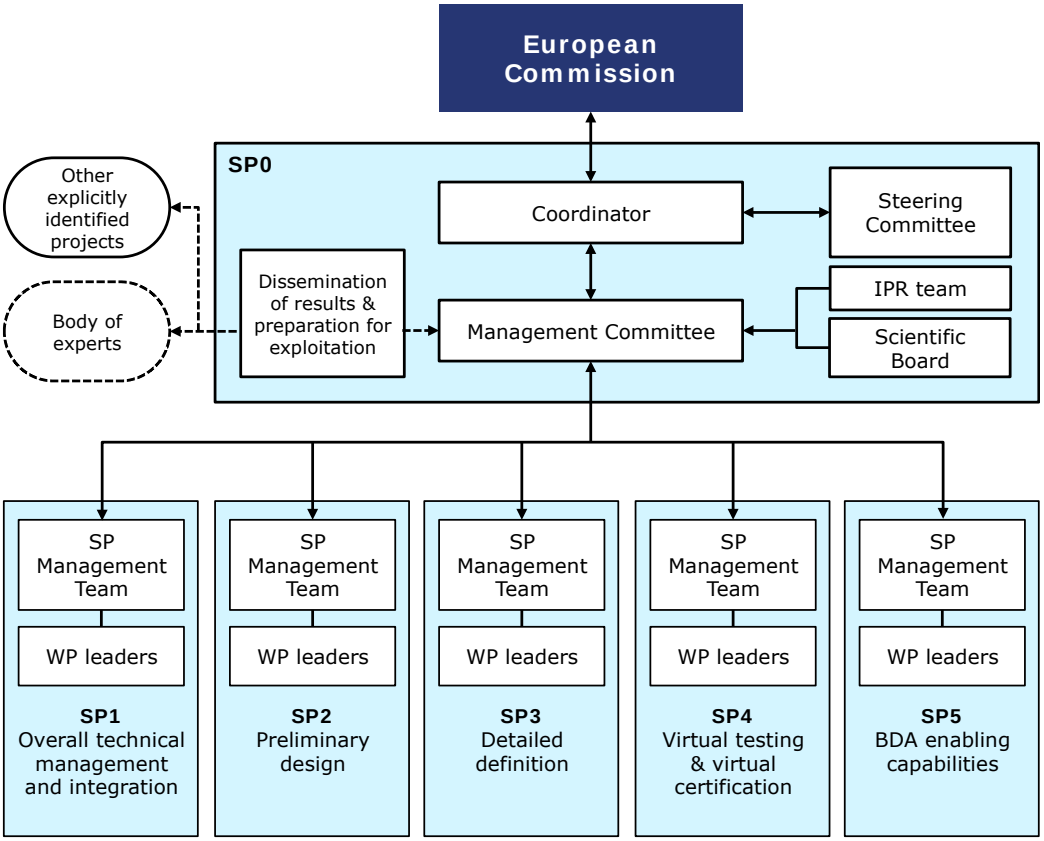
Other case studies of FP6 and FP7 projects show a management structure that differs substantially from the structure described above. This model is more complex, and involves multi-dimensional sub-projects that attempt to combine the development and delivery of multiple types of project outcomes and deliverables within one project structure. Examples of multi-dimensional project objectives include the development of specific projects in one dimension, via work packages, and the development of specific production processes in a second dimension, via development groups, or include the establishment of research networks throughout Europe in one dimension and the organisation of intra-institutional educational collaboration in another dimension.

Other case studies demonstrate even more complexity in management structures. The management structure described above is observed, but also other structures that incorporate multiple layers of management or several decision making bodies that

make strategic decisions on parts of the project while influencing other parts, or that feature several reporting lines to the General Assembly that bypass the Project Coordinator.

Our study results indicate that on an aggregated level the use of this model correlates negatively with successful projects and with research management performance. Figure 3-13 presents such a structure.

Figure 3-13: Example of a complex model of an FP project's management structure



Findings on types/models of partnerships:

- There are two main models of partnerships; the basic model and the complex model.
- Category 1, the basic, dominant model mostly observed in projects which score high on project success.
- Category 2: the more complex, less frequent, and relatively less successful models.

4. Management processes and supporting instruments

In this section, we answer the study research questions that address the management process and supporting instruments used in FP research projects. The answers are formulated based on the findings from the survey, the case studies or both - depending on the data available from either source.[16]

4.1. The organisation of work

This section answers the question "How is work organised (administrative and scientific/intellectual management) from preparing a tender to disseminating the research results?". Sources include the survey, the 30 case studies and the set of additional interviews.

4.1.1. Projects with a high average performance rating

Our high performance FP6 and FP7 case study projects generally show three modes of organisation of the tasks of scientific management, project management, and administrative management (as opposed to the distribution of roles set out in section 3.8). Typically, in FP projects with a high average performance rating all three management tasks are allocated to the formal Project Coordinator, often assisted by an administrative back office and a financial expert from his or her organisation. In the second mode, project management tasks are allocated to a project management team staffed by people from the organisation of the Project Coordinator or staffed by people hired externally. In the third mode, the project management tasks are allocated to a dedicated project manager that heads the project management team. This often includes a scientific coordinator who is in charge of the project content.

This *modus operandi* is implemented in many high performance FP projects. In some well-managed projects, management tasks are allocated to a specialist management company that was included as a partner in the consortium for these specific tasks.

4.1.2. Projects with a low average performance rating

In most of the low performance cases the Project Coordinator also performs administrative management with support of a local team, sometimes specialising in EU projects. In some of these projects, the work package leaders have in important role in the scientific management.

In some other low performance FP7 cases, a more detailed division of tasks can be observed, with projects allocating the overall project management to the formal Project Coordinator. This is exemplified by a project management committee chaired by a technical coordinator, which in turn oversees hub leaders and sub project leaders that coordinate work package leaders supports the coordinator in these cases. Finally, scientific management in these cases is allocated to the technical coordinator and administrative management to a project support team.

[16] The limited number of 30 case studies examined in the study allows for a qualitative analysis only. We have therefore avoided mentioning exact numbers of case studies when describing the manifestation of certain phenomena. When using "in general", "often", "most/mostly", "prevalent", "typically", "predominantly", "usually" and "clearly show the tendency", we refer to at least two-thirds of case studies within (within a certain group of case studies). When using "some" and "only a few" we refer to approximately one-third of the case studies (within a certain group), whereas "can also be" is used to indicate everything less than one-third up until one instance.

Findings on how the work is organised:

- The formal Project Coordinator is typically the focal point of both scientific and administrative matters.
- Our high performance FP6 and FP7 case study projects generally show three modes of organisation of the scientific management, project management, and administrative management.
- Our low performance FP6 and FP7 case study projects generally show allocation of both scientific management and project management to the formal Project Coordinator.

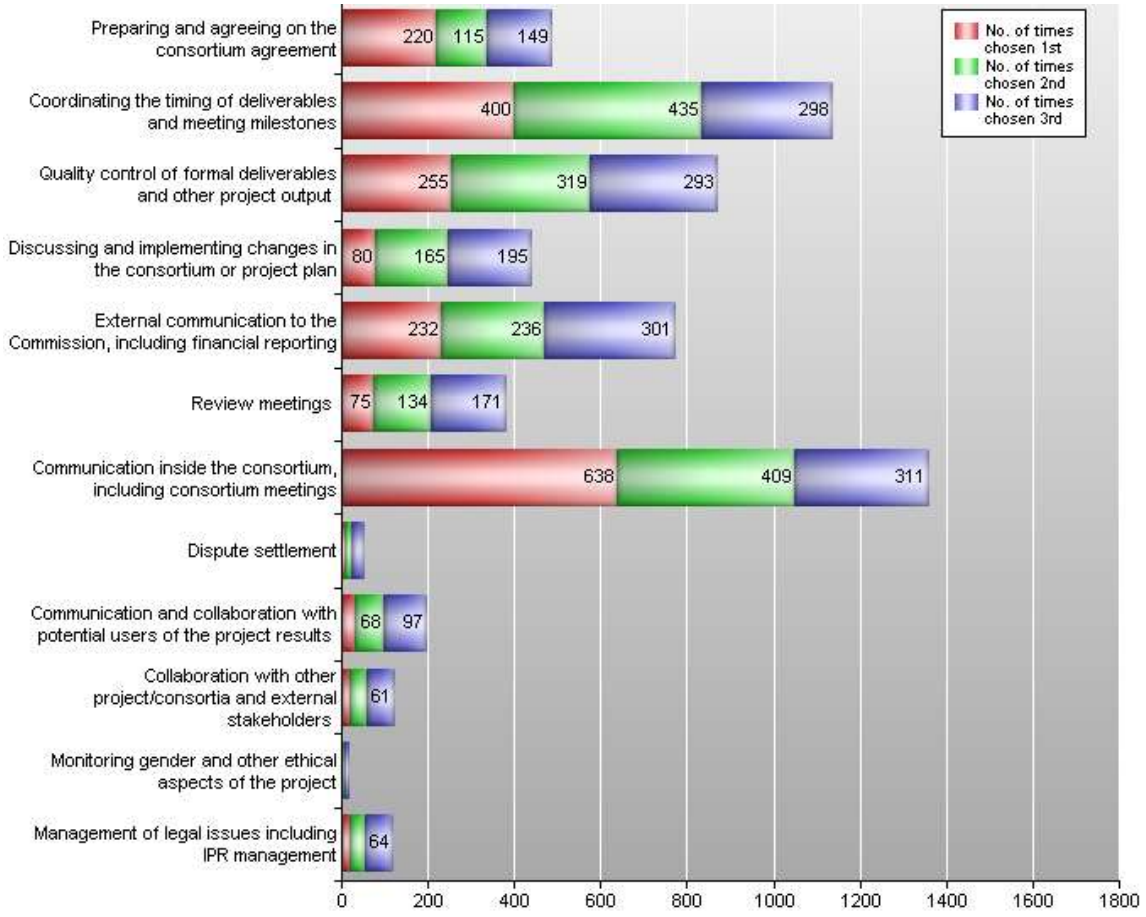
4.2. Management processes

This section answers the question "Which management processes are typically put in place by research teams for the management of their FP-funded projects?". Our findings are based on the survey, the case studies and the interviews on this topic.

4.2.1. The most time-consuming tasks

The survey results show internal communication, coordination and timing of deliverables and milestones, and quality control were the project management tasks most often selected as the top three by project participants who were involved in project management. The two project management tasks that were considered the least time-consuming were dispute settlement and the management of legal issues (including IPR management).

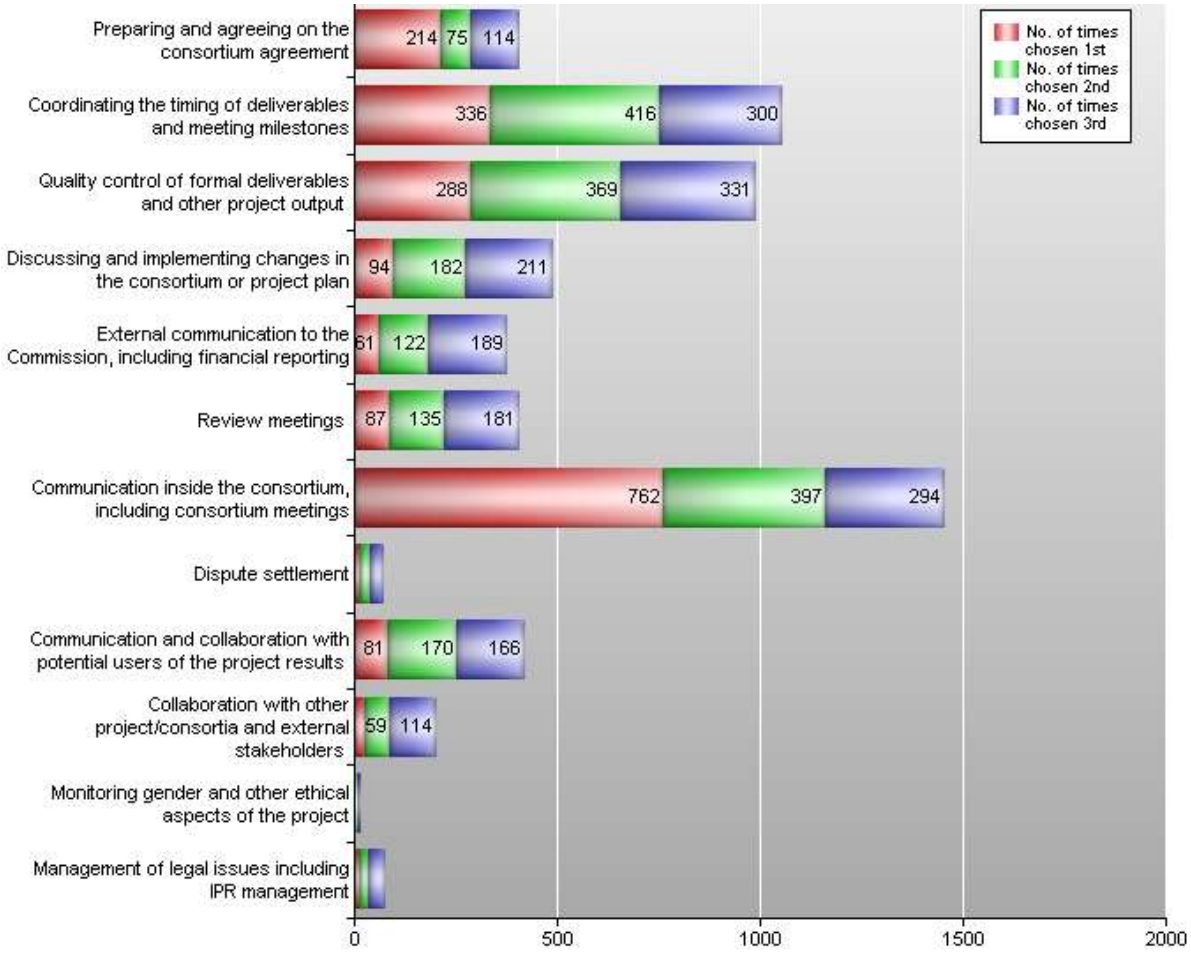
Figure 4-1: The top project management tasks in order of the time spent



4.2.2. The most important tasks

The top three and bottom three selections are the same as with the question on how much time was spent, although the numbers differ somewhat for each selection.

Figure 4-2: The top project management tasks in order of the importance for project performance



4.2.3. Communication to the Commission

External communication to the Commission is the fourth-ranking project management tasks in terms of time spent, while it is the eight-ranking task in terms of importance for the success of the project. This indicates that project managers do not consider communication to the Commission a task that contributes significantly to project success, which may show that they do not consider the Commission a "client" of the project. As project managers (especially the Project Coordinator) appear to spend a substantial amount of their time on communication to the Commission, they are likely to consider reporting on the project and its finances as a so-called *dissatisfier*: something that needs to be done, because not doing it will harm the project, while doing it better than a minimum effort does not yield positive project results.

Findings on management processes:

- Internal communication in the consortium, meeting project milestones and quality control of deliverables take up most of the time of the Project Coordinator; however, they are considered very important to the success of the project.
- Project managers do not consider communication to the Commission a task that contributes significantly to project success.

4.3. Division and delegation of tasks

This section answers the question "Which management processes are typically put in place by research teams for the management of their FP-funded projects?" on the subject of "division and delegation of tasks". Findings are based on our 30 case studies of FP6 and FP7 projects and 6 non-case study interviews.

The division of tasks in these projects is often established during the proposal phase of the project. In some cases, motivation and willingness to contribute to the success of the project are taken into account in addition to merit. Decision making in these projects is typically consensus-based, with elements of top-down decision making to serve as tiebreakers. Other case studies of FP6 and FP7 projects with a high average performance score show a similar meritocratic division of work, yet with a more top-down oriented method of decision making, with more detailed outlines of the decision authority of different consortium members or sub-groups within a consortium.

The case studies of both FP6 and FP7 projects with a low average performance score show a similar approach towards the division of tasks compared with the FP projects with high average performance scores. Case studies of FP6 projects with a low average performance score show a meritocratic division of tasks, yet our study also shows projects in which tasks were divided based on combining specific organisations with one another, such as technology labs and clinical labs, or where a meritocratic division of tasks within a consortium that features non-European organisations turned out to be suboptimal due to cultural differences.

Findings on division and delegation of tasks:

- In both FP6, and FP7, and regardless of project performance, division and delegation of tasks is based on merit.

4.4. Top-down decision taking versus consensus decision-making

This section answers the question "Which management processes are typically put in place by research teams for the management of their FP-funded projects?" on the subject of "top-down decision taking versus consensus decision-making". Findings are based on our survey data, the case studies and the interviews on this topic.

4.4.1. Partners involved in decision-making

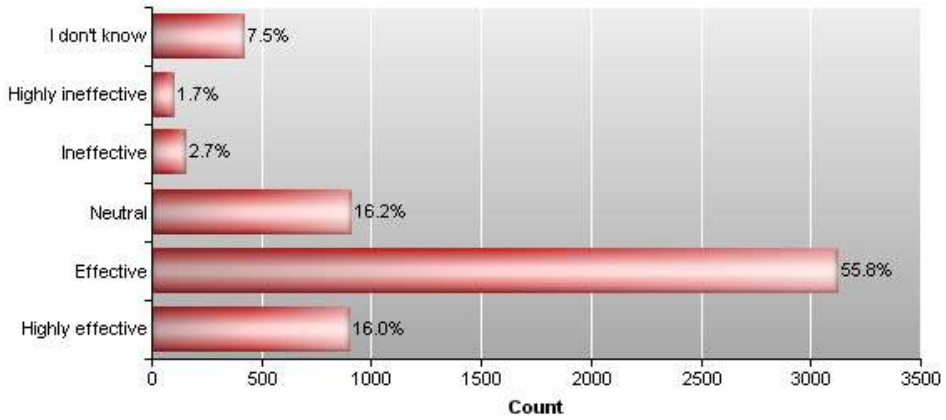
Consensus-based decision-making is more common in FP-funded projects than top-down decision-making processes, especially if one interprets "top-down" management as not involving partners in decision-making at all. Table 4-1 illustrates this.

Table 4-1: Extent to which Project Coordinator or project manager involved partners in substantial decisions about the project (FP6 and FP7)

To what extent did the Project Coordinator or project manager involve partners in substantial decisions about the project?	Frequency	Percentage
1. All partners were involved	4,535	56%
2. The main partners were involved	2,781	34%
3. Partners were informed but not directly involved	510	6%
4. Partners were neither involved nor informed	52	1%
5. Not applicable	237	3%
6. I don't know	31	0%
Total	8,146	100%

This finding is confirmed by the fact that more than 55 per cent of survey respondents reported that the General Assembly functioned effectively and 16 per cent even evaluated it to be highly effective in relation to the EC grant agreement. This information is relevant because the General Assembly is intended to be the instrument through which consortia make decisions based on consensus.

Figure 4-3: Extent to which the General Assembly functioned effectively, according to its formal tasks as described in the EC grant agreement



We have also asked FP participants and coordinators whether involving more partners would have yielded better outputs if they reported that not all partners were involved. Overall, more than half of these respondents were of the opinion that this would not have helped. However, an interesting distinction can be made between those respondents who answered that the main partners were involved and those that either mentioned that partners were informed but not involved, or that partners were neither informed nor involved. In case of the first, only 8 per cent of the respondents thought it would yield better outputs if more partners were included. In case of the second, 43 per cent of the respondents reported the project would have yielded better outputs if more partners were included.

4.4.2. Style of decision making

In most of our case studies of FP6 and FP7 projects with a high average performance rating, the coordinator tries to share information with other consortium members in a timely fashion, trusting them to deliver as needed, and discussing any issues one-to-one. Referencing contractual obligations and discussing individual accountability plays a small role in these consortia. Interestingly, our survey findings confirm that the latter management styles do not contribute to good research management (see section 5.3.2).

On the other hand, FP7 projects with a low average performance score show more emphasis on top-down decision making and less on a consensus-oriented decision-making style. One of the illustrations is that contractual obligations and discussing individual accountability are perceived as important for research management. In FP7 projects with a low average performance score where a consensus-oriented decision-making style is employed, the case studies show that some of the consortium members believe that this management approach has contributed to inefficiencies within the project. In one case, the Project Coordinator decided to abandon his consensus orientation and to switch to top-down decision making instead.

Case studies of FP6 projects with a low average performance score emphasise a consensus orientation, with coordinators relying on trust and timely sharing of information to allow consortium partners to get their job done. The one case study of an FP6 project with a low average performance score that featured a top-down

decision-making style indicates that this particular project could have generated better outcomes if more partners had been included in the decision making.

Findings on top-down decision taking versus consensus decision-making:

- Consensus-oriented decision making is observed in most FP projects; yet FP7 projects show a greater importance of consensus orientation than FP6 projects.
- Our survey shows that more than half of the FP participants feel that all partners were involved in the decision-making process; more than one third finds that at least the main partners were involved.
- 30% of the respondents that noted that partners were not involved in the decision-making process thought involving more partners would have yielded better outputs of the project.
- In most case studies a consensus-oriented style of decision making is observed, except for low performing FP7 projects.

4.5. Detecting and solving problems

This section answers the question "Which management processes are typically put in place by research teams for the management of their FP-funded projects?" on the subject of "processes put in place to detect and solve problems/bottlenecks". The findings are based on the case studies and the interviews on this topic.

4.5.1. FP7 projects

In FP7 projects, coordinators often rely on periodic reports, standardised operating and communication procedures, and the verification of consistency of deliverables. Also, coordinators use project monitoring tools and deliverable tracking tools to provide early warnings. Some of these case studies show the importance of clear communication, while one case study describes a project in which problems and bottlenecks are noticed only after deliverables turn out to be delayed.

4.5.2. FP6 projects

In FP6 projects, communication seems to be more informal. Coordinators pragmatically use teleconferences as a management instrument. But standardisation in terms of frequency or agenda seems lower.

4.5.3. Formal and informal communication

In many of these projects consortium partners proactively and voluntarily share relevant information. No specific tools or formal processes are employed to this end, and the coordinator has a crucial role in detecting bottlenecks, dealing with matters in an informal, sometimes even subtle manner by phone or email.

Case studies of FP7 projects with a high average performance rating also describe projects where detection and addressing of problems and bottlenecks occur via formal communication with a relatively high frequency, mostly through teleconferences combined with less frequent physical meetings, and the reviewing of progress reports. Case studies of high performing FP6 projects demonstrate the importance of highly frequent communication efforts by the Project Coordinator, who relies on meetings to discuss issues with partners

Other case studies of those FP6 projects describe consortia that use the evaluation of progress reports as an important element in the detection of problems and bottlenecks, discussing issues in formal meetings.

Findings on processes put in place to detect and solve problems/bottlenecks:

- The evolution from FP6 to FP7 turned out to come with relatively more formal management processes.
- Case studies of FP7 projects demonstrate more formal management processes.
- The case studies of FP6 projects show more informal management processes.
- Case studies of high performance FP projects show highly frequent (informal and formal) communication between the Project Coordinator and the consortium.

4.6. Financial management

This section answers the question "Which management processes are typically put in place by research teams for the management of their FP-funded projects?" on the subject of "financial management". Findings are based on our 30 case studies of FP6 and FP7 projects and 6 non-case study interviews.

The most straightforward mode of financial management has the formal Project Coordinator handling all financial management by him- or herself, compiling information received from consortium partners and reviewing overall EC-related finances, using Microsoft Excel-based tools and trying not to burden consortium partners too much with financial matters.

The second mode of financial management is quite similar, yet sees the formal Project Coordinator supported by an internal team of administrative and finance experts.

The third mode of financial management features alongside the formal Project Coordinator a financial expert, who handles all financial aspects of the project. This financial expert can be part of a project management team that deals with overall project management within the consortium as a project partner dedicated to project management, can be an external (independent) finance professional specialising in EC funding, or a representative from a consortium partner that has more experience with FP financial issues.

The fourth mode of financial management is less prominent but also found in our case studies. It is a mode of financial management that features an external financial expert specialising in EC and FP funding. One case study describes a consortium running into some problems due to limited financial experience on the part of the formal Project Coordinator, who attests it would have been better to deploy a fulltime administrative employee who could attend meetings and courses in Brussels to get a full understanding of the financial rules and regulations of the Framework Programme.

Low performing case study projects describe the same four modes of financial management. Additionally, these case studies describe suboptimal financial management processes due to limited experience with FP funding regulations amongst several consortium partners, leading to delays and suboptimal budget allocation. Also, the case studies mention complex financial management processes as a result from SME consortium partners going bankrupt.

Findings on financial management:

- Our study shows that there are four ways to organise the financial aspects of FP projects:
  - the formal Project Coordinator handling all financial management by him- or herself;
  - the formal Project Coordinator is supported by an internal team of administrative and finance experts;
  - a financial expert alongside the formal Project Coordinator, who handles all financial aspects of the project;
  - an external financial expert specialising in EC and FP funding.

4.7. Quality control, evaluation and validation

This section answers the question "Which management processes are typically put in place by research teams for the management of their FP-funded projects?" on the subject of "quality control, evaluation and validation". The findings are based on our 30 case studies and 6 additional, non-case study interviews.

4.7.1. FP7 projects with a high average performance rating

The case studies of FP7 projects with a high average performance rating typically show quality control, evaluation and validation of project deliverables and outputs to be performed by work package leaders for the outputs and deliverables related to their work packages, and by the formal Project Coordinator for all deliverables and relevant project output. Also, these case studies describe projects featuring dedicated quality reviewers, either internally from within the consortium or externally from the network of the formal Project Coordinator. Also, the case studies describe a variety of non-typical quality control procedures, including surveying project participants, reviewing progress reports, and *ad-hoc* processes in projects without a formal process for quality control. Quality control is generally considered an important management task within consortia.

4.7.2. FP6 projects with a high average performance rating

The case studies of FP6 projects with a high average performance rating show a variety of quality control processes, featuring independent control committees staffed by selected consortium members, external quality control committees working in tandem with the formal Project Coordinator, and control processes that include work package leaders to perform quality control per work package, with the coordinator controlling for overall quality. Several of the case studies describe projects wherein quality control is not considered to be very important.

4.7.3. FP6 and FP7 projects with a low average performance rating

From the case studies of FP6 and FP7 project with a low average performance score, a similar variety appears, with most emphasis placed on quality control processes wherein work package leaders control the quality of the output and deliverables related to their work packages, and the formal Project Coordinator controls for quality of overall project outputs and deliverables. Also, projects are described wherein internal quality control committees are featured, as well as projects wherein the formal Project Coordinator was the only one tasked with quality control – the latter not leading to optimal results. Finally, some case studies describe projects where no quality control procedures were established at all, and where quality control was not considered very important.

4.7.4. FP6 and FP7 projects with a high standard deviation in their performance ratings

Case studies of FP6 and FP7 projects with a high standard deviation on their performance score typically feature internal quality control committees, staffed in some cases by representatives from the General Assembly and in other cases by PhD students from the department of the formal Project Coordinator.

Findings on quality control, evaluation and validation:

- The responsibility for quality control, evaluation and validation at work package level is often placed with the work package leaders, while the Project Coordinator controls the quality of project deliverables and other relevant output.
- Case studies of high performing projects show a specific quality management system, placing the responsibility for quality control, evaluation and validation with the work package leaders for their WPs; quality control is considered important in FP7 but less so in FP6 high performing projects.
- Case studies of low performance FP6 and FP7 projects show similar quality management approaches to high performance FP6 and FP7 projects; in several cases quality control is not considered to be very important.
- Case studies of FP6 and FP7 projects with a high standard deviation on their performance score typically feature internal quality control committees.

4.8. Monitoring the projects and reporting

This section answers the question "Which management processes are typically put in place by research teams for the management of their FP-funded projects?" on the subject of "monitoring (progress and results of) the projects and reporting". Findings are based on our 30 case studies and 6 additional, non-case study interviews.

4.8.1. FP6 and FP7 projects with a high average performance rating

High performance case studies generally emphasise monitoring processes wherein consortium partners or work package leaders develop quarterly progress reports to the Project Coordinator, and processes wherein monitoring of progress is conducted via periodic meetings of the steering group or the executive board. These case studies also describe projects where monitoring is done via monthly teleconferences or Skype calls, sometimes in tandem with quarterly meetings. Case studies of high performance FP6 projects typically have formal internal reporting processes put in place; a minority rely on trust. These cases emphasise monitoring processes based on periodic progress reports that are reviewed and assessed by the formal Project Coordinator. Typically, these progress reports are required every three or six months. Other case studies of these projects describe projects in which a monitoring process was absent, and progress was a matter of trust based on a collaborative spirit generated during consortium meetings.

4.8.2. FP6 and FP7 projects with a low average performance rating

Several cases describe processes that have consortium partners report monthly on their progress, either to the Project Coordinator through report sheets or templates uploaded to a project website or to the entire consortium by email. Also, case studies describe processes where consortium partners develop quarterly progress reports and send these to the Project Coordinator, and processes where the formal Project Coordinator was tasked with monitoring the progress and results, either by frequent communication or through digital tracking tools. The monitoring process is clearly allocated to the management team, under the responsibility of the formal Project Coordinator who asks specific consortium partners for input. Other case studies of

these projects describe monitoring being done by intensive informal communication by the project consortium, and by having consortium partners write two or three progress reports per year.

Findings on monitoring of the projects' results and reporting:

- A variety of formal and informal monitoring processes is put in place in FP projects.
- Almost all high performance FP projects show formal monitoring processes put in place that rely on either regular reports or regular meetings.
- Low performance cases projects score show a variety of attempts to manage the monitoring of project progress and results.

4.9. Human resource management

This section answers the question "Which management processes are typically put in place by research teams for the management of their FP-funded projects?" on the subject of "human resource management". The findings are based on our 30 case studies and 6 additional, non-case study interviews.

In general, the case studies describe that human resource management (HRM), when conducted, is particularly useful for the training and supervision of graduates, PhD students and Post-docs. Typically, the case studies show HRM was not conducted at a project level. It was up to individual partners to manage their human capital. Coordinators appear to associate HRM with PhD employment, training and possible exchange. Only in case of calamities like firing or the departure of principal investigators from the project did Project Coordinators report to actively engage in HRM.

Findings on human resource management:

- There is no formal role for human resource management in FP projects, as it is left to participant employers.

4.10. Internal communication, external communication and dissemination of results

This section answers the question "Which management processes are typically put in place by research teams for the management of their FP-funded projects?" on the subjects of "internal communication", "external communication" and "dissemination of results". The findings are based on our 30 case studies and 6 additional, non-case study interviews.

In general, the case studies describe that projects have between two and four physical meetings with the whole consortium annually. During these meetings project progress is discussed and the General Assembly is held to decide on strategic issues. The manner in which communication between these physical meetings is organised differs per project. Some projects have formally scheduled frequent phone conferences with the full consortium, whereas others leave day-to-day/weekly communication to work package leaders. This is mostly dependent on both the size of the consortium, as smaller projects tend to have conference calls with the full consortium, whereas larger projects are more organised around WP communication, and the nature of the work, as a higher number of interdependencies between WPs requires more communication. By keeping detailed discussions away from the physical full consortium meetings, these can be kept to the point and effective.

The case studies generally show that for the day-to-day or weekly communication almost all consortia rely on conventional communication tools like telephone and e-mail. In addition, many consortia in the case studies made use of an internal section of the project website, accessible to consortium partners only, to share documents and information. The formal progress reports for the EC were mostly used as the format to keep partners updated.

All projects studied use a dedicated work package to structure and organise all project dissemination activities. A key role in most dissemination campaigns was fulfilled by the dedicated project website, which is typically used for both internal and external communication.

Finally, the case studies show that in most instances internal communication is assessed as being of high importance to project success, whereas external communication is valued as less important. The importance of communication skills for research management varies substantially per project.

4.10.1. FP6 and FP7 projects with a high average performance rating

These projects all made use of wide-spread communication tools like phone, email and video or telephone conferencing for internal communication. The reported number for annual physical meetings with the full consortia ranges between one and four. Smaller meetings, usually on a WP level, are organised on an *ad-hoc* basis. Most consortia in these case studies report the use of the project website (including protected parts) or other document sharing tools to keep all partners up to date on project progress.

No substantial issues in communication with the EC were reported for these projects in the case studies. In most instances, various different types of dissemination activities and formats were used for external communications, aimed at different types of stakeholder groups. This includes conferences, workshops, trade shows, company reports, seminars and press releases.

Case studies of FP6 projects with a high average performance rating show that internal communication is considered as very important for project success as well. Substantial time is committed to internal communication in these projects. Consortia make use of telephone and e-mail combined with at least one annual physical meeting. Depending on the type of information exchanged and the nature of the project, more advanced communication tools are used, such as a project website, intranet or online databases.

Participants in these projects generally regard EC project officers as accessible, responsive, experienced and knowledgeable. External communication with project end-users is dependent on the nature of the project. For fundamental research projects, publications are mostly used, whereas research and innovation actions are more focused on dissemination actions more targeted towards specific end-users (e.g. when targeting patients, flyers were send to general practitioners). Both tasks are usually the responsibility of the Project Coordinator.

4.10.2. FP6 and FP7 projects with a low average performance rating

With regard to internal communication of FP7 projects in our case studies, one of the key issues is the amount of time it takes to (re)schedule internal meetings, to reorganise in case consortium composition changes and to get all consortium partners up to speed on internal procedures. External communication is reported to be negatively influenced by changes in EC representatives that govern project progress (i.e. the Project Officers). At the same time, we notice that case studies of FP6 projects with a low average performance score show that internal communication in these projects is generally evaluated as important and properly facilitated. In these projects, various types of communication methods and tools other than e-mail and phone conferences were used, such as dedicated platforms and websites. In these

projects, physical meetings were organised from one to five times per year. Evaluation of external communication performance by Project Coordinators and possible dissemination managers differs across these projects from very good to poor. The EC's project officers were generally evaluated as highly accessible, responsive and knowledgeable. Various types of communication methods and tools other than the project website and publications were used for dissemination, including dedicated platforms, trainings, scientific symposia, videos, and newsletters. As such, the differences with high performance projects are small.

Findings on internal communication, external communication and dissemination of results:

- Internal communication appears to be considered relatively more important in high performance FP7 projects; low performance FP7 projects report more communication issues.
- Typically, high average performance FP7 projects have (internal) communication as a top management priority.
- In low performing FP7 projects, consortia send out mixed signals when it comes to internal and external communication.
- For FP6 projects, no striking differences have been identified in the comparison of high performance and low performance projects.

4.11. Knowledge transfer and intellectual property rights

This section answers the question "Which management processes are typically put in place by research teams for the management of their FP-funded projects?" on the subject of "knowledge transfer and intellectual property rights". The findings are based on our 30 case studies and 6 additional, non-case study interviews.

In general we see that IPR is a very complex matter for Project Coordinators. This is partly because the topic is complex in itself. But several of our interviewees also make it clear that the IP regulations and their use by the Commission and its Agencies, are far from efficient. This was made clear by both the participants in our Expert Workshop, and in interviews with individual IP experts. According to one of our interviewees, the Commission seems to use its own concepts, and its own rules, that "are not supported in the world of IPR law". A good example is "Access Rights". Horizon 2020 includes a new article on "access rights for Member States" which grants countries access to research results under certain pre-conditions. Consulted IP experts stress that this is not a legal term and it is not supported in IP law. Also, our interviewees indicate that some rules in consortium agreements contradict anti-trust law. Moreover, SME paragraphs are considered too complex. This is especially an issue when it comes to Background IP (which an SME is allowed to hold). The requirements that a company has to meet to be labelled SME are sometimes very complex. The total set of requirements is over 50 pages long. For an average SME they are far too complex. The Background IP paragraphs are therefore not used as often as they should to result in optimal effects for European SMEs.

4.11.1. FP6 and FP7 projects with a high average performance rating

In those instances where projects in the case studies did have the potential to develop patentable content, procedures to carefully assess deliverables prior to publication were installed. This assessment was focused on limiting chances to endanger patentability of project outcomes as a result of sharing contributions to the state of the art, such as dissemination of results to the general public prior to patent filing. No other clear patterns emerge from the comparison between high and low performing projects.

Case studies of FP7 projects with a high average performance rating show that most of these projects did not result in patented outcomes and correspondingly, the consortium ranked management of intellectual property rights (IPR) as relatively unimportant. For these projects, knowledge transfer was most often conducted through close stakeholder involvement. For the projects in the case study that did (aim to) develop IPR, procedures and rules for IPR management were clearly defined prior to the project's start. Typically, ownership of patents remained with those partners which were involved with activities leading to patentable outcomes. Prevention of IPR issues can be taken care of by developing good agreements at the proposals stage.

None of the FP6 projects with a high average performance score in the case studies clearly developed patentable results. The knowledge transfer and IPR management was not clearly defined and executed. In one instance this explicitly reduced the chances of patenting project results.

4.11.2. FP6 and FP7 projects with a low average performance rating

Case studies where patentable results were developed show that installed IPR management bodies and processes did not function properly or resulted in mistrust or disagreement amongst consortium partners. Proper alignment between interests of various partners, such as universities versus SMEs and/or industrial partners, is also reported to be lacking in some of these cases. This proves to be a serious issue for both participants and the coordinators in FP projects. Especially issues with regard to publications are reported. This statement also applies to other publicly disseminated deliverables.

Findings on knowledge transfer and intellectual property rights:

- The IP regulations that the Commission and its Agencies use, are not efficient. Moreover, there are several situations in which Horizon 2020 regulations in the field of IP seem to deviate significantly from general IP Law. Some rules in consortium agreements contradict anti-trust law.
- Moreover, SME paragraphs are considered too complex.
- In high performance FP projects in our case studies IP rights were relatively insignificant.
- Low performance case studies generally show several IP-related issues.

4.12. Well-established vs. less emphasised processes

This section answers the question "Which processes are in general well-established; which processes are less emphasised?". Findings are based on our 30 case studies and 6 additional, non-case study interviews.

Although there is no clear pattern in which processes are well-established, the case studies generally show that communication (both internal and external), progress monitoring and quality evaluation were mentioned most often as either well- or poorly established in relation to research management performance. From this we might deduce that particularly these processes are interpreted by Project Coordinators as having high influence on research management performance.

Case studies of FP7 projects with a high average performance score describe communication procedures as well-established. Other well-established factors mentioned include professionalism, relationship building and proposal development. Factors and processes described as less well-established include Project Officer functioning, Human Resource Management (HRM) and evaluation of progress and results.

Case studies of FP6 projects with a high average performance score show that typically, consortium building and decision-making processes were well-established in these projects. Project coordinators in these projects were able to successfully build consensus for key decisions in the project. A bottom-up structure was mentioned as a key condition for consensus building. Other mentioned well-established processes include quality control and evaluation of progress and results. Financial management was mentioned as being less well organised.

Case studies of FP7 projects with a low average performance score describe internal communication, external communication and progress monitoring as poorly established in these projects. In nearly all of these projects, one or more of these processes were mentioned as a key barrier for research management success. In addition, the inability to cope with strict EC requirements and lack of installation of formal management procedures were mentioned as negative points. Also, no clear pattern can be identified in processes that were well-established.

In case studies of FP7 projects with a low average performance score, processes mentioned as well-established differ strongly between the various projects. Communication (both internal and external), quality evaluation, progress monitoring and task delegation are described as success factors for some FP7 projects and as points of improvement for others.

Case studies of FP6 and FP7 projects with a high standard deviation on their performance score most often describe communication and financial management as well-established processes. Quality control and (general) experience were described as both positive and negative factors. Typically, there is no clear pattern across these projects.

Findings on well-established vs. less emphasised processes:

- FP projects appear to vary in terms of well-established and less emphasised processes.
- Communication, progress monitoring and quality evaluation have a significant impact on quality of the project.

4.13. Project management costs

This section answers the questions "What is the cost for project management in terms of average budget and time dedication?" and "How much of the EU contribution is dedicated to management?". The findings are based on our survey results, our 30 case studies and 6 additional, non-case study interviews.

4.13.1. FP7 versus FP6

Figures 4-4 and 4-5 show the survey results for management budgets in FP6 and FP7 projects, respectively. In both FP6 and FP7, a substantial share of respondents indicate that less than 7 per cent of the project budget was devoted to research coordination and management. However, while in FP6 projects it was not allowed to allocate more than 7 per cent of the total project budget to research coordination and management, over 40 per cent of the respondents for FP7 projects indicate that in their project, 7 per cent or more was allocated for research coordination and management.

By themselves, the survey results on this subject should however be treated with some reservation, as about one in six respondents indicated that they do not know what percentage of the total budget of their project was spent on research coordination and management.

Figure 4-4: Percentage of the total budget devoted to research coordination and management (FP6)[17]

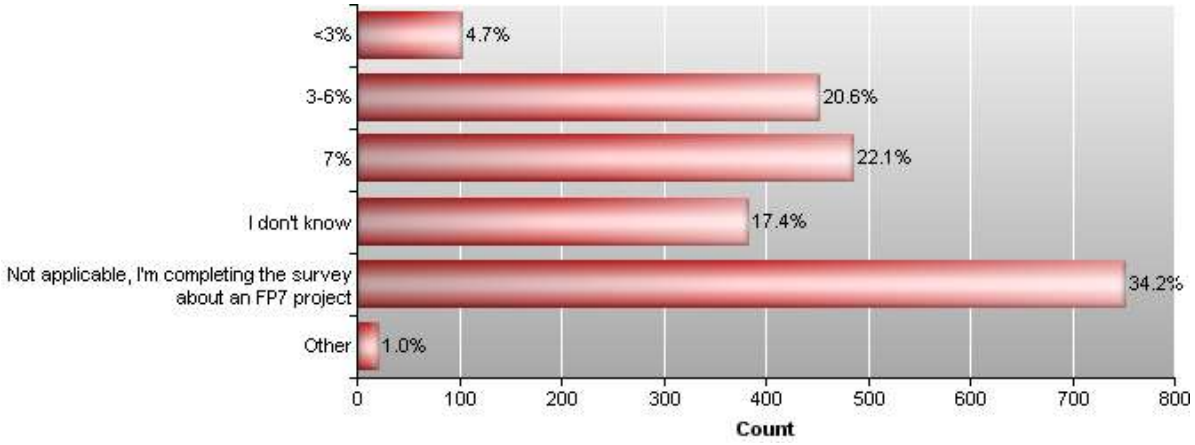
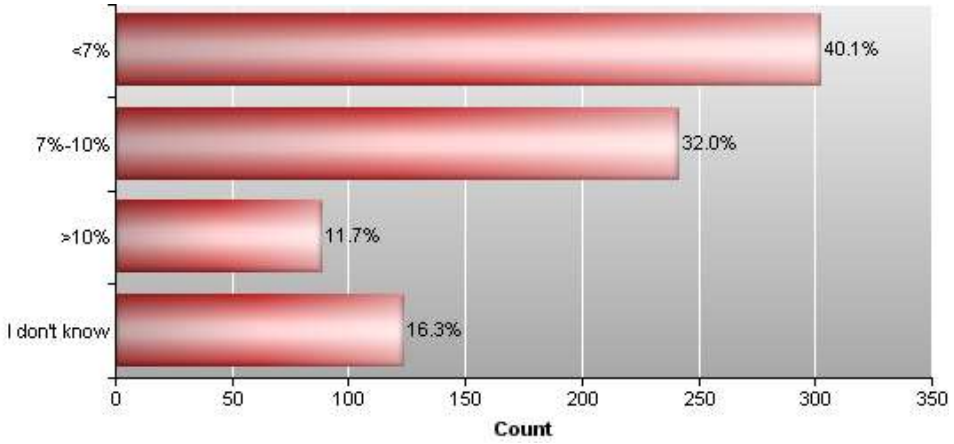


Figure 4-5: Percentage of the total budget devoted to research coordination and management (FP7)



4.13.2. Project management effort versus dedicated budget

Effort in terms of person-months is often much higher than the dedicated budget. Many coordinators in the case studies indicate that the actual time spent on management exceeded the budgeted management cost. In addition, scientific coordination, which could not be covered as management activities, required substantial efforts. If these efforts would be consolidated with management costs, the overall budget share for management would be substantially higher.

The exact percentage of the budget dedicated to project management varies substantially between all projects in the case studies, although it appears that the high performance FP projects have a larger share of the budget dedicated to project management than low performance FP projects.

4.13.3. FP7 projects

In case studies of FP7 projects with a high average performance score, the cost of project management as a percentage of the total EC contribution in the formal project budget ranged between 7 and 14 per cent, substantially higher than in the low

[17] Note that for FP6, management budget could not exceed 7% of the total project cost.

performance projects. Many coordinators indicate that the actual time spent on management exceeded budgeted management cost.

Case studies of FP7 projects with a low average performance rating show that the cost of project management claimed as a percentage of the total EC contribution in the budget typically amounted to 7 per cent. However, in these cases, the project managers[18] reported that in reality this amount was often much higher, sometimes even twice as high.

4.13.4. FP6 projects

In case studies of FP6 projects with a high average performance score, the cost of project management as a percentage of the total EC contribution ranged between 4 per cent and 7 per cent. Low performing FP6 case studies show a greater variety in budgets allocated to project management. Also in these case studies, some coordinators indicate that in practice project management required much more effort than planned.

Findings on costs of project management:

- Most case studies indicate that the actual cost for project management is higher than budgeted.
- The share of the EU contribution spent on management varies significantly.
- Project management budgets are higher in FP7 projects than in FP6 projects.
- Generally, the dedicated budget for project management does not equal the person-months spent on project management.
- Our case studies seem to suggest that in FP7 project performance goes hand in hand with budgets allocated to project management; in our FP6 case studies, the relationship seems less evident.

4.14. Project management tools

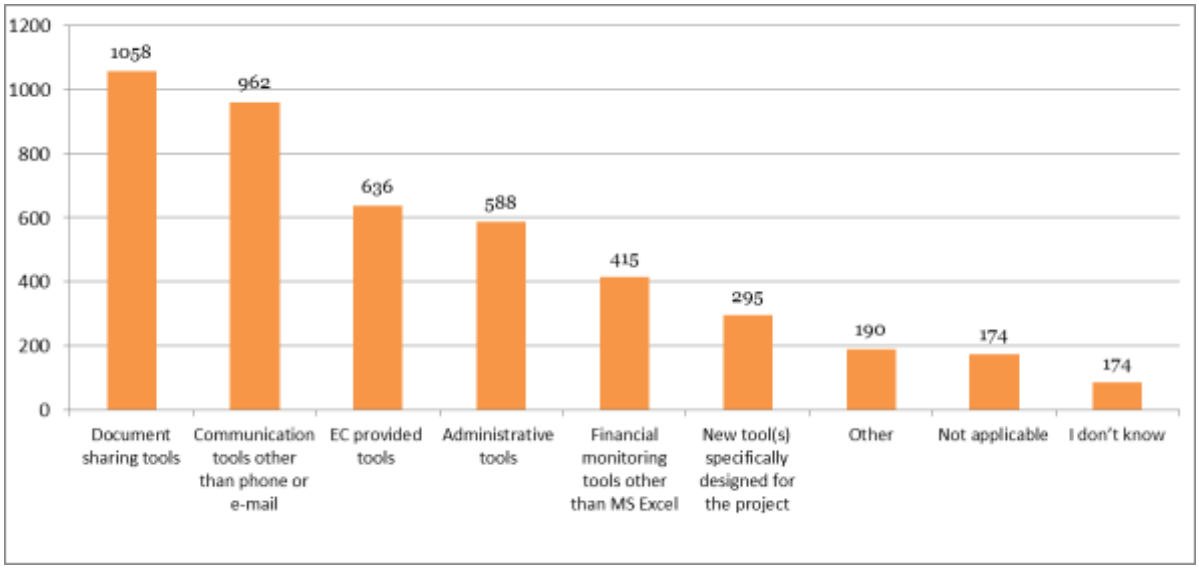
This section answers the question "Which instruments are used to support the different processes?". The findings are based on our survey results.

Document sharing tools are used most often; about one third of FP project managers use EC-provided tools. When it comes to tools used for project management tasks in FP6 and FP7 projects, the only tools used by more than half of the project managers are document-sharing tools. This is closely followed by communication tools other than phone and e-mail, examples of which named in case study interviews are conference call systems and Skype.

About one third of project managers have indicated that they use EC-provided tools and administrative tools for project management purposes. Financial monitoring tools other than Microsoft Excel are used even less. Almost 300 project managers have indicated that they have used a tool specifically designed for the project.

[18] Including the formal Project Coordinators, Scientific Coordinators and other project managers who answered the survey.

Figure 4-6: Tools used for project management tasks



The results of the survey are mirrored by what we found in case study interviews, where the majority of project managers report the use of few other tools than Microsoft Office, Microsoft Outlook, Skype and conference call systems.

Findings on project management tools:

- The use of specific project management tools is very limited.
- Document sharing tools are used most often, about one third of FP project managers use EC-provided tools.

4.15. Project management tools provided by the European Commission

This section answers the question "To what extent do the instruments put in place by the European Commission support the project management, for example the reporting tools? What could be improved?". Our findings come from our survey data, the case studies and additional interviews.

4.15.1. FP6 and FP7 projects with a high average performance rating

The tools are very clear to more experienced FP coordinators, but require relatively high effort for less experienced coordinators to master. Recommendations for improvement include the provision of a standard template to build the project's budget. Currently, most consortia build such a template themselves. Other suggestions include the reduction of administrative requirements even further, to build in some form of flexibility in the EC tools (experienced as rigid by some coordinators in these case studies) and to provide more early stage coaching for less experienced coordinators/consortia. Also, the coordinators in the case studies indicated that the language used in the instructions provided by the EC could be more comprehensible.

4.15.2. FP6 and FP7 projects with a low average performance rating

Some coordinators in these case studies indicate that they only used the tools when mandatory. Others indicated that tools worked well. Recommendations include further simplifications of procedures and tools, reduced rigidity, and improved comprehension of the language used in written communication by the EC, and a training session in the use of EC tools.

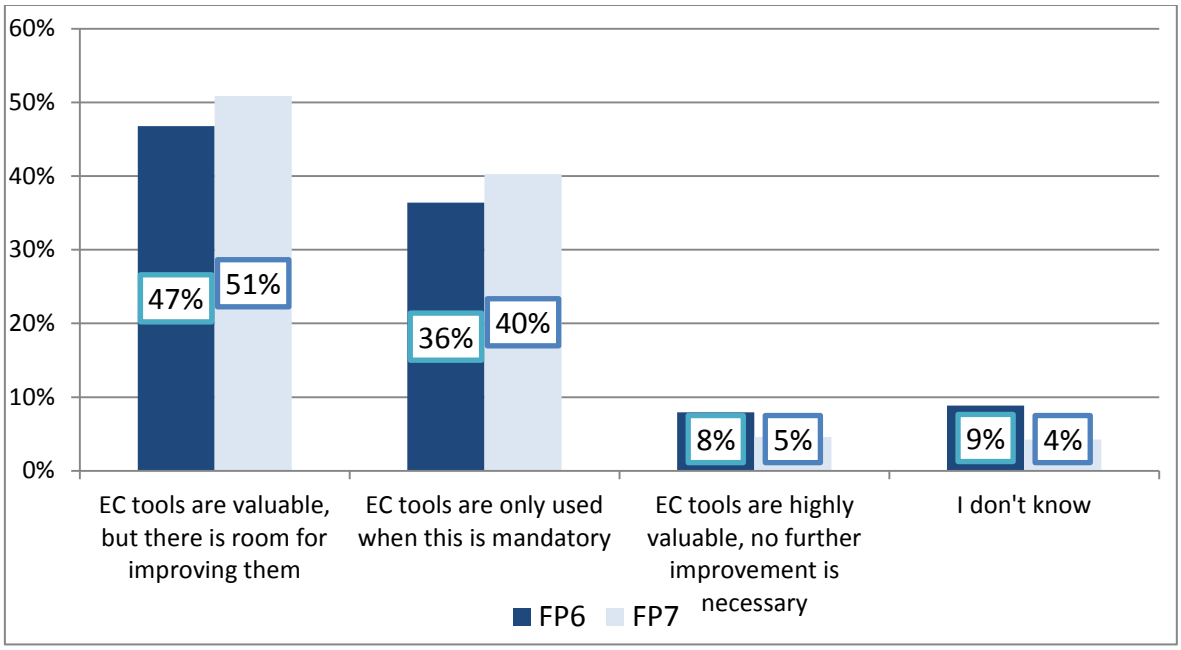
The level of detail required when describing milestones and deliverables prior to the start of the project is not in line with what happens in practice. The course of a project can deviate from the plan due to a multitude of reasons. It is therefore not always possible to provide a detailed description of a project's progress. Other suggestions include offering more opportunities to continue previous FP projects and reducing the requirements for developing proposals, which are experienced as very lengthy.

4.15.3. Usefulness of EC-provided tools

Approximately 32 per cent of the respondents indicated that they make use of the various tools provided by the European Commission, as shown in Figure 4-6. As shown in Figure 4-7, over 38 per cent of project managers only use EC-provided tools when this is mandatory. This indicates that this group does not perceive any added value of these tools to what they consider to be a successful project. Close to another 49 per cent believe that EC-provided tools do add value to their projects, but that room for improving these tools still exists. A mere 7 per cent of the responding project managers indicate that they do not see room for improving EC-provided tools.

Overall, respondents from FP7 were somewhat more sceptical of the tools provided by the EC. A larger proportion of our FP7 proportion suggests that EC tools need improvement or are only used when mandatory. This suggests that over time, the perceived added value of tools has fallen.

Figure 4-7: Perceived added value of tools provided by the EC by coordinators (FP6 vs FP7)

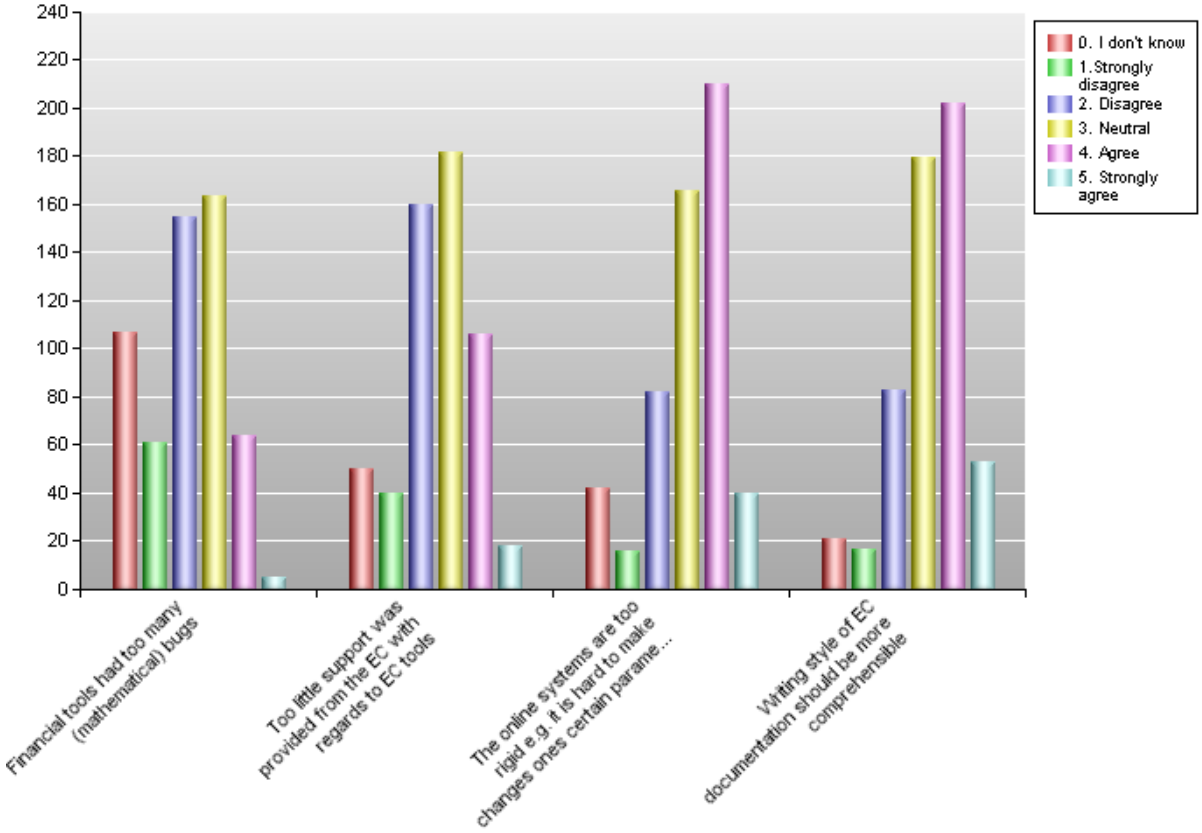


4.15.4. Room for improvement

When asked to what extent they agree to four suggestions for improving EC-provided tools, most of the project managers agree that the online systems are too rigid e.g. it is hard to make changes once certain parameters are defined; and that the writing style of EC documentation should be more comprehensible. On the other hand they do not agree with the proposition that the financial tools had too many (mathematical) bugs and that too little support was provided by the EC with regard to EC tools.

This is shown in Figure 4-8.

Figure 4-8: Participants thoughts on the tools provided by the EC



Findings on EC-provided project management tools:

- There is certainly room for improvement of EC-provided tools, and for the accessibility of the writing style of documentation.
- Coordinators of high performing case studies typically indicate that the provided EC tools are useful for fulfilling certain parts of the administrative requirements.
- Coordinators of low performing case study FP projects indicate that they typically did not make use of EC tools unless the use was mandatory.
- The vast majority of project managers indicate that EC-provided tools could have been more useful to their projects.
- The EC can improve project management tools by improving its communication style towards researchers, and by making its online systems more flexible.

5. Performance and efficiency of research management

In this section, we answer the four remaining questions from the Tender Specifications, which focus on the effects of research management on the performance and efficiency of FP6 and FP7 projects. We rely again on the data from the survey and the case studies. In some cases we refer to findings presented in sections 3 and 4, as well as to quantitative and qualitative analyses performed on the survey and case study data.

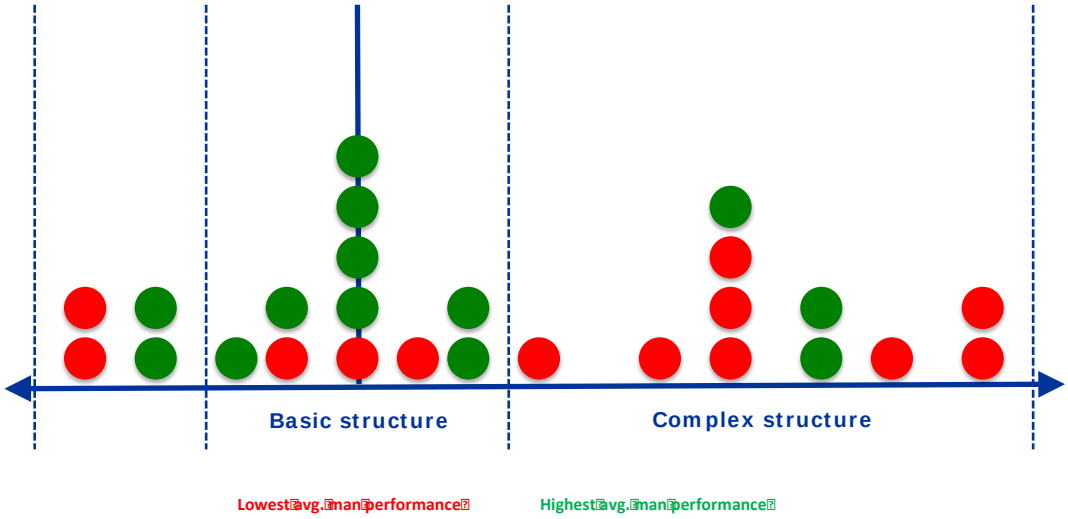
5.1. Efficiency of research management models

This section answers the question "Are some research management models more efficient than other ones to ensure delivering quality products on time? Are, for instance, smaller projects more efficient than bigger ones?".

We cannot say to what extent management structures have an impact on research performance. However, our study indicates that indeed some models are more efficient than others in terms of research management performance. In terms of management structures we can distinguish between what we referred to as the basic model and the complex model. We described these in section 3.8. Especially our 30 case studies indicate that the basic management model is more effective than the complex model to ensure research management performance.

This is illustrated by Figure 5-1 that plots the management models in our case studies in terms of complexity, and shows the quality of their management performance. Within the scope of the basic management structure, a large majority of the projects (eight out of eleven, 72%) had a good management performance. Within the scope of the complex management model, only three out of eleven (28%) of the case study projects had good research management performance.

Figure 5-1: The basic model for consortium management structure vs. the complex model in terms of management performance



The most efficient model in terms of research management performance seems to be the basic management structure. In these cases the management structure only

consists of a body that coordinates the day-to-day management affairs within a project, often called an executive board or an executive committee, and which reports to a general assembly in which each consortium partner has a voice on matters that are fundamental to the progress and direction of the project.

We have considered the possibility that the relationship is reversed: relatively small and simple projects are more successfully managed and come with more basic management structures. We are convinced however that this is not the case here. Our survey results indicate that neither budget size, nor consortium size nor number of WPs – as proxies for project size and complexity – are associated with research management performance. We therefore conclude that the size and complexity of the project is not a determinant of research management performance. Hence, the notion that basic management models lead to better research management performance (instead of the other way around) seems justified. Indeed our case studies also point in this direction.

5.2. Efficiency of Project Coordinators

This section answers the question "Are industry coordinators better managers than researchers?". This question was not part of the Tender Specifications for the current study, but was raised by the Commission after reviewing the draft Final Report.

We find that, in fact, researchers appear to be better managers than industry coordinators. The remainder of the section illustrates this finding.

5.2.1. Observed differences in perceived project success

With respect to the Project Coordinators in our sample (961), our survey indicates that 261 come from industry (120 from large corporations, 141 from SMEs). Of the 700 other Project Coordinators, 324 come from a university, 295 from a research institute, 29 from a public or governmental administration and 52 from other institutions.

To gain insight in this question, we consider industry to contain both large corporations and SMEs. Researchers are classified here as coming from either universities or from research institutes. The descriptives tell us that on average, the perceived project success was higher for projects led by researchers. The difference is found statistically significant with a simple t-test, the results of which are displayed in Figure 5-2.

Figure 5-2: T-test for project success (industry coordinators vs. researchers)

```
. ttest rnd_avg_pj_succes if p6_q11==1, by(industry)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	619	8.408724	.056556	1.407098	8.297658	8.519789
1	261	7.858238	.1027011	1.659187	7.656006	8.060469
combined	880	8.245455	.0507848	1.50652	8.145781	8.345128
diff		.5504862	.1096873		.3352063	.7657661

```
    diff = mean(0) - mean(1)                                  t =   5.0187
Ho: diff = 0                     degrees of freedom =      878

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 1.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 0.0000
```

Within industry, Figure 5-3 shows that on average, projects led by SMEs were perceived to perform better than projects led by large corporations. The results of the

simple t-test are not statistically significant; hence we cannot draw conclusions on the observed differences.

Figure 5-3: T-test for project success (SME vs. large industry coordinators)

```
. ttest rnd_avg_pj_succes if p6_q11==1&industry==1, by(lc)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	141	7.978723	.1439309	1.709085	7.694164	8.263283
1	120	7.716667	.1455134	1.594019	7.428536	8.004798
combined	261	7.858238	.1027011	1.659187	7.656006	8.060469
diff		.2620567	.2058247		-.1432461	.6673596

```
    diff = mean(0) - mean(1)                                  t =   1.2732
Ho: diff = 0                     degrees of freedom =      259

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.8980         Pr(|T| > |t|) = 0.2041          Pr(T > t) = 0.1020
```

Results overall for universities and research institutions do not appear to differ much, although projects led by universities were perceived as slightly more successful in our sample. The simple t-test is not significant, as Figure 5-4 shows, so we cannot draw conclusions on the observed differences.

Figure 5-4: T-test for project success (universities vs. research institutes)

```
. ttest rnd_avg_pj_succes if p6_q11==1&industry==0, by(uni)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	295	8.355932	.0816092	1.401684	8.19532	8.516544
1	324	8.45679	.0784698	1.412456	8.302414	8.611166
combined	619	8.408724	.056556	1.407098	8.297658	8.519789
diff		-.1008579	.1132554		-.3232706	.1215548

```
    diff = mean(0) - mean(1)                                  t =  -0.8905
Ho: diff = 0                     degrees of freedom =      617

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.1868         Pr(|T| > |t|) = 0.3735          Pr(T > t) = 0.8132
```

5.2.2. Observed differences in research management performance

A similar conclusion can be drawn for RMP. Overall in our sample, RMP is perceived to be higher in projects led by Project Coordinators from research institutions and universities than in projects led by industry coordinators. The results of the simple t-test displayed in Figure 5-5 indicate that the perceived differences are statistically significant.

Figure 5-5: T-test for research management performance (industry coordinators vs. researchers)

```
. ttest rnd_avg_man_perf if p6_q11==1, by(industry)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	619	8.306947	.0491916	1.223873	8.210344	8.40355
1	261	7.961686	.0957094	1.546232	7.773222	8.15015
combined	880	8.204545	.0450403	1.33611	8.116146	8.292944
diff		.3452609	.097975		.1529683	.5375534

```
    diff = mean(0) - mean(1)                                  t =   3.5240
Ho: diff = 0                     degrees of freedom =      878

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9998         Pr(|T| > |t|) = 0.0004          Pr(T > t) = 0.0002
```

Within industry, we observe that projects led by Project Coordinators from SMEs on average score lower on perceived RMP than Project Coordinators from large firms. According to a one-sided t-test, this difference is statistically significant at the 5 per cent level. This is shown in Figure 5-6.

Figure 5-6: T-test for research management performance (SMEs vs. large firms)

```
. ttest rnd_avg_man_perf if p6_q11==1&industry==1, by(lc)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	141	7.808511	.141963	1.685717	7.527842	8.089179
1	120	8.141667	.1231563	1.34911	7.897805	8.385529
combined	261	7.961686	.0957094	1.546232	7.773222	8.15015
diff		-.333156	.1912949		-.7098473	.0435353

```
    diff = mean(0) - mean(1)                                  t =  -1.7416
Ho: diff = 0                     degrees of freedom =      259

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0414         Pr(|T| > |t|) = 0.0828          Pr(T > t) = 0.9586
```

Differences in perceived RMP between universities and research institutes can hardly be observed and are not statistically significant, as Figure 5-7 shows.

Figure 5-7: T-test for research management performance (universities vs. research institutes)

```
. ttest rnd_avg_man_perf if p6_q11==1&industry==0, by(uni)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	295	8.308475	.0684975	1.176483	8.173667	8.443282
1	324	8.305556	.0704053	1.267295	8.167045	8.444066
combined	619	8.306947	.0491916	1.223873	8.210344	8.40355
diff		.002919	.0985711		-.1906564	.1964945

```
    diff = mean(0) - mean(1)                                  t =   0.0296
Ho: diff = 0                     degrees of freedom =      617

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.5118         Pr(|T| > |t|) = 0.9764          Pr(T > t) = 0.4882
```

5.2.3. Concluding remarks on Project Coordinator efficiency

Overall, we see that projects coordinated by researchers show a better perceived project success and a higher perceived RMP. Put differently, for the projects in our sample, researchers are perceived as better managers than industry coordinators.

For RMP, we found that projects in our sample led by coordinators from SMEs show an overall lower perceived RMP (statistically significant at the 5% level). This suggests that coordinators from large firms are perceived as better managers than those from SMEs.

Note, however, that these conclusions have been drawn on the basis of a rather small subset of our total survey sample. While statistically significant in our sample, it needs to be carefully considered to what extent these findings are a good representation of FP6 and FP7 projects as a whole before solid conclusions can be drawn at the programme level.

5.3. Enabling factors for research management performance

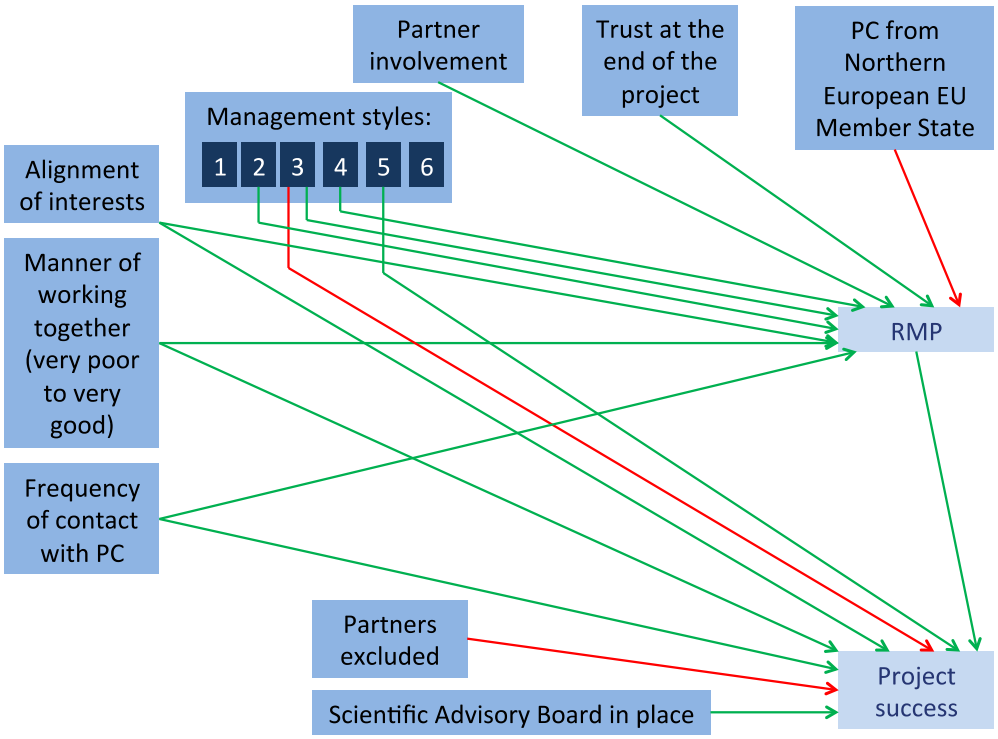
This section answers the question "Can we identify some enabling factors for efficient project management?".

In order to substantiate and extend the identification of best practices for research management performance, an econometric model was estimated. Using data gathered from our survey a high number of factors were regressed on research management performance, as perceived by survey respondents. This section presents the results of the best-fitted models.

Figure 5-8 shows all independent variables that have a significant positive (green) or negative (red) relationship with RMP, project success, or both[19]. In addition, a significant relationship exists between RMP itself and project success as a dependent variable. These relationships we describe in the following sub-sections.

[19] All relationships shown in the figure are significant at the .001 level, except those of "PC from Northern European EU Member State" (.01 level), "Partners excluded" (.01 level), "Use of management style #3" (.001 level to RMP; .01 level to Project success) and "Use of management style #4" (.05 level, to RMP only).

Figure 5-8: Independent variables that have a significant (positive = green, negative = red) relationship with RMP, project success, or both



We note here – with reference to Annex F – that the non-response analysis of the survey indicates that the results should be considered as representative of collaborative FP6 and FP7 projects (i.e. three or more consortium partners), but less so of all FP6 and FP7 projects.

5.3.1. Research management performance is enabled by multiple factors, according to the survey results

Table 5-1 shows the results of the ordered logistic regression with Research Management Performance (RMP) as the dependent variable. The methodological considerations for selecting this model are addressed in Annex G. Please note that due to the exploratory nature of this econometric research, the results should be interpreted with caution. The results are described in more detail in section 5.3.3.

Table 5-1: Results of the ordered logistic regression for Research Management Performance

Research Management Performance (0-10)		
Independent variable	*Coefficient*	*Std. error*
Nr. of physical meetings (average)	0.02	(0.011)
FP7 project (0=no (=FP6), 1=yes)	-0.031	(0.068)
Partner involvement (low to high)	-0.453***	(0.057)
Trust at the start of the project (low to high)	-0.006	(0.044)
Trust at the end of the project (low to high)	0.262***	(0.045)
% of individuals within the consortium already collaborated	-0.009	(0.029)
Partners excluded, 0=no, 1=yes	-0.084	(0.070)
Manner of working together (very poor to very good)	1.122***	(0.062)
Frequency of contact with PC (high to low)	-0.143***	(0.036)
Alignment of interests (low to high)	0.320***	(0.053)
Use of management style 1 (low to high)	-0.046	(0.038)
Use of management style 2 (low to high)	0.149***	(0.039)
Use of management style 3 (low to high)	0.653***	(0.055)
Use of management style 4 (low to high)	0.109*	(0.047)
Use of management style 5 (low to high)	0.062	(0.049)
Use of management style 6 (low to high)	0.044	(0.033)
Executive Board in place (0=no, 1=yes)	-0.016	(0.078)
Project Office in place (0=no, 1=yes)	-0.005	(0.072)
Work Package Teams in place (0=no, 1=yes)	0.057	(0.115)
Scientific Advisory Board in place (0=no, 1=yes)	0.132	(0.069)
Stakeholder Advisory Board in place (0=no, 1=yes)	0.08	(0.078)
Other structure in place (0=no, 1=yes)	0.131	(0.124)
1b.region (baseline)	.	.
2.region	0.069	(0.128)
3.region	-0.246**	(0.095)
4.region	-0.01	(0.091)
5.region	0.154	(0.124)
LR Chi^2	1856.29	
df	26	
Pseudo R^2	0.1636	
N	3269	

** p<0.05, ** p<0.01, *** p<0.001, standard error in brackets.*

5.3.2. Project success is significantly affected by research management performance and several other factors

In order to assess the extent to which project success is perceived to be determined by research management performance, we estimated an ordered logistic regression model with a high number of variables obtained from our survey. Table 5-2 presents the results of our regression analysis, using the most comprehensive model estimated. Please note that due to the exploratory nature of this econometric research, the results should be interpreted with caution. The results are described in more detail in section 5.3.3.

Table 5-2: Regression results of ordered logistic regression for Project Success

Project Success (0-10)		
Independent variable	*Coefficient*	*Std. error*
Research Management Performance (1-10)	1.002***	(0.032)
Nr. of physical meetings	-0.015	(0.010)
Partners excluded, 0=no, 1=yes	-0.179**	(0.067)
Partner involvement (high to low)	0.021	(0.056)
RMP importance (low to high)	0.051	(0.047)
Manner of working together (very poor - very good)	0.512***	(0.061)
Frequency of contact with PC (high to low)	-0.077*	(0.034)
Trust at the start (low to high)	0.028	(0.043)
Trust at the end (low to high)	-0.02	(0.045)
Use of management style 1 (low to high)	-0.029	(0.037)
Use of management style 2 (low to high)	-0.054	(0.038)
Use of management style 3 (low to high)	-0.165**	(0.053)
Use of management style 4 (low to high)	0.013	(0.046)
Use of management style 5 (low to high)	0.157***	(0.048)
Use of management style 6 (low to high)	-0.013	(0.032)
Alignment of interests (low to high)	0.387***	(0.053)
Executive Board in place (0=no, 1=yes)	0.008	(0.076)
Project Office in place (0=no, 1=yes)	-0.034	(0.070)
Work Package Teams in place (0=no, 1=yes)	-0.179	(0.112)
Scientific Advisory Board in place (0=no, 1=yes)	0.271***	(0.067)
Stakeholder Advisory Board in place (0=no, 1=yes)	-0.012	(0.075)
Other structure in place (0=no, 1=yes)	0.161	(0.118)
Project mainly conducted from Western Europe	0	(.)
Project mainly conducted from Northern Europe	-0.186	(0.124)
Project mainly conducted from Southern Europe	-0.086	(0.093)
Project mainly conducted from Eastern Europe	0.067	(0.088)
Project mainly conducted from other regions	0.114	(0.119)
FP7 project (0=no (=FP6), 1=yes)	0.103	(0.066)
LR Chi^2	2487.71	
DF	27	
Pseudo R^2	0.1984	
N	3478	

** p<0.05, ** p<0.01, *** p<0.001, standard error in brackets.*

5.3.3. Project success is significantly affected by research management performance; some drivers of research management performance and project success differ from one another

The results presented in the tables above include the following significant effects:

- **Research management performance (RMP)** as perceived by the respondents has a statistically significant positive correlation with **project**

success. This implies that better research management yields better project results, and the other way around. The model therefore validates the hypothesis that research management performance is an important determinant of the success of a project.[20]

- **Partner involvement – the extent to which the Project Coordinator involves partners in substantial decisions about the project** is significantly related to **RMP**. The coefficient is negative and the variable is ordered inversely (a lower value means higher involvement). Hence, we can conclude that when the Project Coordinator involves partners more in decision-making, RMP improves. While this relationship seems intuitively quite straightforward, it is supported here by a control variable, which measures to what extent project partners expect that involving more partners in the project would have improved its outcomes. We have reported on this variable in section 4.4.2. From that analysis it becomes clear that it is especially important to involve the main project partners in substantial decision making.

  The level of involvement of partners in the decision-making process is not a statistically significant determinant of project success. Although one would expect higher level of involvement to be correlated with a higher perceived project success by the participants, our regression analysis found no statistical evidence for this.

- **Trust (between project partners, on the personal level) at the end of the project** has a positive relationship with **RMP**. The same relationship does not apply to trust at the start of the project; ex-ante trust is not significant. This implies that it is not sufficient for research management to be considered successful if partners trust each other at the start of the project, hence effort needs to be made during the project to at least maintain the existing level of trust among partners or to increase trust if it is not high to begin with.

  This relates to our finding that building a consortium based on the merits of the partners in relation to the call text adds to project success. Building a consortium in this manner is likely to result in a significant number of consortium partners who have not cooperated before. Therefore building trust is a key feature of research management in highly successful consortia. Trust can be built by ensuring frequent communication, aligning the interests of consortium partners and making use of certain management styles, as is shown on the following pages.

  Although **trust at the end of the project** is an important driver of research management performance, it **is not (directly) significantly correlated with project success**. While one may expect that trust is essential for the overall success of the project, the results of our regression analysis imply that it should be regarded as an enabling factor for research management performance instead.

- From the regression results it also follows that one of the key determinants of both **RMP** and **project success** is **the manner in which project partners worked together** (ranging from very poor to very good). The statistically

[20] Survey respondents' perception on the extent to which research management contributes to project performance may influence their relative scores for research management performance and project success. To control for this bias, survey respondents were asked to what extent they believed that research management performance had an influence on project success. Using their answers, we can also test for a "placebo" effect.

significant positive relationship with perceived project success implies that projects are more likely to succeed if partners work better together.

- Another variable that is positively related to **RMP** and **project success**, is the **frequency of contact between the Project Coordinator and each of the partners in the consortium**. The coefficient is negative and the variable is ordered inversely (a lower value means higher frequency of contact). As the findings from the case studies in section 4.5 show, the nature of the contact – formal or informal, in person or via telephone/e-mail or another medium – is less important than the frequency. This is something Project Coordinators can directly influence when managing an FP project.
- **Alignment of interests of consortium partners to the project objectives** also adds to **RMP** and **project success**. This implies that management should seek alignment of partners and should also be well prepared for situations where conflicts of interest or misalignment or partners may arise. Although perfect alignment of partners is unreasonable to expect, the results suggest that improvement is possible in this aspect in a substantial number of FP projects. As was shown in section 4.11, it is particularly important for Project Coordinators to pay attention to this aspect in projects where consortium partners' interests may diverge in relation to the utilisation of intellectual property developed in the FP project. Case study projects in which IP features less prominently appear to create less of a challenge for alignment of interests.
- **Three out of the six management styles that may be used by FP project managers as proposed in the survey** seem to contribute to **RMP**, while **just one out of the six styles** appears to contribute to **project success**. The styles that are positively related to RMP are the following:
    - Style #2 - Benefit from scientific leadership and personal reputation
    - Style # 3 - Timely sharing of information
    - Style # 4 - Invest in one-on-one communication and build relationships

  Style #2 is aimed at utilising existing authority in the subject matter that is relevant to the project. Style #3 is aimed at facilitating and supporting project partners in implementing project tasks. Style #4 is relationship-oriented. This shows that various styles can be effective in increasing RMP.

  The three other styles proposed in the survey are not significantly related to RMP. These are:

    - Style #1 - Refer to contractual agreements and use accountability
    - Style #5 - Rely on established relationships and high trust levels
    - Style #6 - Use network power such as positions in other consortia and in high-level committees

  Style #1 is formal and relies on negative motivators; contracts and accountability imply that if consortium partners do not perform their tasks as the Project Coordinator wants, there is the possibility of penalties. Style #5 relates to the point made above about trust: relying on existing levels of trust is not sufficient, a Project Coordinator should increase or at least maintain trust to foster RMP. Finally, style #6 relies on formal authority to get things done. As such, it is related to Style #1, as authority implies that the coordinator is more powerful than the partners. This power can be perceived as threatening, which may explain why style #6 is not as effective as styles #2, #3 and #4.

  The regression analysis also shows that **managers who rely on established relationships and high trust levels (i.e. management style #5) tend to lead better performing projects.** Interestingly, only style #5 is positively

related to project success. Styles #2 and #4, which are positively related to RMP, have no apparent relationship to project success. **Style #3 (timely sharing of information)**, which is also positively related to RMP, turns out to be *negatively* related to project success at the .01 significance level. This finding is difficult to explain. One possibility logic dictates is that while project partners may appreciate receiving information when it becomes available to the Project Coordinator, in some cases this could lead to a form of information overload, diverting project participants' focus away from their agreed project tasks. This may explain why the survey results show a positive effect on research management performance (partners feel they are taken seriously by the Project Coordinator and kept in the loop), while project success suffers (partners spend their time less efficiently than they might have without receiving the information). This explanation was confirmed by experiences of WP4 interviewees, who refer in particular to the use of web-based shared project space, in which so many documents are uploaded that it becomes unclear what is important for project participants to know and what is not.

- **A Northern European origin of the Project Coordinator** (encoded as Region 3) **is *negatively* related to RMP**, while other geographies are not significantly related to RMP. This finding is difficult to explain. Due to perfect collinearity between categories for regions (i.e. a project is per definition part of only one of these groups), a baseline needed to be selected. In our case, Western Europe was arbitrarily selected as the baseline. The statistical significance needs to be interpreted vis-à-vs this baseline. In comparison with the baseline, Northern Europe was the only significant value, which implies that it differs significantly from the other regions of origin of Project Coordinators. Further exploration of the regional dimension in relation to management styles shows that some styles are used more than others in specific EU regions.

Table 5-3: Correlations between the Project Coordinator's region of origin and the management styles observed in the project

Region	Style 1	Style 2	Style 3	Style 4	Style 5	Style 6
Western Europe	-0,0068	-0,0105	-0,0223	0,0075	-0,0097	-0,0029
Southern Europe	0,0001	0,006	0,0053	-0,0241	0,0161	0.0325*
Northern Europe	-0.0549*	0,0173	-0,0026	-0.0301*	-0,0202	-0,0295
Eastern Europe	0,0282	-0.0401*	-0,0057	0,0193	-0,0058	-0,0299
Other	0.0436*	0.0441*	0.0362*	0,0266	0.0345*	0.0601*

The table shows that at the .05 significance level (denoted * and marked in green), **Project Coordinators of Northern European origin make use of styles #1 and #4 significantly less often than their counterparts from all other regions**. While style #1 is not positively related to RMP or project success, style #4 – Invest in one-on-one communication and build relationships – has been found to be positively related to RMP (see findings detailed above). The limited use of the management style #4 may clarify why Northern European Project Coordinators score lower on RMP.

No statistical evidence was found for difference in project success when considering from which region the project was mainly conducted. Projects that were mainly conducted from any of the included regions do not show significant differences in project success compared with the baseline. This means that these groups, including the baseline of "Western Europe", do not determine statistically significant differences in project performance. Put differently, from an econometric point of view, these regions of origin of Project

Coordinators show, *ceteris paribus*, similar results for perceived project success.

- Concerning the management structures in FP6 and FP7 projects, we see that **the presence of a Scientific Advisory Board** has a significant positive effect on **project success**. One should, however, be careful while interpreting these results as the complexity or nature of the projects may require installing a Scientific Advisory Board for better management of the project. This does not necessarily mean that installing a Scientific Advisory Board will lead to better project results. Nevertheless, if applicable to the project, it should be fully explored by project managers. **The presence of a Scientific Advisory Board is not related to RMP.**
- The regression results also give statistical evidence for the **negative effects of unstable consortia** during the project phase. The statistically significant negative correlation with perceived project success implies that **projects that face partners that need to be excluded, tend to be less successful.** Our regression cannot identify the underlying reason for this is. On the one hand it seems that unstable consortia indeed lead to lower project performance. On the other hand, in our stakeholder interviews we were told that exclusion procedures as required by the Commission are cumbersome, inflexible, and time and resource demanding. It is therefore uncertain whether the negative effects arise from unstable consortia by themselves or from the notion that it is difficult to exclude partners after specific events, such as a company going out of business or a change of strategy after being acquired by a large industrial firm.

  An interesting point to note is that **the exclusion of partners did not significantly influence research management performance**. Exploratory econometric analysis of the factors that influence the chance consortia need to exclude partners revealed a significant negative relationship between research management performance and whether partners were excluded. This implies that research management performance on itself is not significantly affected by the exclusion of partners (for instance, the process of replacing a partner can be well-managed), but that the exclusion of partners is more likely to occur with low research management performance. This in turn has a significant negative effect on the overall success of the project.
- With respect to the current structures in place, **no statistical evidence was found for differences in overall performance between FP6 and FP7 projects**. Taking into account the various factors neither one of the two programmes yielded statistically different results.

Interestingly, in a related, small-scale study project, Löwik (2014) finds that FP project success may be defined on different levels, i.e. as compliance with the conditions of the EC grant agreement (ECGA) or as valorisation of project results. While these definitions of success are potentially conflicting within an FP project, Löwik finds that both goals can be achieved simultaneously when there is a good balance in the consortium between SMEs and other partners, WP deliverables are clearly described and the EC project officer is sufficiently committed to the project and shows flexibility towards minor adjustments in the ECGA.[21]

[21] Löwik, M. (2014, unpublished) Master thesis, under supervision of Dr. W.T.M. Jansen of PwC and Prof. Eric Claassen of Vrije Universiteit Amsterdam.

5.3.4. Findings are robust for different themes and schemes under FP6 and FP7 and are not affected by project size

Our findings from the regression analyses do not change when FP6 and FP7 themes and schemes are added as dummy variables.[22] The single exception to this rule is the relationship between the exclusion of project partners and project success, which is no longer significant at the .05 level when themes are added.[23] Adding themes or schemes to the regressions contributes relatively little to the explanatory power of the models, as expressed by the R-squared.

Size (approximated by total project costs) does not significantly influence either RMP or project success.

The finding that project success and RMP do not significantly differ between FP6 and FP7 projects is further strengthened when themes and schemes are analysed separately. The following **schemes** have significant relationships with either RMP or project success, or both:

- Projects with FP7 funding schemes **Article 171**[24] and **CP-CSA** and FP6 scheme **MCA are positively correlated with project success** (statistically significant, compared to the baseline "STREP"). **Article 171 is also negatively correlated with RMP**.
- Projects with FP6 funding schemes **CLR** and **CRAFT** and FP7 scheme **BSG are negatively correlated with project success** (statistically significant, compared to the baseline "STREP"). **CLR** and **CRAFT are also negatively correlated with RMP**.

The nine other funding schemes under FP6 and FP7 are not significantly related to either project success or RMP.

The following **themes** have significant relationships with either RMP or project success, or both:

- **Horizontal research activities involving SMEs** (FP6) and **Research for the benefit of SMEs** (FP7) **are negatively correlated with project success** (statistically significant, compared to the baseline "Transport" (FP7)). **Horizontal research activities involving SMEs** (FP6) **is also negatively correlated with RMP**. This is not the case for Research for the benefit of SMEs (FP7).
- **Human resources and mobility** (FP6), **Research Infrastructures** (FP7) and **Socio-economic sciences and Humanities** (FP7) **are positively correlated with project success, but not with RMP** (statistically significant, compared to the baseline "Transport" (FP7)). Interestingly, Research Infrastructures (FP6) is not significantly correlated to project success.
- **Four themes are positively correlated with RMP, but not with project success** (statistically significant, compared to the baseline "Transport" (FP7))**: Citizens and governance in a knowledge-based society** (FP6), **Food, Agriculture, and Biotechnology** (FP7), **Nuclear Fission and Radiation Protection** (FP7), and **Security** (FP7).

The 27 other themes are not significantly related to either project success or RMP.

[22] The results of the additional statistical analyses performed are included in Annex H.

[23] Note that the standard error barely changes, but the estimator drops as shown in the statistical output in Annex H.

[24] The full names of these themes and schemes are included in the list of abbreviations and acronyms on page 8.

While most of the significant relationships found may be expected to indicate specific characteristics and idiosyncrasies of specific themes and schemes, one set of findings stands out from the rest. Apparently, themes that are aimed at the involvement of SMEs, both in FP6 and FP7, have a tendency to be negatively correlated with project success. This may be due to the diverging interests and priorities that are inherent to building consortia of organisations of different types. SMEs in particular tend to have a shorter time horizon in their project planning than universities and RTOs, and the three-to-four-year time span of an FP project is potentially difficult to fit into the portfolio of activities of a typical SME, even if it is R&D-oriented. The negative correlation may also be the result of the "forced" inclusion of SMEs, which have to be found outside the personal network of the researchers that initiate the consortium-building process and therefore present a research management challenge in the form of building trust with new partners.

Findings on efficiency of research management models:

- One can identify **six enabling factors** for efficient ***research management***.
  - partner involvement – the extent to which the Project Coordinator involves partners in substantial decisions about the project;
  - trust (between project partners, on the personal level) at the end of the project;
  - the quality of the way consortium partners have worked together is also positively related to research management performance;
  - the frequency of contact between the Project Coordinator and each of the partners in the consortium;
  - alignment of interests of consortium partners to the project objectives;
  - three out of the six management styles proposed in the survey:
    - Style #2 - Benefit from scientific leadership and personal reputation
    - Style #3 - Timely sharing of information
    - Style #4 - Invest in one-on-one communication and build relationships
- A Northern European origin of the Project Coordinator is **negatively related to *RMP***, while other geographies are not significantly related to research management performance. This finding may be explained by the fact that Northern European Project Coordinators tend to rely less often than others on style #4 - Invest in one-on-one communication and build relationships.
- ***Project success*** **is positively affected by *RMP***, as well as the following factors:
  - the quality of the way consortium partners have worked together is also positively related to research management performance;
  - the frequency of contact between the Project Coordinator and each of the partners in the consortium;
  - alignment of interests of consortium partners to the project objectives;
  - the presence of a Scientific Advisory Board;
  - only one out of the six management styles proposed in the survey:
    - Style #5 - Rely on established relationships and high trust levels
- Unlike ***RMP***, ***project success*** **does not benefit from**:
  - partner involvement – the extent to which the Project Coordinator involves partners in substantial decisions about the project;
  - trust (between project partners, on the personal level) at the end of the project;
  - management styles #2, #3 and #4 – **style #3 is even negatively related to project success**.
- The exclusion of project partners is **negatively related to project success**.
- **Project success and RMP do not differ between FP6 and FP7 projects as a group.** Specific schemes and themes are related to project success, RMP or both. Specifically, **FP6 and FP7 themes that require the involvement of SMEs are negatively related to project success**.

5.4. Good management practice for FP projects

This section answers the question "Can we draw a list of good management practice for FP projects, according to the typology previously envisaged?".

1. **Build a consortium based on the merits of the partners in relation to the call text; do not rely on existing relationships only.** Follow the call text closely when the consortium is composed, as the best performing projects have been shown to do so.

2. **Define and communicate clear roles and responsibilities and do so already at the grant proposal stage.** This implies that rather than simply assigning someone the role of e.g. Project Coordinator or WP Leader, it should be clearly described which responsibilities, authority and resources are associated with each role. Ensure that all consortium partners are aware of their role in providing checks and balances towards the work of the Project Coordinator and any other bodies through the General Assembly.

3. **Do not create more roles than the basic ones** of Project Coordinator, Scientific Coordinator, WP Leader, unless the project scope requires a more complex structure. Keep the management structure as simple as possible.

4. **The role of Project Coordinator should be awarded based on proven competence**, rather than on hierarchy or standing in the research field or on who took the initiative to write the grant proposal. We see this happening with most other roles in consortia, but not always with the Project Coordinator. Project Coordinators that are experienced in project management and are responsive to project partners' input perform better research management. In contrast research experience or experience participating in FP projects is less important.

5. **Ensure sufficient resources for research management.** Our findings show that as a rule, research management requires more resources than originally budgeted. The challenge is in budgeting accurately what a project will need in terms of research management and translating that into the time that will be spent by the managers.

6. **Ensure that Project Coordinators are proficient in working with mandatory EC-provided tools.** Even if the Project Coordinator delegates the financial and administrative tasks to a specialist project manager, it is the Project Coordinator who is finally responsible to the European Commission. Therefore, he/she should ensure the ability to work with mandatory EC-tools, for example by taking a course or being instructed by an experienced coordinator.

7. **Take a trust-based approach by always starting from the informal consensus-oriented decision-making model**, rather than starting with top-down decision making right from the start. Also, if not all partners have an existing working relationship, invest in social activities for team building (get everyone on board). It is crucial to work on fostering trust between partners throughout the project life cycle. This should not be confused with working with partners one already knows, as our analysis of the survey results that both trust at the start of the project and the percentage of participants that have worked together before are not correlated to research management performance, or to project success.

8. **Consider why management styles #2, #3, #4 are conducive to research management performance and #5 to project success, while styles #1 and #6 have no effect on either.** Each of styles #2 (Benefit from scientific leadership

and personal reputation), #3 (Timely sharing of information) and #4 (Invest in one-on-one communication and build relationships) focuses on another type of management, i.e. respectively expertise-based, facilitating and relationship-oriented. Style #5 (Rely on established relations and high trust levels), while not contributing to RMP, appears to positively influence project success. Research managers that use inclusive consensus-based approaches are perceived to be more effective than managers relying on top-down decision making or transactional accountability within the consortium.

9. **Keep all project partners involved.** Frequent contact is more important than mode or intensity of contact to increase project success. In communication, tools are less important than a practical and people-oriented approach. Internal communication also has an important objective in aligning consortium partners' interest with project objectives and keeping them aligned.

10. **Accept that there is a high probability that one or more consortium partners will leave the consortium during the project, as this happens in around 30 per cent of all FP projects.** This may be due to all sorts of events external to the consortium that the Project Coordinator cannot influence, such as a takeover of an industry partner that results in revised strategic priorities of the company, an SME going bankrupt or a key person in the consortium taking up a new position in another organisation. Project managers should invest in a transparent relationship with the project officer. This implies informing the project officer pro-actively about why a partner, rather than waiting until the next progress report. This allows the project officer to take a more flexible approach towards changes in the consortium, and to use his experience to add value to the challenges of the consortium. The project officer should not only be considered as a person to report to, but also as a person that might have a good overview of the field and that might use this overview to help the consortium if needed.

5.5. Suggestions regarding structures and models put in place by the European Commission

FP6, FP7, and Horizon 2020 are generally considered as unique and very valuable programmes. Within this context the European Commission should be aware of the following when it wants to help researchers improve the performance of their research management.

1. Our study suggests that removing the 7 per cent maximum for project management budget has been conducive to good management. This flexibility is not only highly appreciated by researchers, it also allows researchers to improve the quality of their research management, and hence the performance of their research projects. Our study shows this empirically. The European Commission has decided to continue this flexible approach in Horizon 2020, which is a good thing. **Our suggestion would be to continue this strategy of flexibility vis-à-vis projects, their coordinators, and their participants.**

2. The European Commission should be aware of the effects that the call texts have. Finding the right types of partners is a very challenging task for any consortium initiator. Of course the partners have to be convinced to invest in a project proposal. But before that one has to conceptually think about the consortium in terms of types of participants, e.g. research groups at universities or research and technology institutes, large firms intending to innovate, SMEs, SME associations or groupings, public or governmental administration (local, regional or national), early-stage researchers (postgraduate students), experienced researchers,

institutions running research infrastructures of transnational interest, organisations and researchers from third countries, international organisations, and civil society organisations. Our study clearly shows that projects that are able to stick to the call texts as much as possible in terms of the types of partners that are included in the consortium perform better in terms of management and in terms of overall performance. This has clear implications for FP coordinators in the future: stick to the call texts when forming a consortium. However, it also has implications for the European Commission and its agencies that implement Horizon 2020 and future programmes: make sure the call texts are explicit, also in terms of demands put to the consortia. It is a good thing that call texts are more open under Horizon 2020, but the Commission should keep in mind that where specific requirements in terms of partner selection are needed, this should be clearly stated, as adherence to these requirements tends to increase RMP, and thereby project success. **Our suggestion would be to continue to pay close attention to these call texts, and be fully aware of the effects they have on both the consortium characteristics, and by extension on research performance.**

3. If the European Commission wants to improve the quality of the consortia, the call texts are a good instrument as described above. However, the European Commission also has a number of supply-side instruments in use for this purpose. Best known are the European Commission's matchmaking events, and the CORDIS database. Both are often used by "newcomers to the business". Our survey and our case studies show that their effects in terms of research performance are limited. Our survey findings show that only a small minority uses matchmaking events to find participants or to find consortia. The projects that make use of this instrument are generally not the best ones in terms of performance, according to our survey findings. The same goes for the CORDIS database. Our case studies show that this source is not known for its added value. In theory these instruments might increase the dynamics of consortium building. The extent to which this is useful in terms of research performance might be addressed in future research. In the shorter term we would suggest the following. **Our suggestion to the European Commission would be make the necessary effort to improve the appreciation of these instruments by the research community, thereby improving their usefulness to experienced FP participants.**

4. The European Commission should also offer continuity to individual research managers. One of the most obvious (and present) manifestations of the European Commission to FP project managers is a single person: the project officer. Project officers are often highly appreciated by FP Project Coordinators, for their experience, their knowledge of the EC agenda, and their ability to look in "the kitchen" of neighbouring FP projects. However, we have found that regular changes of project officers are considered normal by FP coordinators, with some cases in which a project officer is replaced as many as four times during the lifecycle of the FP project. FP Project Coordinators are clearly disappointed by this. It also results in a rigid approach of the European Commission when e.g. changes in the consortium are needed, as project officers who replace a colleague on an FP project are not always aware of its complete history as experienced by their predecessor. Project coordinators need continuity from the side of the European Commission. This will improve their performance. **Our suggestion would be to make better use of account management[25] approaches towards FP**

[25] By "account management" we mean the management of dedicated sales and/or marketing processes (in this case the process of FP project monitoring and reviewing from the side of the EC) directed towards important stakeholders in business and industrial markets (in this case FP

projects and to investigate if such an instrument can contribute to more continuity among the project officers from the perspective of FP project managers and participants. The ongoing delegation of the project officer role from the Commission to the European Research Agency and the European Research Council Executive Agency provides the opportunity to facilitate this continuity by reviewing and updating working procedures.

5. The European Commission should however not overestimate its effect on FP projects. Our study empirically shows that the tools offered by the European Commission are hardly used by FP participants and coordinators. In those cases that they are used, their effect on the performance of research management is practically zero. Moreover, their quality often seems lacking from the point of view of the participants. They lack flexibility, and technically they are far from perfect. They require too much time to get used to. **Our suggestion to the European Commission would be to have a critical look at the European Commission's tools, to focus on the tools that really matter, and to improve them to such an extent that they start adding value to projects.** When doing so, we suggest that the European Commission should be aware that most tools can already be found on the market. Also investment in the improvement of tools should be limited to mandatory tools only, in order to ensure efficient utilisation of resources.

6. Our case studies show a myriad of examples of management structures in FP projects. Similar findings result from the survey. Basically this myriad can be conceptualised into two categories: a basic model and a set of complex models. Of course, FP consortia have quite some degree of freedom when designing their internal management. However, our analyses show that in almost all cases, a relatively simple model adds value to research management performance and to FP project performance. Under Horizon 2020 the evaluation of the implementation (including management structure) constitutes a relatively smaller part of the overall evaluation score of proposals than under FP7. This may already solve this issue in part, as some low performing projects under FP6 and FP7 may have aimed to come up with unconventional, creative management structures to impress reviewers, but suffered from their impracticalities in the execution of the project. **Our suggestion would be to further investigate the relationship between a project's management structure and its performance, and if needed, implement more incentives in the evaluation procedure towards the straightforward, but successful, "basic model". This may be done for example by instructing reviewers to critically assess whether or not management structures are overly complex in relation to the project size and complexity.**

7. Horizon 2020 has also adopted a novel tool to facilitate the description of innovation activities within projects: the Technology Readiness Level (TRL) model. The model has been developed by the National Aeronautics Space Administration

project coordinators), which can be seen as the practical implementation of a long-term buyer seller relationship. In this case we specifically refer to pro-active account management which is aimed at developing a customer-focused organisation. Account management is then no longer the outcome of a defensive move, driven by competition or imposed by customers, but becomes part of the implementation of a customer-focused strategy. As such, account management is much more strategic, as it helps to improve relationships with key stakeholders and to achieve the strategic objectives of an organisation (Gosselin, D. P., & Bauwen, G. A. 2006. Strategic account management: customer value creation through customer alignment. Journal of Business & Industrial Marketing, 21, 376-385).

(NASA) to describe the maturity of an innovation from research concept to market entry in 9 different readiness levels. In a small, exploratory satellite study[26] we examined the pros and cons of the TRL model when applied for Horizon 2020 collaborative HEALTH projects. Three most important advantages of the TRL model were considered to be the creation of a common language, the simplification of complex information and the possibility to set targets and allocate time and budget to them. The main disadvantages were considered to be the inability of the TRL model to assess the maturity of a system, the risk of misinterpretation on what is meant by the different levels, and the risk of "gravitation towards numbers", i.e. TRL levels becoming a goal in themselves, rather than a means to describe technology readiness. **Our suggestion would be to take into account these advantages and disadvantages when making use of the TRL model and the information it provides.**

[26] Visser, R. (2014, unpublished) Master thesis under supervision of Dr. W.T.M. Jansen of PwC and Dr. W. Ho of the Vrije Universiteit Amsterdam.

6. Concluding Remarks and Recommendations

This section provides summarised conclusions and recommendations to the European Commission and its agencies and FP project consortia. When followed up in a timely fashion these recommendations are anticipated to have a major impact on FP research management and project performance. To guide the implementation of the recommendations we have prioritised them (most important recommendations have been listed first). In doing so the intrinsic impact of a given recommendation has been weighed against the current policy trends. For example, some recommendations on highly relevant issues were nevertheless considered to be of relative low priority as the situation already changed for the better in the Horizon 2020 programme, whereas other recommendations have gained a higher priority as current trends worsen the situation.

Our concluding remarks and recommendations are based on our survey results, our case studies, our expert interviews and our round table with experts and repeated FP participants. We are fully aware of the structural developments from FP6, via FP7, to Horizon 2020. Therefore we advise the reader that in terms of various aspects of the programmes, from e.g. governance of the programmes to project accountability, a lot has changed, and that further changes are expected to take place. Despite these developments in the institutional context of FP projects, our data show some clear red lines in terms of what constitutes good research management performance and benefits overall project performance. The following concluding remarks and recommendations have been derived from that.

In general our study findings indicate that Research Management is first and foremost about people, not about complex management models and management tools. This implies that models and tools should be kept simple to best facilitate the research manager in communication with the consortium and the project office.

This section contains the following recommendations, which are organised by topic in the sub-sections on the following pages.

Recommendations to the European Commission:

1. The European Commission and its agencies should increase their capacity in terms of project officers and set up a structured account management approach (as defined in section 5.5).
2. The European Commission should critically review currently offered matchmaking instruments, like the CORDIS partner search function and matchmaking events, as these do not contribute to better performing FP consortia. It should develop more effective instruments instead.
3. The European Commission should communicate to reviewers and project coordinators that overly complex management models should be avoided.
4. The European Commission should explore the possibilities of simplifying the IP rules in Horizon 2020 and ensure a better alignment with WTO/TRIPS and anti-trust rules.
5. The European Commission should develop better indicators for project officers to monitor and assess projects.
6. We recommend that the European Commission reviews the tools it currently provides, to focus on the mandatory tools that really matter, and to improve them to such an extent that they start adding value to projects.

Recommendations to Project Coordinators:

1. Project coordinators should build a consortium based on merits rather than on existing relationships.
2. Project coordinators should favour a consensus-based decision making model, rather than a hierarchical or formal management style, and ensure frequent communication with all consortium partners.
3. Project Coordinators should avoid overly complex management structures and clearly define roles and responsibilities. Roles and responsibilities in the project should be awarded based on proven competences for the role, not because of status or hierarchical reasons.
4. Project Coordinators should communicate pro-actively to the Commission's project officer about all aspects of their project, including about expected or upcoming changes in the composition of the consortium.

6.1. Good practices in research management are aimed at building trust and relationships, ensuring frequent communication and facilitating the consortium partners

The study shows that several of the research management practices encountered are particularly effective. These practices are aimed at three major goals of research management:

1. increasing trust and building relationships between consortium partners;
2. ensuring frequent communication between the Project Coordinator and consortium partners, while involving at least all main consortium partners in important decisions;
3. facilitating the work that is to be performed by consortium partners, by providing structure and information.

Research managers that use all-inclusive consensus-based approaches are perceived to be more effective than managers relying on top-down decision making or transactional accountability within the consortium.

What remains unclear is how it can be explained that timely sharing of information (management style #3) is beneficial to research management performance, while hampering project success as perceived by project partners. Some interviewees suggested that timely sharing of information is beneficial to research management performance, while overload of trivial or non-crucial information may hamper project success due to "information fatigue" or unstructured information.

We therefore recommend the following.

***First Recommendation to Project Coordinators*:** Project coordinators should build a consortium based on merits rather than on existing relationships. As a result, at the beginning of the project trust may be low as partners need to get used to each other. This is absolutely fine, as long as the project manager invests in trust throughout the project life-cycle to achieve high trust levels at the end of the project.

***Second Recommendation to Project Coordinators*:** Project coordinators should favour a consensus-based decision making model, rather than a hierarchical or formal management style. This should be complemented with an all-inclusive approach. In addition to the abovementioned consensus-based decision-making, this also requires frequent communication with the consortium. Frequency of communication is much more important than mode or intensity. These activities serve to align consortium partners' interests and contribute to project success.

6.2. How consortium composition comes about and subsequently changes can be considered a given; what matters is how Project Coordinators and EC project officers are able to respond to it

FP6 and FP7 consortia come in many different shapes and sizes. They are formed in a process that is largely based on existing networks and relationships of researchers, followed by the search for the types of organisations or competencies in a consortium that are still missing in comparison to the Commission's call for proposals. A clear tendency exists to form sequential consortia with (mostly) the same partners. When existing networks dominate this process and relatively few new partners are included, it creates the risk of low research management performance in the project. Although we have established that a clear correlation exists between these two concepts, it is not yet clear to us how limiting the introduction of new partners works to reduce research management performance. This is suggested as a topic for further study in section 7.

Size does matter; larger projects (i.e. projects with more consortium partners and more individual participants) are more difficult to manage. The "basic" management structure (i.e. the simplest appropriate structure respective to size and complexity of the research tasks at hand) increases research management performance.[27] Good Project Coordinators design simple project structures. From a management point of view, these structures are both relatively effective and efficient.

It was also found that consortia that have made use of EC-provided matchmaking instruments, such as the CORDIS database or matchmaking events organised by the Commission, are generally not among the highest performing projects.

As stated before, our study clearly shows that research management is first and foremost the business of people, not of complex management models and management tools. In the last couple of years the European Commission has decreased the number of project officers, and has replaced several of their roles with e.g. administrative ICT tools. Without doubt these tools come with some advantages; however they probably come with a larger number of disadvantages, as we have shown in section **Error! Reference source not found.**.

We therefore recommend the following.

First Recommendation to the European Commission: The European Commission and its agencies should increase their capacity in terms of the number and capabilities of project officers and set up a structured account management approach (as defined in section 5.5) that could help assist the consortia in several ways, including coping with inevitable changes in their composition. It would also enable the European Commission and its agencies to simplify the administrative requirements associated with consortium composition and/or project course amendments that are now too high.

Second Recommendation to the European Commission: The European Commission should critically review currently offered matchmaking instruments, like the CORDIS partner search function and matchmaking events, as these do not contribute to better performing FP consortia. Instead the European Commission and its agencies should focus on developing other instruments to achieve the objective of creating high-performing consortia, such as networking events at conferences and social media-based communication.

[27] Complexity has been checked for in terms of the number of work packages, the project budget and the number of partners respectively.

Third Recommendation to Project Coordinators: Project Coordinators should be aware that a management structure that stays close to the call text is conducive to project performance. They should avoid overly complex management structures, and clearly define roles and responsibilities. Roles and responsibilities in the project should be awarded based on proven competence for the role, not because of status or hierarchical reasons.

FP consortia are relatively dynamic partnerships. In about one third of the projects, changes in the consortium occur. A substantial proportion of them is beyond the control of FP project managers. These are the result of the natural evolution of the FP project itself (making specific partners redundant and/or less motivated) or of external circumstances, such as researchers moving from one institute to another, changes in the legal structure of partners reshaping the project, or industry partners that are merged, taken over, going bankrupt or facing tax or legal issues. Knowing this, changes in the composition of consortia should be considered a potential fact of life in any FP project. The study also shows that excluding partners from consortia reduces the likelihood of high project performance. What is not clear at this point is why project performance suffers. This may be – first and most straightforward – the result of changes in consortium composition that limit the consortium's ability to deliver the project objectives set out in the Grant Agreement. Second, it may also be the case that the (internal) evolution of the research made certain consortium partners redundant and, separately, also may require an adjustment of the project objectives. If the project objectives cannot be changed, because of the structure imposed by the Framework Programme, it is likely that the original project objectives cannot be met due to the new direction the research is taking. Third, the project may be less successful due to delays in the research caused by the financial and administrative adjustments that are necessary to accommodate the change in consortium composition, as well as consortium members' attention that is drawn away from the research tasks by the unrest caused by a consortium member leaving.

Although it is not certain that these three explanations are all that there is to the relationship, understanding that there may be different causes to changes in consortium composition will help to mitigate their negative effects. In each of the three explanations described above, both the Project Coordinator and the EC Project Officer can contribute to working towards a solution. A shared understanding by both of them (e.g. through implementation of the second recommendation to project coordinators indicated below) of which cause is at work is crucial for mitigating the negative effects of the change in consortium composition.

We therefore recommend the following.

Fourth Recommendation to Project Coordinators: Project Coordinators should communicate pro-actively to the Commission's project officer about all aspects of their project, including about expected or upcoming changes in the composition of the consortium. Such communication would not only result in clear benefits on the part of the Commission. Our study clearly shows that informing the project officer well in advanced and in an informal manner – instead of waiting until the deadline of a progress report a couple of months later – allows the project officer room for a more flexible and tailored approach that decreases administrative burdens on the part of the consortium.

6.3. Several specific adjustments of FP7 vs. FP6 and Horizon 2020 vs. FP7 appear to have worked out well; on the other hand IP remains an issue

Several EC instruments have been changed for the better at the start of FP7 and Horizon 2020 respectively. One example is letting go of the 7 per cent maximum budget for research management costs at the start of FP7. Another is putting less emphasis on the management structure of consortia in evaluating project proposals under Horizon 2020, thereby creating fewer incentives for consortia to propose overly complex management and governance structures. However, some evaluators have not yet adopted this new practice. Finally, the increased focus on further developing the European Research Area (ERA) can yield concrete results in Horizon 2020 by focusing on the role of junior researchers in on-going projects.

On the last point, the study shows that human resource management has been limited in most FP6 and FP7 projects to training and development of junior researchers (PhD researcher and post-docs) within the separate organisations of consortium partners. HRM did not take place at the level of the project. This amounts to a missed opportunity for making the ERA work, as FP projects are particularly suited for "on-the-job" exchanges of junior researchers between the partner organisations in a consortium, thereby strongly increasing both the learning experience and the potential results of the projects. It must be noted that training regularly used to be part of FP7 collaborative project calls, but until now seems not to be included in calls for collaborative projects in H2020.

Our findings also show that IPRs were indeed a problem area in a large number of FP projects. Our expert interviews indicate that in a large majority of the collaborative FP projects, IPRs are of no relevance. Considerable effort might thus be spent to deal with a topic of little bearing. In those consortia where IPR is relevant, the project participants and coordinators find the rules too complex (cf. section **Error! Reference ource not found.**). Also clear misalignments with anti-competition law and WTO rules have been reported in our expert interviews. All aspects factored in, there seems to be a noticeable share of projects where IPRs become a topic of dispute among consortium partners. It is not clear whether the current IPR regulations in Horizon 2020 help solve the problems or whether they sometimes even augment or create them. On the plus side, one has to note that the set of rules is standardised, so there is some learning to be assumed on how to deal with them.

We therefore recommend the following.

Third Recommendation to the European Commission: The European Commission should communicate to reviewers and project coordinators that overly complex management models should be avoided. As the Horizon 2020 evaluation procedure tends to puts less emphasis on management of the project, incentives for overly complex management structures may already have been diminished. Nevertheless, reviewers should be instructed to evaluate management structures against their simplicity, clarity and efficiency, to favour the more basic management structure relative to the complexity of the project.

Fourth Recommendation to the European Commission: The European Commission should explore the possibilities of simplifying the IP rules in Horizon 2020 and ensure a better alignment with WTO/TRIPS and anti-trust rules. It could be considered to have a structure in place that would only work as checklist of points to be considered and leave actual contract wording and drafting with respect to IPR to the parties involved. However, these are very general recommendations. We warn against taking a quick shot at this complex and – in its important details – not well-understood topic.

***Fifth Recommendation to the European Commission*:** The European Commission should develop better indicators for project officers to monitor and assess projects. This could help to draw a more consistent line in project reviewing by project officers. Changes in project officers, and especially the manner in which they assess projects (different aims and attitudes), are detrimental to project management and success. These indicators should be made available for future studies as more objective measurements of project performance.

6.4. Tools seem to be of little relevance to research management; EC-provided tools can be improved

Our study shows that the selection of specific project management tools does little to affect research management performance, or project success. No good practices emerge from the findings that set high performance projects apart from their low performance counterparts with regard to the tools they do or do not use. It must be noted, however, that tools are needed for proper project administration. In addition, not all Project Coordinators might be considered professional tool users. This implies that the role of tools in FP projects is closely tied to fulfilling administrative requirements, but not to excelling at research management.

The study does shed light on the popularity and usefulness of tools provided to FP project managers by the European Commission. The extent to which these tools are used is limited. Also, a majority of the project managers in the survey have recommendations for improving the tools.

We therefore recommend the following.

***Sixth Recommendation to the European Commission*:** We recommend that the European Commission reviews the tools it currently provides, to focus on the mandatory tools that really matter, and to improve them to such an extent that they start adding value to projects. When doing so, the European Commission should be aware that most tools can already be found on the market and are already widely used by consortia. It should therefore not design something separate (stand-alone) if this is not absolutely necessary. The European Commission should also be aware of the low numbers of Project Coordinators who consider themselves proficient in working with mandatory EC-provided tools. The EC should require that project coordinators are proficient in the use of the (improved) mandatory EC tools. Development of proper instructional materials should be taken into account when considering a more intensive account management approach and when revising the current European Commission-provided tools.

7. Suggestions for further research

This section presents suggestions for further research, based on the findings and conclusions reported in sections 3 to 6.

Suggestion for further research 1: We suggest a study on the institutional and practical structures of the FP programmes in comparison with those in other parts of the world to gain broader insights beyond the European realm. The current study has been concerned with "opening up the black box" of research management in FP projects. While the exploratory approach allowed us to gain insight into the existing research management practices in FP6 and FP7 projects, and the suggestions for improvement that the community of FP6 and FP7 coordinators and participants can offer, this has limited our analysis to a European perspective. There are differences between the FPs and research funding programmes in third countries, such as the United States and Japan. We noted these differences in the areas of project-level governance – in US-funded defence-related research projects, researchers are hired as employees of the government agency that funds their work; in some Japanese programmes the project officers manage the research projects themselves, rather than leaving the research management to the researchers. Also, some US programmes do not allow complex IP structures, but require that research results are made publicly available through an open access approach.

Suggestion for further research 2: The performance of FP projects would benefit from further study into the relationship between changes in consortium composition and project performance. Not only the full range of trajectories between the two phenomena bears further investigation, also the potential for mitigating measures clearly warrants more study, as adequate solutions in these cases will increase the likelihood of greater success of these projects under Horizon 2020.

Suggestion for further research 3: A study should be performed on the relationship between the importance of intellectual property (IP) in FP projects and RMP, as IP is becoming more important in Horizon 2020 and is crucial in reaping the societal benefits of EU-funded research. Our findings indicate that the interests of researchers are at risk of not being aligned with the interests of industry partners when it comes to IP. The proposed study should be targeted at identifying those project and consortium characteristics in which aligning interests around IP becomes particularly challenging for research managers. Such a study should also make use of case studies that indicate where, how and why problems with IPR have arisen in practice in an illustrative manner. It should also take into account national efforts and working groups dealing with standardised R&D collaboration contracts, of which there are plenty. Based on the respective findings, a revision of the IPR regulations should be sought. We would not recommend a purely legal review, though, as this would leave again much of the topic and its actual economic significance as a black box.

Suggestion for further research 4: Research management performance appears to be negatively influenced when less than 20 per cent of the consortium partners do not have an existing relationship with other partners. A topic for further study is whether this effect applies in specific types of projects, what causes this relationship, and what it might imply for future call texts. One angle could be to explore the stream of

literature on exploration and exploitation in organisational learning, which has also shown merit in industrial production and process innovation.[28]

[28] We refer here to March, James G. (1991) Exploration and Exploitation in Organizational Learning. *Organisation Science* 2, Issue 1: 71-87 and subsequent publications such as Benner, Mary J. and Tushman, Michael L. (2003) Exploitation, Exploration, and Process Management: The Productivity Dilemma Revisited, *Academy of Management Review* 28, no. 2: 238–256.

Annexes

A. Research questions posed by the European Commission and sections where they are addressed

Table A-1 presents the research questions posed by the European Commission in its Tender Specifications enclosed with Call for tenders 2013/S 010-011411, as well as the section of this report in which our answers to each of the questions are presented.

Table A-1 Research questions with section references

Research question	Section
What are the different functions and roles within a team involved in FP research projects?	3.1
Who is the manager? What is her/his profile? (size, age, gender, nationality, expert level, type of contract)	3.2
Who are those managed? What are their profiles? (size, age, gender, nationality, expert levels, types of contracts)	3.3
What are the factors that define the actual size and composition of a team or a consortium?	3.4
How was the team/consortium set up? Who are the "initiators" (e.g. degree of FP experience, organisation type and size, initiating countries, etc.)? Which channels/networks are used to search for partners?	3.5
To what extent has the team remained stable during the different phases of the project (from writing proposal to communicating about project results)?	3.6
Is there a tendency to form more than once a consortium with the same partners?	3.7
Based on these findings, what are the main typical types or models of partnerships (i.e. typology of FP research teams)?	3.8
How is work organised (administrative and scientific/intellectual management) from preparing a tender to disseminating the research results?	4.1
Which management processes are typically put in place by research teams for the management of their FP-funded projects, in particular to organise….	4.2
…Division and delegation of tasks	4.3
…Top-down decisions taking vs consensus decision-making	4.4
…Which processes are put in place to detect and solve problems/ bottlenecks?	4.5
…Financial management	4.6
…Quality control, evaluation and validation	4.7
…Monitoring (progress and results of) the projects and reporting	4.8
…Human research management	4.9
...Internal communication (within the consortium): how do project teams deal with the fact that partners are often physically located in different countries?	4.10
…External communication (towards the European Commission, wider research community, public)	4.10
…Dissemination of results	4.10
…Knowledge transfer and intellectual property rights	4.11
Which processes are in general well-established; which processes are less emphasized?	4.12
What is the cost for project management in terms of average budget and	4.13

Research question	Section
time dedication? How much of the EU contribution is dedicated to management?	
Which instruments are used to support the different processes?	4.14
To what extent do the instruments put in place by the European Commission support the project management, for example the reporting tools? What could be improved?	4.15
Are some research management models more efficient than other ones to ensure delivering quality products on time? Are, for instance, smaller projects more efficient than bigger ones?	5.1
Can we identify some enabling factors for efficient project management?	5.3
Can we draw a list of good management practice for FP projects, according to the typology previously envisaged?	5.4
Are some structures/models put in place by the European Commission more supportive to better management than other ones?	5.5

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This annex lists the sources used in developing this report.

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C. Methodological approach

The study started with a literature review and 25 exploratory interviews

Early in the study life cycle we presented to the European Commission a literature review and the results from a substantial set of exploratory interviews. Our literature review covered relevant academic literature in the field or research management; reports and relevant studies in the field of project management; reports and relevant studies in the field of research and technological development policy and the operation of Framework Programmes in general. As a starting point we identified a total of 38 reports and studies that were published between 2003 and 2014. With snowball methodologies, we expanded this list.

After we concluded the literature review, a set of 25 exploratory interviews were conducted with:

- EC project officers (6 interviews);
- FP Project Coordinators (15 interviews);
- external experts (4 interviews).

These interviews were used to validate our findings from the desk research and to gain insight in the frames of reference of our respective stakeholder groups.

The findings from our literature review and interviews were presented to the European Commission as a separate deliverable in April 2014.[29] This document contained the main findings regarding the challenges in performing and studying research management; the variety of research activities, actors and consortia; management tasks; management models; management skills; management tools; and project performance and management performance.

The findings were used for the design of our survey and the design of our case studies, which are described below.

After the inception phase, we conducted a survey among participants of 8,301 projects

Below we describe the approach to designing and implementing the survey of FP project participants and the approach taken for the analysis of the survey results.

The sampling strategy resulted in a good sample size, and a representative coverage of a broad range of projects

Given the set of selection criteria described below, we have chosen to maximise our sample towards actual population size within FP6 and FP7 as opposed to adopt a smaller, stratified sample which resembles the total population. We have found that our approach allows us technically as well as economically to include as many projects as possible within our selection criteria (see below). In this way we were able to cope with a number of practical issues that we encountered and which could have reduced actual response rates drastically:

- drop-out of database entries due to missing or invalid e-mail addresses;
- possible survey fatigue due to overlap with other FP study samples;
- uneven distribution of responses across projects;

[29] PwC, Technopolis Group (2014). Study on Assessing the Research Management Performance of Framework Programmes Projects: Progress Report.

- drop-out of database entries due to substantial presence of serial participants in both FP6 and FP7. Serial participants will be asked to provide answers only for their most recently finished project (this will be explained further below).

Before sending out surveys we tested the completeness of E-CORDA data

A test run has been performed to obtain an impression of the data validity of contact details in the E-CORDA database for FP6 and FP7 projects. In our test run, we sampled 10 FP6 and 10 FP7 collaborative projects. It turned out that the number of missing addresses and bounced e-mails was higher than expected. For FP6 we encountered 52 missing contact details and 43 bouncing e-mails out of 194 addressees. Note that these FP6 projects were quite large, with 19 partners per project on average. This mini sample was not representative for the population, but nonetheless it provided us with an impression. For FP7, 0 missing contact details and 35 bouncing e-mails out of 125 addresses were observed. Assuming that these numbers are representative for the whole sample, and assuming (conservatively) a 5 per cent response rate for FP6, this would imply that in the survey we would expect only 386 individual responses when we would target our original sample size of 1,500 FP6 projects. Based on these observations we have decided to enlarge the sample sizes of FP6 and FP7 projects. As such, the final sample size is the result of carefully balancing the maximum possible sample size based on our selection criteria and minimising overlap with concurring FP studies to prevent survey fatigue.

Our final sample composition was the result of a two-step approach

First of all, we broke down the complete FP6 and FP7 population into projects that are currently relevant with regard to the study of research management and those which are not. The two key criteria for making this selection were:

1. the reported project end-date; and
2. the number of partners per project.

For participants to be able to accurately and fully assess research management performance in a project, we ensured that the project had ended before the survey was launched. As a reference date we took 31 December 2013. Although we acknowledge that the reported end-date in the provided EC database might deviate from the actual project end-date, the provided information is the best indication we have. All projects with a reported end-date after 31-12-2013 were excluded from the sample.

Desk research and exploratory interviews have shown that research management is of particular importance for projects with larger consortia, as these contexts provide more challenges and possible calamities. In order to make survey results as relevant and interesting as possible, we decided to focus on projects in which at least 3 or more partners participated. In many instances this concerns collaborative projects, but the sample is not limited to this type of activity.

Moreover, projects that were reported as cancelled in the E-CORDA database were excluded. Cancellation of projects can be a result of termination before the Grant Agreement is signed or during the course of the project. The latter category may be further explored during interviews or case studies. We expect some different project dynamics that are better captured during an interview rather than a static survey. Also, participants of cancelled projects may be more likely to not respond to a survey, as they may assess that the survey does not apply to them.

Application of these two criteria resulted in the following number of projects and participants for both FP6 and FP7.

Table C-1: Number of FP6 and FP7 projects and participants per project after the first step in the sampling process

Sample after 1st step in the sampling process	FP6	FP7
Number of projects	5,600	4,585
Number of participants	71,487	49,029
Average number of participants per project	12.77	10.69

As explained below, the second step in the process consisted of minimising possible survey fatigue amongst FP7 participants. Consultation with the parties involved in three studies of FP projects that were conducted in parallel with the current study indicated that there was no immediate overlap among FP6 projects. As several studies have simultaneously or sequentially consulted FP7 participants through online surveys, survey fatigue can easily set in among FP7 project participants. To minimise this risk, we have compared our maximum sample for FP7 (as mentioned in Table C-1) with that of the FP impact on Human Research Capacity Study (FP HRC Study). The Network Analysis Study and Major Innovations Study have selected samples that do not overlap with the sample selected for this study.

Comparative analysis of both samples showed that 3,931 projects had one or more participants that were included in both samples. As the remaining 713 unique projects did not provide a large enough sample, we decided to tolerate a maximum overlap percentage of 25 per cent of project participants after consulting with the Commission. In practice this means that a project with 4 participants may have a maximum of 1 participant in both samples, in order to be included in our study. Using this overlap threshold of 25 per cent overlap per project, 3,771 participants are targeted both by FP HRC Study and our Research Management Performance Study. For FP7 this yielded the following sample.

Table C-2: Number of retained FP7 projects after the second step in the sampling process

Sample after 2nd step in the sampling process	FP7
Number of projects	2,701
Number of participants	28,687
Average number of participants per project	10.62
Number of participants included in samples of FP HRC Study and FP RMP Study	3,771

To check whether the measures for mitigating survey fatigue (25% overlap tolerance) did not create a bias in our sample for FP7, we conducted a comparative analysis between the population obtained after step 1 in the sampling process (i.e. the maximum sample as described in Table C-1) and our sample obtained after step 2 in the sampling process (i.e. the final sample as described in Table C-2). For the comparison we adopted the strata that were used in the FP HRC Study to draw a sample, as a potential bias would most likely manifest in one or more of these criteria.

Table C-3 displays the sample's relative deviation from the population (maximum sample). The closer this value is to zero, the more the sample resembles the population. The comparative analysis with respect to organisational nationality is included in Annex D. Based on reported deviations from the population we did not find any substantial bias in our sample. We have therefore adopted the maximum overlap percentage of 25 per cent for drawing the FP7 sample. We have included all 2,701

available FP7 projects in the final sample. This is a substantial increase of our sample in comparison to the initial plans.

As a back-up we have agreed with the researchers conducting the parallel FP HRC Study that, in the case of very poor response rates, we can still target those participants of projects with more than 25 per cent overlap, which are not included in the FP HRC Study. Because of a high response rate, this approach was not needed.

FP6 participants who did not participate in FP7 will not be consulted by other parallel studies. The FP6 sample will therefore not be further refined based on the coordination with other research studies and consists of the maximum number of eligible projects. The descriptive characteristics of the FP6 sample are included in the table below.

Table C-3: Comparison of survey sample for FP7 projects (N=2,701) with FP7 population (N=4,585)

Sample			Relative deviation	Population		
Programme	**#**	**%**	**%**	**Programme**	**#**	**%**
7.A.SP1[30]	23,292	81.19%	13.95%	7.A.SP1	34,936	71.26%
7.A.SP2	0	0.00%	-100.00%	7.A.SP2	38	0.08%
7.A.SP3	1,374	4.79%	-28.95%	7.A.SP3	3,305	6.74%
7.A.SP4	3,130	10.91%	-45.74%	7.A.SP4	9,859	20.11%
7.B.SP5	891	3.11%	70.91%	7.B.SP5	891	1.82%
Total	28,687			Total	49,029	
Role	**#**	**%**	**%**	**Role**	**#**	**%**
participants	25,986	90.58%	-0.07%	participant	44,443	90.65%
coordinators	2,701	9.42%	0.66%	coordinator	4,586	9.35%
Total	28,687			Total	49,029	
Organisation	**#**	**%**	**%**	**Organisation**	**#**	**%**
HES	10,292	35.88%	9.48%	HES	16,067	32.77%
OTH	354	1.23%	-63.73%	OTH	1,668	3.40%
REC	7,093	24.73%	-1.09%	REC	12,256	25.00%
PRC	10,370	36.15%	8.73%	PRC	16,301	33.25%
PUB	578	2.01%	-63.91%	PUB	2,737	5.58%
Total	28,687			Total	49,029	
Gender	**#**	**%**	**%**	**Gender**	**#**	**%**
Gender M	18,168	66.09%	1.08%	Gender M	31,029	65.39%
Gender F	9,321	33.91%	-2.03%	Gender F	16,424	34.61%
Total*	27,489			Total*	47,453	

** Total number deviates because gender was not mentioned for all participants*

[30] The abbreviations and acronyms in this table are clarified in the list of abbreviations and acronyms on page 8 of this report.

Table C-4: Descriptive characteristics of the FP6 sample (N=5,600, being the actual sample taken for the study which equals the total FP6 sample)

Descriptives FP6 sample		
Programme	**#**	**%**
Integrating and strengthening the ERA	61,737	86.36%
Structuring the ERA	8,546	11.95%
Euratom	1,204	1.68%
Total	71,487	
Role	**#**	**%**
participant	5,601	7.83%
coordinator	65,886	92.17%
Total	71,487	
End-date		
on or before 31-12-2010	36,287	50.76%
after 31-12-2010	35,200	49.24%
Total	71,487	

The survey response included 7,980 respondents, who provided information on 4,462 projects

After the survey had been open for two months and several reminders had been sent to respondents who had not yet completed the questionnaire, a final response of 7,980 respondents was available for analysis. Tables C-5 breaks down the response in terms of FP participants and the projects they responded about. We distinguish between projects for which only one respondent answered the survey questions, projects for which two respondents did so and projects with three or more respondents. The reason for this is that case studies were selected from the latter group only (see text on case studies below).

Table C-5: Survey response at the level of individual FP6 and FP7 participants

Participants	All respondents	With Project Coordinator in sample	FP6	FP7
Participants in projects with 1 respondent	2,457	399	1,604	853
Participants in projects with 2 respondents	2,316	292	1,500	816
Participants in projects with 3 respondents	3,207	279	2,234	973
Total	**7,980**	**970**	**5,338**	**2,642**

When comparing the total numbers of FP6 and FP7 participants responding to the samples targeted in the survey, we find response rates for the FP6 sample of 7.47 per cent and for the FP7 sample of 9.61 per cent.

It should be noted that the analysis for the study was conducted mostly at the project level, as mentioned in section 2 of this report. Therefore we also describe the distribution of the survey responses at the project level in Table C-6.

Table C-6: Survey response at the level of individual FP6 and FP7 projects

Projects	All respondents	With Project Coordinator in sample	FP6	FP7
Projects with 1 respondent	2,457	399	1604	853
Projects with 2 respondents	1,158	292	750	408
Projects with 3 or more respondents	847	279	580	267
Total	**4,462**	**970**	**2,934**	**1,528**

The survey results were analysed using several statistical techniques to establish a well-fitting statistical model

The univariate descriptives from the survey were used to describe existing research management practices observed in FP projects in the sample. These descriptives have been combined with insights from the case studies and expert interviews to answer the research questions reported on in sections 3 and 4 of this report.

A non-response analysis was performed by comparing several basic traits of the FP6 and FP7 Project Coordinators responding to the survey with the population of FP6 and FP7 Project Coordinators in general and the population of FP6 and FP7 Project Coordinators of projects with three or more consortium partners. The results of this non-response analysis are presented in Annex F.

From the non-response analysis, we conclude that the results from the survey should be considered as representative of collaborative FP6 and FP7 projects (i.e. three or more consortium partners), but less so of all FP6 and FP7 projects. We consider that this may be the result of the fact that a larger FP project (i.e. a project with more consortium partners and individual participants) is likely to result in a higher response rate at the project level. Therefore, larger projects are prone to be more prominently represented in the survey responses than smaller ones.

In addition, the existence of statistical relationships in the survey was explored using various statistical techniques. The results of this exercise are presented in section 5 of this report. Details about the techniques employed to analyse the data are provided in Annex G.

Annex H contains the results of an analysis that assesses the robustness of our general statistical results to additional variables representing the themes and schemes that existed in FP6 and FP7. The interpretation of these results is provided in section 5.3.4.

The raw survey data are included in Annex L, which is published together with this report as a separate document.

After the survey was finalised, we conducted 30 mixed-method case studies at the level of individual FP projects

We have performed in-depth analysis of 30 FP6 and FP7 projects through case studies. These case studies were selected on the basis of our survey results and the availability of project documents and were analysed based on survey results, desk research on project documents, and interviews with key informants within the project.

We based our selection of 30 case studies on three criteria, including our survey results

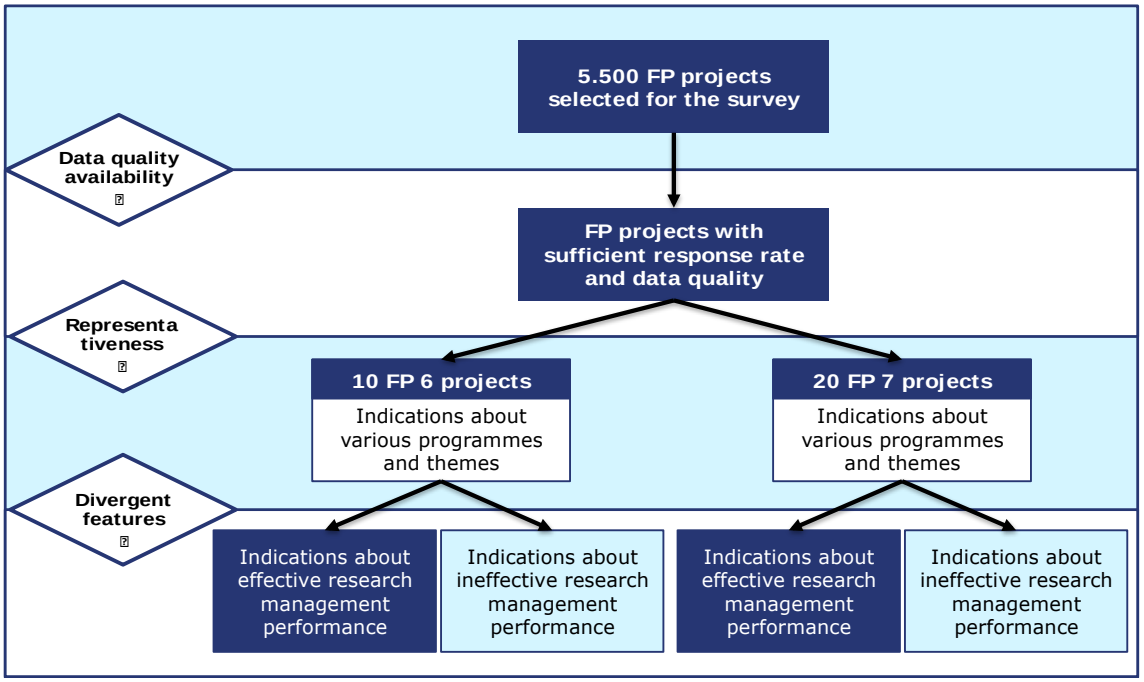
The thirty cases have been selected based on several criteria. These criteria serve to select a sample of case studies that is representative, has substantial data quality and that is information rich (showing divergent features with regards to research management performance). Figure C-1 illustrates the methodology for case study selection.

Criterion 1/3: Data quality and availability

Only FP projects that yield a relatively high response rate to the survey, and additionally have sufficient data quality of responses, were considered eligible for selection in the case study sample. A high response rate for an FP project implies that the survey data contains at least three respondents that completed the survey. Projects not fulfilling these criteria were omitted from the case study selection pool. Subsequently -within the remaining pool of included FP projects- only FP projects were retained for which sufficient EC documentation was available. The documentation that we analysed for each case study included:

- Work Force Statistics, Grant Agreements, the Science and Society Reporting Questionnaire and the Socio-Economic Reporting Questionnaire for FP6 projects.
- Periodic Report (completed by the Project Coordinator), the Assessment Report, Grant Agreements, the Review Reports and the Final Report (completed by the EC Project Officer or reviewers) for FP7 projects.

Figure C-1: Process from survey sample through to case study findings



Criterion 2/3: Representativeness

To ensure that the selected sample of case studies represents the total population of FP6 and FP7 projects with regards to the different types of projects within each theme, we have opted for purposive sampling of case studies. We selected 10 cases for FP6 and 20 cases for FP7 respectively. In addition, when selecting the case study cases we aimed to select a sample that is evenly spread across themes. In addition, we aimed to include projects with coordinators from various regions within Europe and both

large and small consortia. It was not possible to check for covering several instruments/funding schemes.

Criterion 3/3: Indications about research management performance

Within the boundaries and bandwidth indicated by the previous two criteria, we aimed to ensure a rich case study sample by purposively selecting cases with divergent features with regard to research management performance. Although research management performance is difficult to conceptualise and measure, we have built on the answers to survey questions about the perceived performance of the management of FP projects. In the survey respondents were asked to rank research management performance during the project on a scale from 1 to 10. Based on the average score of projects across survey respondents (three or more per project) we selected cases with the highest (best performance), lowest (worst performance) and with the highest standard deviation on research management performance. For FP6 this included 4 high performance projects, 4 low performance projects and 2 projects with a high standard deviation in their performance ratings in the survey. For FP7 this included 8 high performance projects, 8 low performance projects and 4 projects with a high standard deviation in their performance ratings in the survey. Table C-5 presents an overview of the case study projects.

Table C-7: Basic characteristics of case study projects

	FP6/ FP7	Theme/Scheme	Coordinator (sector)*	# consortium partners
Project 1	FP6	International Cooperation (INCO)	HES	9
Project 2	FP6	Energy	REC	23
Project 3	FP6	Information Society Technologies – Nanotechnologies and nano science, knowledge-based multifunctional materials and new products (IST-NMP)	REC	17
Project 4	FP6	Life science, genomics and biotechnology for health	HES	19
Project 5	FP6	Mobility	REC	13
Project 6	FP6	Scientific support to policies	OTHER	15
Project 7	FP6	Food quality and safety	OTHER	17
Project 8	FP6	Information society technologies	REC	14
Project 9	FP6	SME activities	PRC	13
Project 10	FP6	Life science, genomics and biotechnology for health	HES	11
Project 11	FP7	Aeronautics and Air Transport	PRC	57
Project 12	FP7	Aeronautics and Air Transport	REC	17
Project 13	FP7	Aeronautics and Air Transport	PRC	59
Project 14	FP7	Energy	REC	17
Project 15	FP7	Environment	HES	18

Project 16	FP7	Environment	REC	11
Project 17	FP7	Fusion	REC	27
Project 18	FP7	Information and communication technology	REC	5
Project 19	FP7	Information and communication technology	PRC	18
Project 20	FP7	Information and communication technology	HES	10
Project 21	FP7	Food, Agriculture and Biotechnology	PUB	16
Project 22	FP7	Nanosciences, nanotechnologies, materials and new production technologies	REC	19
Project 23	FP7	Nanosciences, nanotechnologies, materials and new production technologies	HES	7
Project 24	FP7	Nanosciences, nanotechnologies, materials and new production technologies	HES	10
Project 25	FP7	Nanosciences, nanotechnologies, materials and new production technologies	REC	13
Project 26	FP7	Security	PUB	6
Project 27	FP7	SME activities	OTHER	16
Project 28	FP7	SME activities	PRC	7
Project 29	FP7	SME activities	PRC	11
Project 30	FP7	Transport	HES	9

Detailed data on the case studies came from various sources

A team of experienced investigators, well versed in qualitative research, has been deployed to perform case study data acquisition on the thirty cases. Based on a validated case study protocol these investigators have collected data on a batch of cases specifically assigned to each individual investigator. Structural feedback moments have been set with the case study coordinator, who has also been available for *ad-hoc* feedback and guidance. Data acquisition has been performed through desk research on survey results, desk research on project documentation, and interviews with project participants, always including the formal Project Coordinator.

The sources mentioned above were not available for all case studies. In those cases where data were missing, the interviews and Internet searches were used to gather more information.

After we finalised the case studies, we performed both within-case analyses and cross-case analysis on our data

In order to build each respective case study, we first conducted a within-case analysis. Survey responses of different participants within each selected FP project have been analysed and compared along several dimensions. This analysis resulted in a balanced

perspective on research management in each particular case. Especially the comparison of perspectives from a managing (coordinator, and WP leader to a lesser degree) and non-managing point of view on research management adds to strength and validity of each case.

After having built case studies for each selected FP project, we compared it with the general responses to our survey among FP participants. By plotting the individual cases against the general research management performance of all projects in the survey sample, we were able to roughly determine whether a specific case study is a top performer, sufficient performer, insufficient performer or worst performer.

After the first thorough examination of individual cases, and secondly the plotting and grouping of these cases against the survey analysis of the whole sample of FP projects, the third stage of case study analysis entailed a cross-case analysis and detection of trends observable in various cases. Drawing and verifying conclusions requires systematic understanding of the case study using a logical chain of evidence and maintaining theoretical coherence by tactics such as identifying themes and patterns, establishing plausibility, counting and data clustering.

Based on the aforementioned grouping of cases into good and poor performers (i.e. research management performance), we looked for within-group similarities, coupled with intergroup differences.[31] This allowed us to identify common success factors and barriers for high performance research management. We combined this strategy with a second tactic in which we list the subtle differences that exist between the cases within each group. When conflicting evidence within a group was found, deeper probing of the differences was performed, in order to identify the cause or source of conflict. This was done with an aim to breach establishment of too simplistic frames and allowed us to identify nuances that distinguish between good research management and best practices, as well as barriers.

Case study analysis findings are reported using a standardised approach

The limited number of 30 case studies examined in the study allows for a qualitative analysis only. We have therefore avoided mentioning exact numbers of case studies when describing the manifestation of certain phenomena. However, we provide a rough indication of the number of cases referred to when describing certain aspects discussed in the interviews. We report on each of these groups separately, except when two or more groups show the same findings; in this case we report on these groups together under one heading. We only report on case studies with a high standard deviation in their survey results when they show a model or type of research management that is not featured in the other groups.

When using "in general", "often", "most/mostly", "prevalent", "typically", "predominantly", "usually" and "clearly show the tendency", we refer to at least two-thirds of case studies within (within a certain group of case studies).

When using "some" and "only a few" we refer to approximately one-third of the case studies (within a certain group), whereas "can also be" is used to indicate everything less than one-third up until 1 instance.

[31] Eisenhardt, K. M. (1989). *Building theories from case study research*. Academy of management review, 14(4), 532-550.

15 additional expert interviews were performed to add value to our findings

After completion of the case studies, we conducted a total of 15 additional expert interviews. These were used to pragmatically address questions still needing extra inputs after completion of both the survey and the case studies. Moreover, they were used to validate our draft findings. These interviews have not resulted in significant changes in our findings. In Annex J we present these 15 interviewees. Experts were selected from the following groups.

- **Low response projects: three additional interviews**. Based on similar surveys, we expected and experienced a substantial level of low response to the survey for FP projects that performed as relatively poor. Note that we define low response projects as projects that were excluded from the case studies since less than 3 participants responded to our survey. The assignment of "poor performance" to these projects was based on survey results from the 1 or 2 questionnaires that were filled out for these projects. We have included a total of three additional interviews to explore projects with relatively poor response in our survey.
- **Serial FP participants: three additional interviews**. Three serial FP participants were selected for additional interviews given their substantial expertise with research management across different FP projects.
- **Professional experts in research management: nine additional interviews**. Professional experts in research management constituted another valuable group of interviewees. Although many of them have participated in FP projects, they have added significant insight to the study. We have interviewed a total of nine external experts in research management. Their individual backgrounds are presented in Annex J.

D. Comparative analysis with respect to organisational nationality in survey sample

Table D-1: Comparative analysis on nationality FP7

Nationality [32]	# Sample	% Sample	# Population	% Population	Relative deviation	Nationality	# Sample	% Sample	# Population	% Population	Relative deviation
MA	18	0,06%	54	0,11%	-43,03%	KR	11	0,04%	31	0,06%	-39,35%
DO	2	0,01%	2	0,00%	70,91%	KW	0	0,00%	1	0,00%	-100,00%
ZA	57	0,20%	126	0,26%	-22,68%	KZ	0	0,00%	19	0,04%	-100,00%
AE	1	0,00%	3	0,01%	-43,03%	LA	0	0,00%	3	0,01%	-100,00%
AL	3	0,01%	18	0,04%	-71,51%	LB	4	0,01%	11	0,02%	-37,85%
AM	1	0,00%	17	0,03%	-89,95%	LI	4	0,01%	6	0,01%	13,94%
AR	27	0,09%	65	0,13%	-29,01%	LK	0	0,00%	1	0,00%	-100,00%
AT	784	2,73%	1280	2,61%	4,68%	LS	0	0,00%	2	0,00%	-100,00%
AU	47	0,16%	69	0,14%	16,42%	LT	59	0,21%	207	0,42%	-51,29%
AZ	1	0,00%	15	0,03%	-88,61%	LU	34	0,12%	85	0,17%	-31,64%
BA	7	0,02%	33	0,07%	-63,75%	LV	28	0,10%	186	0,38%	-74,27%
BD	0	0,00%	4	0,01%	-100,00%	MC	0	0,00%	1	0,00%	-100,00%
BE	1221	4,26%	2004	4,09%	4,13%	MD	0	0,00%	23	0,05%	-100,00%
BF	8	0,03%	12	0,02%	13,94%	ME	2	0,01%	39	0,08%	-91,24%
BG	98	0,34%	378	0,77%	-55,69%	MG	1	0,00%	2	0,00%	-14,54%
BH	0	0,00%	1	0,00%	-100,00%	MK	12	0,04%	57	0,12%	-64,02%

[32] The two-letter country codes used in this table can be found at https://www.iso.org/obp/ui/#search.

Nationality	# Sample	% Sample	# Population	% Population	Relative deviation	Nationality	# Sample	% Sample	# Population	% Population	Relative deviation
BI	0	0,00%	1	0,00%	-100,00%	ML	4	0,01%	6	0,01%	13,94%
BJ	4	0,01%	7	0,01%	-2,34%	MM	0	0,00%	1	0,00%	-100,00%
BN	0	0,00%	1	0,00%	-100,00%	MT	19	0,07%	106	0,22%	-69,37%
BO	0	0,00%	4	0,01%	-100,00%	MU	0	0,00%	3	0,01%	-100,00%
BR	43	0,15%	113	0,23%	-34,96%	MW	1	0,00%	3	0,01%	-43,03%
BW	1	0,00%	6	0,01%	-71,51%	MX	32	0,11%	67	0,14%	-18,37%
BY	2	0,01%	21	0,04%	-83,72%	MY	2	0,01%	15	0,03%	-77,21%
CA	46	0,16%	87	0,18%	-9,63%	MZ	3	0,01%	10	0,02%	-48,73%
CD	2	0,01%	3	0,01%	13,94%	NA	1	0,00%	4	0,01%	-57,27%
CF	0	0,00%	1	0,00%	-100,00%	NC	0	0,00%	1	0,00%	-100,00%
CG	0	0,00%	2	0,00%	-100,00%	NE	0	0,00%	3	0,01%	-100,00%
CH	918	3,20%	1449	2,96%	8,28%	NG	6	0,02%	12	0,02%	-14,54%
CI	1	0,00%	3	0,01%	-43,03%	NI	0	0,00%	2	0,00%	-100,00%
CL	6	0,02%	28	0,06%	-63,38%	NL	1734	6,04%	2632	5,37%	12,60%
CM	7	0,02%	14	0,03%	-14,54%	NO	404	1,41%	816	1,66%	-15,38%
CN	79	0,28%	173	0,35%	-21,95%	NP	1	0,00%	1	0,00%	70,91%
CO	10	0,03%	29	0,06%	-41,07%	NZ	9	0,03%	18	0,04%	-14,54%
CR	4	0,01%	13	0,03%	-47,41%	OM	0	0,00%	2	0,00%	-100,00%
CU	0	0,00%	3	0,01%	-100,00%	PA	0	0,00%	3	0,01%	-100,00%
CV	1	0,00%	4	0,01%	-57,27%	PE	3	0,01%	13	0,03%	-60,56%
CY	55	0,19%	191	0,39%	-50,79%	PG	1	0,00%	2	0,00%	-14,54%
CZ	286	1,00%	630	1,28%	-22,41%	PH	1	0,00%	16	0,03%	-89,32%
DE	4655	16,23%	6751	13,77%	17,85%	PK	1	0,00%	2	0,00%	-14,54%

Nationality	# Sample	% Sample	# Population	% Population	Relative deviation	Nationality	# Sample	% Sample	# Population	% Population	Relative deviation
DK	576	2,01%	898	1,83%	9,63%	PL	379	1,32%	968	1,97%	-33,08%
DZ	1	0,00%	16	0,03%	-89,32%	PS	7	0,02%	10	0,02%	19,64%
EC	0	0,00%	7	0,01%	-100,00%	PT	492	1,72%	883	1,80%	-4,77%
EE	70	0,24%	255	0,52%	-53,08%	QA	0	0,00%	1	0,00%	-100,00%
EG	14	0,05%	50	0,10%	-52,15%	RO	175	0,61%	499	1,02%	-40,06%
EL	727	2,53%	1575	3,21%	-21,11%	RS	43	0,15%	147	0,30%	-50,01%
ES	2282	7,95%	3737	7,62%	4,37%	RU	111	0,39%	279	0,57%	-32,00%
ET	3	0,01%	6	0,01%	-14,54%	RW	0	0,00%	5	0,01%	-100,00%
EU	91	0,32%	156	0,32%	-0,30%	SA	0	0,00%	2	0,00%	-100,00%
FI	693	2,42%	1093	2,23%	8,36%	SC	0	0,00%	2	0,00%	-100,00%
FJ	0	0,00%	1	0,00%	-100,00%	SD	1	0,00%	2	0,00%	-14,54%
FO	1	0,00%	4	0,01%	-57,27%	SE	1067	3,72%	1628	3,32%	12,02%
FR	3098	10,80%	4665	9,51%	13,50%	SG	7	0,02%	14	0,03%	-14,54%
GA	0	0,00%	1	0,00%	-100,00%	SI	144	0,50%	397	0,81%	-38,01%
GE	0	0,00%	25	0,05%	-100,00%	SK	63	0,22%	245	0,50%	-56,05%
GF	0	0,00%	1	0,00%	-100,00%	SM	1	0,00%	1	0,00%	70,91%
GH	4	0,01%	17	0,03%	-59,79%	SN	8	0,03%	24	0,05%	-43,03%
GL	2	0,01%	2	0,00%	70,91%	SO	1	0,00%	1	0,00%	70,91%
GN	0	0,00%	1	0,00%	-100,00%	SY	2	0,01%	7	0,01%	-51,17%
GT	3	0,01%	7	0,01%	-26,75%	SZ	0	0,00%	1	0,00%	-100,00%
HK	1	0,00%	4	0,01%	-57,27%	TH	3	0,01%	26	0,05%	-80,28%
HN	0	0,00%	2	0,00%	-100,00%	TJ	0	0,00%	3	0,01%	-100,00%
HR	35	0,12%	155	0,32%	-61,41%	TM	0	0,00%	2	0,00%	-100,00%

Nationality	# Sample	% Sample	# Population	% Population	Relative deviation	Nationality	# Sample	% Sample	# Population	% Population	Relative deviation
HT	1	0,00%	1	0,00%	70,91%	TN	14	0,05%	37	0,08%	-35,33%
HU	283	0,99%	781	1,59%	-38,07%	TR	108	0,38%	342	0,70%	-46,03%
ID	5	0,02%	14	0,03%	-38,96%	TW	5	0,02%	13	0,03%	-34,27%
IE	365	1,27%	623	1,27%	0,13%	TZ	9	0,03%	19	0,04%	-19,04%
IL	265	0,92%	558	1,14%	-18,83%	UA	32	0,11%	97	0,20%	-43,62%
IN	55	0,19%	152	0,31%	-38,16%	UG	8	0,03%	20	0,04%	-31,64%
IR	0	0,00%	1	0,00%	-100,00%	UK	3384	11,80%	5288	10,79%	9,37%
IS	31	0,11%	89	0,18%	-40,47%	US	99	0,35%	192	0,39%	-11,87%
IT	3084	10,75%	4775	9,74%	10,38%	UY	9	0,03%	23	0,05%	-33,12%
JM	1	0,00%	2	0,00%	-14,54%	UZ	0	0,00%	8	0,02%	-100,00%
JO	6	0,02%	24	0,05%	-57,27%	VE	0	0,00%	4	0,01%	-100,00%
JP	27	0,09%	40	0,08%	15,36%	VG	0	0,00%	1	0,00%	-100,00%
KE	10	0,03%	27	0,06%	-36,70%	VN	7	0,02%	28	0,06%	-57,27%
KG	0	0,00%	6	0,01%	-100,00%	YE	0	0,00%	1	0,00%	-100,00%
KH	1	0,00%	8	0,02%	-78,64%	ZM	1	0,00%	3	0,01%	-43,03%

Table D-2: Comparative analysis on nationality FP6

Nationality[33]	# Sample	% Sample	Nationality	# Sample	% Sample	Nationality	# Sample	% Sample	Nationality	# Sample	% Sample
MA	124	0,17%	DK	1646	2,30%	KH	7	0,01%	PY	8	0,01%
DO	1	0,00%	DZ	58	0,08%	KR	21	0,03%	RO	585	0,82%
ZA	131	0,18%	EC	15	0,02%	KY	1	0,00%	RU	447	0,63%
AE	1	0,00%	EE	372	0,52%	KZ	19	0,03%	RW	2	0,00%
AF	4	0,01%	EG	86	0,12%	LA	3	0,00%	SA	1	0,00%
AL	40	0,06%	EL	2168	3,03%	LB	52	0,07%	SC	1	0,00%
AM	15	0,02%	ES	4813	6,73%	LI	6	0,01%	SD	5	0,01%
AN	2	0,00%	ET	14	0,02%	LK	4	0,01%	SE	2561	3,58%
AO	2	0,00%	EU	232	0,32%	LT	334	0,47%	SG	21	0,03%
AR	88	0,12%	FI	1433	2,00%	LU	118	0,17%	SI	605	0,85%
AT	1951	2,73%	FJ	1	0,00%	LV	212	0,30%	SK	429	0,60%
AU	82	0,11%	FO	2	0,00%	MD	17	0,02%	SM	1	0,00%
AZ	9	0,01%	FR	7294	10,20%	MG	2	0,00%	SN	38	0,05%
BA	57	0,08%	GA	7	0,01%	MK	63	0,09%	SR	4	0,01%
BD	5	0,01%	GE	24	0,03%	ML	18	0,03%	SV	6	0,01%
BE	2750	3,85%	GH	18	0,03%	MR	2	0,00%	SY	23	0,03%
BF	22	0,03%	GI	1	0,00%	MT	123	0,17%	TD	1	0,00%
BG	447	0,63%	GL	3	0,00%	MW	7	0,01%	TG	1	0,00%
BJ	11	0,02%	GM	6	0,01%	MX	58	0,08%	TH	37	0,05%
BO	14	0,02%	GN	7	0,01%	MY	16	0,02%	TJ	5	0,01%
BR	155	0,22%	GT	5	0,01%	MZ	11	0,02%	TM	3	0,00%
BT	2	0,00%	GW	1	0,00%	NA	6	0,01%	TN	110	0,15%
BW	8	0,01%	HK	10	0,01%	NC	2	0,00%	TR	422	0,59%

[33] The two-letter country codes used in this table can be found at https://www.iso.org/obp/ui/#search.

Nationality	# Sample	% Sample	Nationality	# Sample	% Sample	Nationality	# Sample	% Sample	Nationality	# Sample	% Sample
BY	25	0,03%	HN	2	0,00%	NE	15	0,02%	TT	2	0,00%
CA	99	0,14%	HR	147	0,21%	NF	1	0,00%	TW	11	0,02%
CD	5	0,01%	HU	1139	1,59%	NG	4	0,01%	TZ	29	0,04%
CG	3	0,00%	ID	27	0,04%	NI	6	0,01%	UA	108	0,15%
CH	1916	2,68%	IE	805	1,13%	NL	3945	5,52%	UG	27	0,04%
CI	4	0,01%	IL	698	0,98%	NO	1288	1,80%	UK	8062	11,28%
CL	69	0,10%	IN	129	0,18%	NP	10	0,01%	US	207	0,29%
CM	10	0,01%	IQ	2	0,00%	NZ	24	0,03%	UY	23	0,03%
CN	379	0,53%	IR	3	0,00%	PA	0	0,00%	UZ	14	0,02%
CO	17	0,02%	IS	128	0,18%	PE	28	0,04%	VA	1	0,00%
CR	12	0,02%	IT	6483	9,07%	PF	1	0,00%	VE	11	0,02%
CU	1	0,00%	JM	1	0,00%	PH	18	0,03%	VN	23	0,03%
CV	3	0,00%	JO	50	0,07%	PK	9	0,01%	YU	126	0,18%
CY	220	0,31%	JP	27	0,04%	PL	1849	2,59%	ZM	11	0,02%
CZ	1064	1,49%	KE	42	0,06%	PS	22	0,03%	ZW	7	0,01%
DE	10383	14,52%	KG	9	0,01%	PT	1146	1,60%	ZZ	2	0,00%

E. Survey questionnaire

The structure of the survey is presented below. The survey descriptives are presented in Annex L, which is published together with this report as a separate document.

Table E-1 Survey questionnaire

Nr.	Category	Routing	Type	Question	Answer options
1	Introduction		Single-choice	We kindly request that you answer the following questions for the latest project in FP6 or FP7 that you had a formal role in. Were you actively involved in the execution of this project (e.g. in research, innovation, project coordination or management)?	Yes No
2	Introduction	If no, previous question	Open	Please enter the e-mail address and the name(s) of the person(s) who were actively involved in the execution of the project(s) on behalf of your organisation.	e-mail address
3	Introduction	If yes, at previous questions. From this question onwards the actual survey starts.	Single-choice	Please select your project acronym. This should be the most recently completed FP project with three or more partners.	prefilled project acronyms
4	Introduction		Multiple-choice	What was your personal role in the project? You can select multiple answer options. Please read the popup definitions by moving your cursor over the answers.	Official Project Coordinator Scientific coordinator Project manager Work Package leader Partner
5	Introduction		Single-choice	What was your age at the start of the project?	# years
6	Introduction		Single-choice	What is your gender?	Male Female

7	Introduction		Single-choice	What is your nationality?	Austrian Belgian British Bulgarian Croatian Cypriot Czech Danish Dutch Polish Portuguese Romanian	Estonian Finnish French German Greek Hungarian Irish Italian Latvian Lithuanian Luxembourgian Maltese	Slovak/Slovakian Slovenian/Slovene Spanish Swedish Other, namely
8	Introduction		Single-choice	On behalf of what kind of organisation did you participate in this project?	University Research institute Public or governmental administration Large corporation > 250 employees firm-wide SME <250 employees firm-wide		
9	Introduction	Routed, if university at question 7	Single-choice	Please indicate which functional level best represents your position within the organisation at the start of the project? Please select the answer option that is most applicable.	Full Professor Associate professor Assistant professor Post-doc PhD candidate Support staff/non-academic staff		
10	Introduction	Routed, if large corporation, SME, public/governmental administration or research institution at question 7	Single-choice	What was your functional level within this organisation at the start of the project? Please select the answer option that is most applicable.	Top-level management, including board of directors, (vice) presidents, CEOs and other chief executives. Middle-level management, including general managers, branch managers, department managers and business unit managers. First-level managers, including supervisors, section leaders team leaders. Senior scientist, engineer or civil servant at the operational level. Junior scientist, engineer or civil servant at the operational level. Support staff		
11	Introduction		Open	How many years of experience in the field of expertise relevant for this project, did you have at the project's start?	# years		

12	Introduction		Single-choice	From which country did you conduct the activities for this project mostly?	BE BG CZ DK DE EE IE EL ES FR HR IT	CY LV LT LU HU MT NL AT PL PT RO SI	SK FI SE UK Other, namely….
13	Introduction		Open	In how many FP projects did you personally participate in total? Please indicate the number of projects you participated in for each Framework Programme.	FP4 (1994-1998) # FP5 (1998-2002) # FP6 (2002-2006) # FP7 (2007-2013) #		
14	Introduction	if, Project Coordinator, scientific coordinator, project manager and 2 or more projects at previous question	Open question	In how many other FP projects did you personally perform the role of the Project Coordinator, scientific coordinator and/or project manager?	#I don't knowNot applicable		
15	About the project	If Project Coordinator, project manager, scientific coordinator	Single-choice	We kindly request that you to answer the following questions for the latest completed project in FP6 or FP7 that you had a formal role in. How many work packages did the project have?	1-3 4-6 7-9 10-15 >15 There were no work packages in this project		

16	About the project	If Project Coordinator, project manager or scientific coordinator	Single-choice	If you fill in the survey for a FP6 project, what was the percentage of the total budget devoted to research coordination and management? Please note that for FP6, management budget could not exceed 7% of the total project cost.	<3% 3-6% 7% Other I don't know NA, I'm completing the survey about an FP7 project
17	About the project	If Project Coordinator, project manager or scientific coordinator and answer option 'NA, I'm completing the survey about an FP7 project' at question 11	Single-choice	If you fill in the survey for a FP7 project, what was the percentage of the total budget devoted to research coordination and management?	<7% 7%-10% >10% I don't know NA, I'm completing the survey about an FP6 project
18	About the project		Open question	What was the project's duration in months?	# Months I don't know
19	About the project		Ranking	Please rank the relative importance of these types of activities in the project from 1 to 4. The answer option that is selected first is most important.	Fundamental/basic research activity Industrial/applied research activity Experimental developments including pilots and demonstrators Networking activity
20	About the project	If Project Coordinator, project manager, scientific coordinator	Single-choice	How would you evaluate the level of management support and administrative support within your organisation, while managing the project?	1. Not supportive 2. 3. 4. 5. Highly supportive
21	About the consortium		Open	How many partners were included in the Grant Agreement (GA)?	# partners

22	About the consortium		Multiple -choice	How did the consortium identify partners (organisations and individuals)?	Collaboration in FP projects Collaboration in other European programmes Collaboration in national research programmes Commercial relations, e.g. suppliers or clients Academic publications Suggestion of external consultant Event related to existing FP projects EC match making events Other, please specify
23	About the consortium		Single-choice	Did the consortium composition change during the project's course?	Yes No I don't know
24	About the consortium	If yes at previous question	Open	How many partners were included in the consortium after signing of the GA?	# partners I don't know
25	About the consortium	If yes at previous question	Open	How many partners were excluded from the consortium after signing of the GA?	# partners I don't know
26	About the consortium		Single-choice	Which type(s) of partner(s) had most influence on the course of the project? Please select the answer option that is most applicable.	1. University 2. Research institute 3. Public or governmental administration 4. Large corporation > 250 employees firm-wide 5. SME <250 employees firm-wide 6. Other type of partner 7. Not applicable, the power balance was equally distributed 8. I don't know
27	About the consortium	Routed, if answer is 'SME' at previous question.	Single-choice	Did the project concern 'research for the benefit of SMEs'?	Yes No I don't know
28	About the consortium		Single-choice	To your estimation, what percentage of individuals within the consortium already collaborated with each other before this project started?	0-20% 21-40% 41-60% 61-80% 81-100% I don't know

29	About the consortium		Single-choice	To what extent did cultural diversity exist between the individuals in the consortium?	1. Very low 2. Low 3. Neutral 4. High 5. Very high 6. I don't know
30	About the consortium		Single-choice	In general, how would you evaluate the level of trust between project partners (on a personal level) at the start of the project?	1. High distrust 2. Distrust 3. Neutral 4. Trust 5. High trust 6. I don't know
31	About the consortium		Single-choice	In general, how would you evaluate the level of trust between project partners (on a personal level) at the end of the project?	1. High distrust 2. Distrust 3. Neutral 4. Trust 5. High trust 6. I don't know
32	About the consortium		Single-choice	How would you evaluate the alignment of interests of individual consortium partners with the overall project objectives?	1. Highly unaligned, i.e. many conflicting interests 2. Unaligned 3. Neutral 4. Aligned 5. Highly aligned, i.e. no conflicting interests 6. I don't know
33	Management Tasks	If project management, Project Coordinator and scientific coordinator	Budget	How did you allocate your time between these two categories of management tasks over the course of the project?	1. Administrative, financial and legal aspects > 0-100% 2.Scientific, technical and innovation aspects > 0-100% 3. I don't know

34	Management Tasks	If project management, Project Coordinator and scientific coordinator	Rank	Please **prioritise the top three** project management tasks in order of the time you spent on them, 1 being most time-consuming.	1. Preparing and agreeing on the consortium agreement 2. Coordinating the timing of deliverables and meeting milestones 3. Quality control of formal deliverables and other project output 4. Discussing and implementing changes in the consortium or project plan 5. External communication to the Commission, including financial reporting 6. Review meetings 7. Communication inside the consortium, including consortium meetings 8. Dispute settlement 9. Communication and collaboration with potential users of the project results 10. Collaboration with other project/consortia and external stakeholders 11. Monitoring gender and other ethical aspects of the project 12. Management of legal issues including IPR management
35	Management Tasks	If project management, Project Coordinator and scientific coordinator	Rank	Please **prioritise the top three** project management tasks in order of their importance to the success of the project, 1 being most important.	1. Preparing and agreeing on the consortium agreement 2. Coordinating the timing of deliverables and meeting milestones 3. Quality control of formal deliverables and other project output 4. Discussing and implementing changes in the consortium or project plan 5. External communication to the Commission, including financial reporting 6. Review meetings 7. Communication inside the consortium, including consortium meetings 8. Dispute settlement 9. Communication and collaboration with potential users of the project results 10. Collaboration with other project/consortia and

					external stakeholders 11. Monitoring gender and other ethical aspects of the project 12. Management of legal issues including IPR management
36	Tools	If coordinator or technical project manager	Multiple -choice	Which tools did you use for project management tasks? You can select multiple answer options.	1. Communication tools other than phone or e-mail 2. Financial monitoring tools other than MS Excel 3. Document sharing tools 4. Administrative tools 5. EC provided tools 6. New tool(s) specifically designed for the project 7. Other 8. I don't know 9. Not applicable
37	Tools	If EC tools is selected at previous question	Single-choice	What is the added value of the online tools provided by the EC?	1. EC tools are only used when this is mandatory 2. EC tools are valuable but there is room for improving them 3. EC tools are highly valuable; no further improvement is necessary 4. I don't know
38	Tools	If answer option 1, 2 at previous question	Matrix	To which extent do you agree with the following statements with regard to tools provided by the EC? 1. Financial tools had too many (mathematical) bugs 2. Too little support was provided from the EC with regards to EC tools 3. The online systems are too rigid e.g. it is hard to make changes ones certain parameters are defined 4. Writing style of EC documentation should be more comprehensible	0. I don't know 1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree

39	Skills	Matrix	In the following two questions we want to differentiate between research management skills that are relevant for project management (administrative, financial and legal aspects) and those relevant for scientific coordination (scientific, technical and innovation aspects) of the project. How relevant were the following skills for managing the administrative, financial and legal aspects of the project? 1. Excellent research skills and knowledge 2. Communication skills (includes intercultural communication and language proficiency) 3. Brokering and consensus building 4. Flexibility in terms of changes in the project plan, staffing and consortium 5. Open mindedness in terms of various technologies, academic disciplines, sectors and actors 6. Leadership, including decision-making 7. Commercialisation skills 8. Conflict management 9. Financial management 10. Legal skills	0 - don't know 1 - Irrelevant 2 - Somewhat irrelevant 3 - Neutral 4 - Somewhat relevant 5 - Relevant

40	Skills	Matrix	How relevant were the following skills for managing the scientific, technical and innovation of the project? 1. Excellent research skills and knowledge 2. Communication skills (includes intercultural communication and language proficiency) 3. Brokering and consensus building 4. Flexibility in terms of changes in the project plan, staffing and consortium 5. Open mindedness in terms of various technologies, academic disciplines, sectors and actors 6. Leadership, including decision-making 7. Commercialisation skills 8. Conflict management 9. Financial management 10. Legal skills	0 - don't know 1 - Irrelevant 2 - Somewhat irrelevant 3 - Neutral 4 - Somewhat relevant 5 - Relevant
41	Skills	Matrix	Which management styles were used by the Project Coordinator and/or project manager to manage the project? 1. Refer to contractual agreements and use accountability 2. Benefit from scientific leadership and personal reputation 3. Timely sharing of information 4. Invest in one-on-one communication and build relationships 5. Rely on established relations and high trust levels 6. Use network power such as positions in other consortia and in high-level committees	0. I don’t know 1. Not used at all 2. Rarely used 3. Occasionally used 4. Frequently used 5. Very frequently used

42	Management Structure/Model		Multiple-choice	Please choose which of the organisational elements depicted below were present in the management structure of the project? You can select multiple answer options.	1. General assembly 2. Executive board 3. Project office 4. Work package teams 5. Scientific advisory board 6. Stakeholder advisory board 7. Other, please specify
43	Management Structure/Model	Routed, if answer option 1 was selected at question 33	Single-choice	To what extent did the General Assembly function effectively, according to its formal tasks as described in the EC grant agreement?	1. Highly ineffective 2. Ineffective 3. Neutral 4. Effective 5. Highly effective
44	Management Structure/Model	Routed, if answer option 2 was selected at question 33	Single-choice	To what extent did the Executive Board function effectively, according to its formal tasks as described in the EC grant agreement?	1. Highly ineffective 2. Ineffective 3. Neutral 4. Effective 5. Highly effective
45	Management Structure/Model	Routed, if answer option 5 and/or 6 was selected at question 33	Single-choice	To what extent did the Advisory Board function effectively, according to its formal tasks as described in the EC grant agreement?	1. Highly ineffective 2. Ineffective 3. Neutral 4. Effective 5. Highly effective
46	Management Structure/Model		Multiple-choice	Who was appointed to conduct project management on the level of the FP project? You can select multiple answer options.	1. Official Project Coordinator 2. Internal project manager 3. Internal project management office 4. Other partner in the consortium not being a management company 5. Other partner in the consortium being a management company
47	Management Structure/Model		Multiple-choice	Who was appointed to conduct scientific coordination on the level of the FP project? You can select multiple answer options.	1. Official Project Coordinator 2. Internal project manager 3. Internal project management office 4. Other partner in the consortium not being a management company 5. Other partner in the consortium being a management company 6. No one was appointed to conduct scientific coordination

48	Management Structure/Model		Single-choice	To what extent did the Project Coordinator or project manager involve partners in substantial decisions about the project?	1. All partners were involved 2. The main partners were involved 3. Partners were informed but not directly involved 4. Partners were neither involved nor informed 5. Not applicable 6. I don't know
49	Management Structure/Model	If answer option 2, 3 or 4 at previous question	Single-choice	Would the project have yielded better outputs if more project partners were included in decision-making?	Yes No I don't know Not applicable
50	Management Structure/Model		Open	How many physical meetings with more than 70% of project partners attending did you have on average per year?	# I don't know Not applicable
51	Management Structure/Model	If partner, not Project Coordinator	Single-choice	How frequent did you have any form of contact with the Project Coordinator? Choose the option that is most applicable.	1. twice a month or more 2. once every month 3. once every two months 4. once every six months 5. once a year or less
52	Research Management Performance		Single-choice	How does the actual project completion date compare to the planned project end-date?	1. No deviation 2. Finished before the original planning 3. Finished after the original planning 4. The project was cancelled 5. I don't know 6. Not applicable, the project has not yet finished
53	Research Management Performance	if answer option 3	Multiple-choice	What was the cause for the deviation from the planned project end-date? You can select multiple answer options.	1. A change in project outputs/relevance 2. Productivity of certain consortium partners 3. Project management/coordination 4. Communication within the consortium 5. Communication between the EC and the coordinator 6. Scientific activities 7. IP issues 8. Calamities related to insolvency and/or partner exit 9. External factors that were outside the sphere of influence of the consortium

54	Research Management Performance	if answer option 3	Multiple -choice	Which type of activity was mainly responsible for this deviation? You can select multiple answer options.	1. Fundamental/basic research activity 2.Industrial/applied research activity 3. Experimental developments including pilots and demonstrators 4. Networking activities 5. Dissemination activities
55	Research Management Performance		Matrix	To what extent do you think that excellent research management has (or could have) had an impact on this project's results? Quality of project deliverables Adoption rate/potential of project results by target end-users Chances of current consortium working together in the future Impact factor of publications Degree to which tools or applications for SMEs were developed Commercial potential Degree to which spin-offs were created as a result of the project Degree to which patents or other IPR was created Demonstrability of project end-results Future collaboration with the Project Coordinator or project manager	0. I don't know 1. To a very low extent or not at all 2. To a low extent 3. To a substantial extent 4. To a high extent 5. To a very high extent 6. Not applicable
56	Research Management Performance		Single-choice	To what extent does research management matter in determining good project results?	1. Very little 2. Little 3. Neutral 4. Much 5. Very much
57	Research Management Performance		Single-choice	How would you evaluate the manner in which project partners have worked together?	1. Very poor 2. Poor 3. Neutral 4. Good 5. Very good

58	Research Management Performance	Routed, if not Project Coordinator (question 3)	Matrix	The Project Coordinator for the project was: accessible responsive experienced in FP projects experienced in project management	1. Very low 2. Low 3. Neutral 4. High 5. Very high 6. I don't know
59	Research Management Performance		Matrix	The scientific coordinator for the project was: accessible responsive experienced in FP projects experienced in project management	1. Very low 2. Low 3. Neutral 4. High 5. Very high 6. I don't know
60	Research Management Performance	Routed, if Project Coordinator	Matrix	The EC project officer for the project was: accessible responsive knowledgeable about the subject matter experienced in FP projects experienced in project management	1. Very low 2. Low 3. Neutral 4. High 5. Very high 6. I don't know
61	Research Management Performance		Single-choice	To what extent does your organisation consider the project successful?	1. Highly unsuccessful 2. 3. 4. 5. 6. 7. 8. 9. 10. Highly successful

62	Research Management Performance	Matrix	How would you evaluate performance on the following management tasks by the FP project's management team, including the Project Coordinator, scientific coordinator and project manager: 1. Preparing and agreeing on the consortium agreement 2. Coordinating the timing of deliverables and meeting milestones 3. Quality control of formal deliverables and other project output 4. Discussing and implementing changes in the consortium or project plan 5. External communication to the Commission, including financial reporting 6. Review meetings 7. Communication inside the consortium, including consortium meetings 8. Dispute settlement 9. Communication and collaboration with potential users of the project results 10. Collaboration with other project/consortia and external stakeholders 11. Monitoring gender and other ethical aspects of the project 12. Management of legal issues including IPR management	1. Very poor 2. Poor 3. Neutral 4. Good 5. Very good 6. Not applicable
63	Research Management Performance	Single-choice	How would you assess the effectiveness of project management as a whole? Please indicate a score between 1 and 10 with 10 being the most successful.	1. Highly unsuccessful 2. 3. 4. 5. 6. 7. 8. 9. 10. Highly successful

64	Research Management Performance	Routed, if answer at question 57 is higher than 7	Open question	What were the three most important aspects during the project that enabled good research management performance?	Open I don't know Not applicable
65	Research Management Performance	Routed, if answer at question 57 is lower than 8	Open question	What were the three most important barriers for managing the project effectively?	Open I don't know Not applicable
66	Research Management Performance	Routed, if answer at question 57 is lower than 8	Open questions	In retrospect, how could research management have been more effective in this project?	Open I don't know
67	Research Management Performance		Matrix	To what extent do you agree with the following recommendations towards the EC for enabling better research management? 1. Decrease the gap between the call text requirements and the manner in which the project is actually executed. 2. Allow co-coordination (two coordinators), especially for translational projects, to span the bridge between fundamental and applied science. 3. Provide the possibility to redistribute the overall budget among partners each year, throughout the execution of the project. 4. Maintain the same rules over time and across Framework Programmes. 5. Design calls that require smaller consortia to respond to and execute. 6. Provide more support from the EC for SMEs and other small organisations. 7. Provide more funding for research coordination and management. 8. Reduce the administrative requirements for coordinators and consortia to replace members.	0 - don't know 1 - Strongly disagree 2 - Disagree 3- Neutral 4 - Agree 5 - Strongly agree

68	Research Management Performance	If participated in multiple projects	Matrix	Based on your overall FP experience, to what extent do you agree with the following statements: Research management improved in FP6 projects as compared to previous FP projects. Research management improved in FP7 projects as compared to FP6 projects. The usefulness of EC research management tools improved over time in FP. The role of the Project Coordinator as defined by the EC enabled better research management performance over time. The budget for research management as defined by the EC enabled better research management over time. The changes in regulations for Horizon 2020 allow for better research management in future projects.	0. I don't know 1. To a very low extent or not at all 2. To a low extent 3. To a substantial extent 4. To a high extent 5. To a very high extent 6. Not applicable

F. Survey non-response analysis

In this annex we compare the survey responses on the personal characteristics of Project Coordinators to the same characteristics of the entire E-CORDA database of FP6 and FP7 projects. This provides some insight into the degree of response bias in our sample. Due to limited data in the E-CORDA database, it was not possible to conduct non-response analysis for all project partners.

Table F-1 shows that the percentage of female Project Coordinators responding to our survey is somewhat lower than the percentage of female Project Coordinators in the E-CORDA database for FP7 projects. We should note however, that we can compare the numbers only for FP7 Project Coordinators in the E-CORDA database, as the database does not contain the gender of the Project Coordinator for FP6 projects. The percentages from the survey sample also include coordinators of FP6 projects.

Table F-1: Comparing gender among Project Coordinators in the survey to Project Coordinators in the E-CORDA database

Gender	E-CORDA FP7 all		E-CORDA FP7 ≥ 3		Survey sample
	Count	Percentage	Count	Percentage	Percentage
blank	128	0,58%	126	1,27%	
Female	7577	34,09%	3706	37,34%	22,15%
Male	14523	65,34%	6093	61,39%	77,85%
Total	22228	100,00%	9925	100,00%	100,00%

Table F-2 shows that the survey sample is a fairly good approximation of FP6 and FP7 projects with three or more participants, when it comes to the type of organisation the Project Coordinators work at. However, the fit with the complete populations of FP6 and FP7 project is less good. The table also shows that among the group of larger FP projects, private organisations have significantly increased their role in providing Project Coordinators when we compare FP7 to FP6. Finally, in smaller projects – i.e. one or two consortium partners – higher or secondary education organisations more often provide the Project Coordinator than in projects with three or more partners.

Table F-2: Comparing type of organisation among Project Coordinators in the survey to Project Coordinators in the E-CORDA database

Type of organisation	E-CORDA FP7 all		E-CORDA FP7 ≥ 3		E-CORDA FP6 all		E-CORDA FP6 ≥ 3		Survey Sample
	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage	Percentage
Higher or secondary education	12460	56.06%	3861	38.90%	4463	44.51%	1836	32.70%	34.83%
Private for profit	2766	12.44%	2443	24.61%	877	8.75%	785	13.98%	25.96%***
Public body (excluding research and education)*	444	2.00%	291	2.93%					3.29%
Research organisation	6206	27.92%	3061	30.84%	3367	33.58%	1918	34.16%	30.44%
Other	352	1.58%	269	2.71%	1160	11.57%	954	16.99%	5.48%
Undefined**					161	1.61%	121	2.16%	
Total	22228	100.00%	9925	100.00%	10028	100.00%	5614	100.00%	100.00%

* This category does not exist for the FP6 data in E-CORDA.
** This category does not exist for the FP7 data in E-CORDA. In the survey, this category was not a possible selection; hence no organisations in the survey were classified as undefined.
*** This includes 14.26% SMEs and 11.70% large firms.

Table F-3 shows the distribution for the countries in which Project Coordinators' organisations are located under FP6 and FP7, both for all projects and for projects with three or more consortium partners, as found in E-CORDA. The survey did not ask for the country in which the Project Coordinator's organisation is located, but it did ask survey respondents about their nationality. Table F-3 shows that the survey response on Project Coordinators' nationalities is a fairly good approximation of the distribution of countries where the Project Coordinators' organisations are located for FP6 and FP7 projects with three or more consortium partners.

We note that the response among EU Member States appears to be relatively low for France and the UK, and relatively high for Finland, Italy and Sweden, but these deviations from the population remain within less than five percentage points.

We conclude that the results from the survey should be considered as representative of collaborative FP6 and FP7 projects (i.e. three or more consortium partners), but less so of all FP6 and FP7 projects.

Table F-3: Comparing type of organisation among Project Coordinators in the survey to Project Coordinators in the E-CORDA database

Country of organisation	E-CORDA FP7 all		E-CORDA FP7 ≥ 3		E-CORDA FP6 all		E-CORDA FP6 ≥ 3		Nationality of Project Coordinator (survey sample)*	
	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage*
Albania	1	0.00%		0.00%	2	0.02%		0.00%		
Armenia	5	0.02%	4	0.04%		0.00%		0.00%		
Argentina	12	0.05%	3	0.03%	10	0.10%		0.00%		
Austria	609	2.74%	319	3.21%	285	2.84%	203	3.62%	42	3.83%
Australia	2	0.01%	1	0.01%	1	0.01%		0.00%		
Azerbaijan	2	0.01%	2	0.02%	2	0.02%		0.00%		
Bosnia and Herzegovina	4	0.02%	3	0.03%	1	0.01%	1	0.02%		
Belgium	821	3.69%	471	4.75%	452	4.51%	308	5.49%	52	4.74%
Bulgaria	44	0.20%	13	0.13%	39	0.39%	21	0.37%	3	0.36%
Brazil	2	0.01%	1	0.01%	3	0.03%		0.00%		
Belarus	3	0.01%	2	0.02%		0.00%		0.00%		
Canada	1	0.00%	1	0.01%	1	0.01%		0.00%		
Switzerland	900	4.05%	210	2.12%	212	2.11%	84	1.50%		
Chile	2	0.01%	1	0.01%	1	0.01%		0.00%		
Cameroon	1	0.00%	1	0.01%	1	0.01%		0.00%		
China	32	0.14%		0.00%	13	0.13%	1	0.02%		
Cyprus	63	0.28%	23	0.23%	25	0.25%	7	0.12%	4	0.36%
Czech Republic	105	0.47%	27	0.27%	38	0.38%	18	0.32%	3	0.27%
Germany	2790	12.55%	1518	15.29%	1441	14.37%	979	17.44%	196	17.88%
Denmark	428	1.93%	187	1.88%	207	2.06%	120	2.14%	27	2.46%

Algeria	2	0.01%	2	0.02%		0.00%		0.00%		
Estonia	47	0.21%	29	0.29%	21	0.21%	10	0.18%	2	0.18%
Egypt	10	0.04%	7	0.07%	2	0.02%		0.00%		
Greece	603	2.71%	353	3.56%	330	3.29%	203	3.62%	37	3.38%
Spain	2063	9.28%	1019	10.27%	712	7.10%	366	6.52%	86	7.85%
EU*	14	0.06%		0.00%	6	0.06%		0.00%		
Finland	318	1.43%	193	1.94%	156	1.56%	110	1.96%	33	3.01%
Faroe Islands	4	0.02%	1	0.01%		0.00%		0.00%		
France	2332	10.49%	963	9.70%	1310	13.06%	708	12.61%	97	8.85%
Georgia	3	0.01%	3	0.03%	1	0.01%		0.00%		
Ghana	1	0.00%		0.00%	1	0.01%		0.00%		
Croatia	33	0.15%	7	0.07%	9	0.09%	2	0.04%	0	0.00%
Hungary	184	0.83%	81	0.82%	109	1.09%	47	0.84%	7	0.64%
Ireland	387	1.74%	197	1.98%	168	1.68%	67	1.19%	16	1.46%
Israel	686	3.09%	74	0.75%	117	1.17%	53	0.94%		
India	13	0.06%	1	0.01%	9	0.09%		0.00%		
Iran	1	0.00%		0.00%		0.00%		0.00%		
Iceland	43	0.19%	24	0.24%	19	0.19%	10	0.18%		
Italy	1747	7.86%	1115	11.23%	865	8.63%	572	10.19%	138	12.59%
Jordan	9	0.04%	9	0.09%		0.00%		0.00%		
Japan	2	0.01%	1	0.01%		0.00%		0.00%		
Kenya	3	0.01%	1	0.01%	2	0.02%	1	0.02%		
Kyrgyzstan		0.00%		0.00%	1	0.01%		0.00%		
Cambodia	1	0.00%		0.00%		0.00%		0.00%		
South Korea	2	0.01%	2	0.02%		0.00%		0.00%		
Kazakhstan		0.00%		0.00%	1	0.01%	1	0.02%		
Lebanon	2	0.01%	2	0.02%		0.00%		0.00%		

Liechtenstein	2	0.01%	2	0.02%		0.00%		0.00%		
Lithuania	26	0.12%	16	0.16%	20	0.20%	10	0.18%	3	0.27%
Luxemburg	30	0.13%	19	0.19%	15	0.15%	12	0.21%	4	0.36%
Latvia	28	0.13%	16	0.16%	10	0.10%	4	0.07%	2	0.18%
Libya	1	0.00%	1	0.01%		0.00%		0.00%		
Monaco	1	0.00%	1	0.01%		0.00%		0.00%		
Moldova	7	0.03%	5	0.05%		0.00%		0.00%		
Montenegro	9	0.04%	5	0.05%		0.00%		0.00%		
Former Yugoslav Republic of Macedonia	14	0.06%	4	0.04%	4	0.04%	1	0.02%		
Malta	20	0.09%	14	0.14%	7	0.07%	3	0.05%	0	0.00%
Mexico	3	0.01%	2	0.02%	2	0.02%	1	0.02%		
Morocco	4	0.02%	4	0.04%	1	0.01%		0.00%		
New Caledonia	1	0.00%		0.00%		0.00%		0.00%		
Nigeria	1	0.00%		0.00%		0.00%		0.00%		
The Netherlands	1420	6.39%	658	6.63%	661	6.59%	403	7.18%	71	6.48%
Norway	304	1.37%	209	2.11%	149	1.49%	111	1.98%		
New Zealand	3	0.01%	2	0.02%		0.00%		0.00%		
Pakistan		0.00%		0.00%	1	0.01%		0.00%		
Poland	224	1.01%	89	0.90%	195	1.94%	116	2.07%	16	1.46%
Occupied Palestinian Territory	5	0.02%	5	0.05%		0.00%		0.00%		
Portugal	296	1.33%	135	1.36%	107	1.07%	63	1.12%	16	1.46%
Paraguay		0.00%		0.00%	1	0.01%	1	0.02%		
Romania	57	0.26%	24	0.24%	43	0.43%	19	0.34%	2	0.18%
Republic of Serbia	40	0.18%	22	0.22%		0.00%		0.00%		

Russia	21	0.09%	2	0.02%	28	0.28%	6	0.11%		
Senegal	1	0.00%		0.00%		0.00%		0.00%		
Slovenia	49	0.22%	24	0.24%	31	0.31%	15	0.27%	2	0.18%
Slovakia	36	0.16%	20	0.20%	31	0.31%	18	0.32%	6	0.55%
South Africa	4	0.02%	2	0.02%	2	0.02%		0.00%		
Sweden	645	2.90%	293	2.95%	331	3.30%	197	3.51%	44	4.01%
Syria	1	0.00%	1	0.01%		0.00%		0.00%		
Thailand	2	0.01%		0.00%		0.00%		0.00%		
Tunisia	7	0.03%	6	0.06%	2	0.02%	1	0.02%		
Turkey	252	1.13%	27	0.27%	67	0.67%	17	0.30%		
Uganda	1	0.00%		0.00%		0.00%		0.00%		
Ukraine	15	0.07%	7	0.07%	1	0.01%		0.00%		
United Kingdom	4355	19.59%	1435	14.46%	1724	17.19%	723	12.88%	98	8.94%
United States	3	0.01%	3	0.03%	1	0.01%	1	0.02%		
Uruguay	2	0.01%	1	0.01%	2	0.02%		0.00%		
Uzbekistan	1	0.00%		0.00%	3	0.03%		0.00%		
(former) Yugoslavia**		0.00%		0.00%	16	0.16%		0.00%		
Other		0.00%		0.00%		0.00%		0.00%	89	8.12%
Total	22228	100.00%	9925	100.00%	10028	100.00%	5614	100.00%		

* The survey respondents were asked to select one of the EU Member States or "other" as their nationality.
** At the time of the start of FP6, the Federal Republic of Yugoslavia (consisting of the Republic of Serbia and Montenegro) still existed. It broke up into two countries in 2003. Hence, organisations were located in this country under FP7.

G. Methodological details of our statistical analyses

Using the collected survey data, further econometric analysis was applied. The high number of survey responses provided a good basis for such an analysis. Nevertheless, one of the key challenges is found in the type of information collected through our survey. Most of the data can best be described as either categorical or ordinal. This makes applying standard econometric analysis more complicated and in many cases infeasible. Nevertheless, the following econometric techniques were applied in the analysis of the collected data:

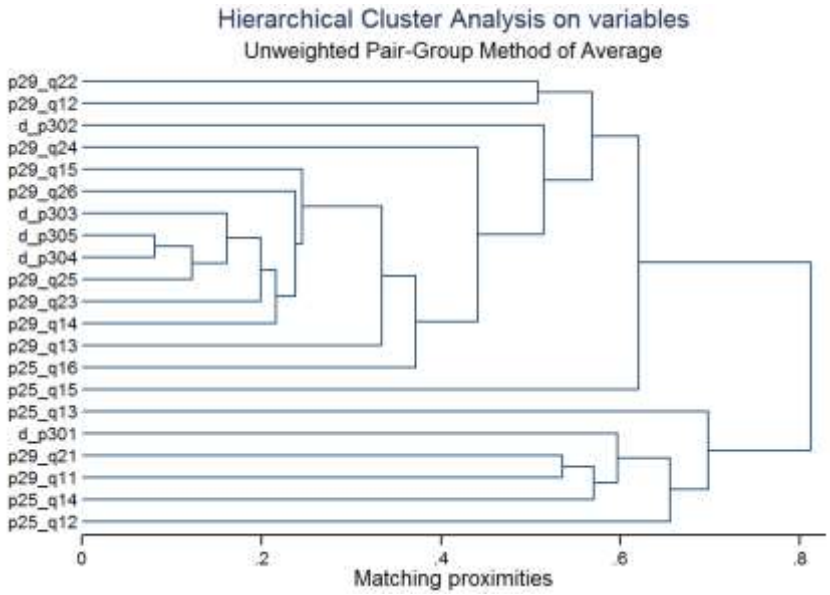
- Cluster and factor analysis;
- Ordinary Least Squares regression analysis;
- Instrumental Variable regression analysis;
- Logistic regression analysis;
- Ordered logistic regression analysis.

The process is described in more detail below.

Cluster and factor analysis

After the descriptive analysis, the first step was to further explore clustering techniques and factor analysis. Due to the high degree of categorical, ordinal and dichotomous (i.e. non-nominal) variables, factor analysis cannot be applied in a meaningful way to our dataset. Therefore only clustering techniques were further considered. The high number of dichotomous variables also limits our possibilities for cluster analysis. In such a case, hierarchical cluster analysis is one of the few econometric techniques that can provide meaningful results. In an attempt to identify archetypes of research management models in our data, hierarchical cluster analysis was performed on a selected set of variables. Figure G-1 provides the output of this analysis.

Figure G-1: Output of hierarchical cluster analysis



The cluster analysis revealed two clear clusters, cluster A and cluster B. Cluster B is characterised by the variables that indicate whether an Executive Board, a Project Office, or Work Package Teams are present, whether the official Project Coordinator was appointed to conduct management of the project, whether the official Project Coordinator was appointed to conduct scientific coordination, and whether all partners

were involved in the decision-making process jointly explain some of the variance in the data. All other included variables are considered as another single cluster.[34] Leaving the econometric technicalities aside, hierarchical clustering analysis did not reveal significant archetypes for research management.

Ordinary Least Squares and Instrumental Variables regression analysis

Following the cluster analysis, additional econometric modelling was considered for identifying some of the key factors that influence research management performance and project success. Initially, standard Ordinary Least Squares and more elaborated Instrumental Variables regression equations were explored. However, given the mixture of ordinal and categorical data in our dataset, the assumption of linearity between the dependent variable and independent variables was violated. Moreover, the residuals in our models violated the assumption of normal distribution. This resulted in regression results that could not be interpreted with confidence.

Logistic and ordered logistic regression analysis

In order to overcome challenges associated with ordinal data, an ordered logistic regression equation was finally estimated. Standard logistic regression analysis is used for predicting the outcome of a categorical dependent variable, i.e. taking the form of either 0 or 1. However, as we are dealing with ordinal dependent variables (research management performance and project success on a scale of 1-10, with increments of 1), standard logit regression models do not suffice.

Ordered logit regression models, in contrast to standard logit regression models, assume the presence a continuous latent variable underlying the dependent variable. Put differently, these models take into account the different levels of our variables for research management performance and project success without the explicit need to determine distances between the intervals of e.g. [1, 2], [2,3], etc. This makes the ordered logit regression analysis the most suitable econometric tool for our exploratory econometric analysis.

[34] Note that the clustering technique did not allow us to specify the value of these variables within these clusters. It only showed that these variables were the main overall discriminators in the sample.

H. Results of statistical analysis of FP6 and FP7 themes and schemes

As indicated in section 5.3.4, our statistical findings were tested for robustness to the effects of specific themes and schemes under FP6 and FP7. This annex presents the statistical output of these analyses. The interpretation of these findings is provided in section 5.3.4.

Table H-1: Results of the ordered logistic regression for research management performance, with FP6 and FP7 themes as independent variables

Research Management Performance (0-10), including themes FP6 and FP7		
Independent variable	*Coefficient*	*Std. error*
Nr. of physical meetings (average)	0,016	(0.011)
FP7 project, 0=no (=FP6), 1=yes		
Partner involvement (low to high)	-0.493***	(0.058)
Trust at the start (low to high)	-0,012	(0.045)
Trust at the end (low to high)	0.272***	(0.046)
P14_Q3	-0,009	(0.030)
Partners excluded, 0=no, 1=yes	-0,065	(0.073)
Manner of working together (very poor - very good)	1.126***	(0.063)
Frequency of contact with PC (high to low)	-0.164***	(0.037)
Alignment of interests (low to high)	0.300***	(0.054)
Use of management style 5 (low to high)	0,071	(0.050)
Use of management style 1 (low to high)	-0,042	(0.039)
Use of management style 2 (low to high)	0.142***	(0.040)
Use of management style 3 (low to high)	0.654***	(0.056)
Use of management style 4 (low to high)	0.111*	(0.048)
Use of management style 6 (low to high)	0,05	(0.033)
Executive Board in place (0=no, 1=yes)	-0,04	(0.080)
Project Office in place (0=no, 1=yes)	-0,028	(0.073)
Work Package Teams in place (0=no, 1=yes)	0,033	(0.118)
Scientific Advisory Board in place (0=no, 1=yes)	0,07	(0.071)
Stakeholder Advisory Board in place (0=no, 1=yes)	0,081	(0.081)
Other structure in place (0=no, 1=yes)	0,054	(0.127)
1b.region (baseline)		
2.region	0,154	(0.128)
3.region	-0.275**	(0.096)
4.region	-0,044	(0.092)
5.region	-0,042	(0.125)
Theme: Life sciences, genomics and biotechnology for health (FP6)	0,312	(0.207)
Theme: Information society technologies (FP6)	0,138	(0.188)
Theme: Nanotechnologies and nanosciences, knowledge-based multifunctional (FP6)	0,252	(0.203)
Theme: Aeronautics and space (FP6)	0,147	(0.247)
Theme: Food quality and safety (FP6)	0,264	(0.239)
Theme: Sustainable development, global change and ecosystems (FP6)	0,357	(0.201)
Theme: Citizens and governance in a knowledge-based society (FP6)	0.578*	(0.263)
Theme: Activities of International Cooperation (FP7)	0,933	(1.275)

Theme: Energy (FP7)	0,323	(0.323)
Theme: Environment (FP7)	0,014	(0.294)
Theme: Euratom (FP6)	0,689	(0.360)
Theme: Food, Agriculture, and Biotechnology (FP7)	0.666*	(0.305)
Theme: Fusion Energy (FP7)	1,599	(1.149)
Theme: Health (FP7)	0,531	(0.272)
Theme: Horizontal research activities involving SMEs (FP6)	-0.477*	(0.230)
Theme: Human resources and mobility (FP6)	0,4	(0.222)
Theme: Information and Communication Technologies (FP7)	0,04	(0.193)
Theme: Joint Technology Initiatives (Annex IV-SP1) (FP7)	-0,512	(0.403)
Theme: Nanosciences, Nanotechnologies, Materials and new Production Technology (FP7)	-0,029	(0.227)
Theme: Nuclear Fission and Radiation Protection (FP7)	0.748*	(0.367)
Theme: Policy support and anticipating scientific and technological needs (FP6)	0,063	(0.208)
Theme: Regions of knowledge (FP7)	-1.732*	(0.855)
Theme: Research Infrastructures (FP7)	0,492	(0.358)
Theme: Research and innovation (FP6)	0,054	(0.320)
Theme: Research for the benefit of SMEs (FP7)	0,048	(0.244)
Theme: Research infrastructures (FP6)	0,338	(0.303)
Theme: Research potential (FP7)	-0,945	(1.610)
Theme: Science and society (FP6)	0,33	(0.374)
Theme: Science in Society (FP7)	-0,055	(0.782)
Theme: Security (FP7)	0.799*	(0.385)
Theme: Socio-economic sciences and Humanities (FP7)	0,584	(0.352)
Theme: Space (FP7)	0,44	(0.403)
Theme: Specific measures in support of international cooperation (FP6)	0,396	(0.254)
Theme: Support for the coherent development of research & innovation policies (FP6)	-0,224	(0.640)
Theme: Support for the coordination of activities (FP6)	0,32	(0.346)
o. Theme: Transport (including Aeronautics) (FP7, baseline)		
Total project costs (natural log)	0,036	(0.037)
R-squared	0,1705	
N	3227	

** p<0.05, ** p<0.01, *** p<0.001*

Table H-2: Results of the ordered logistic regression for research management performance, with FP6 and FP7 schemes as independent variables

Research Management Performance (0-10), including schemes FP6 and FP7		
Independent variable	*Coefficient*	*Std. error*
Nr. of physical meetings (average)	0,013	(0.010)
Partner involvement (low to high)	-0.480***	(0.058)
Trust at the start (low to high)	-0,018	(0.045)
Trust at the end (low to high)	0.284***	(0.046)
% of individuals within the consortium already collaborated	0,002	(0.030)
Partners excluded, 0=no, 1=yes	-0,05	(0.074)
Manner of working together (very poor - very good)	1.108***	(0.063)
Frequency of contact with PC (high to low)	-0.148***	(0.037)
Alignment of interests (low to high)	0.313***	(0.054)
Use of management style 5 (low to high)	0,074	(0.050)
Use of management style 1 (low to high)	-0,033	(0.039)
Use of management style 2 (low to high)	0.149***	(0.040)
Use of management style 3 (low to high)	0.645***	(0.056)
Use of management style 4 (low to high)	0.108*	(0.048)
Use of management style 6 (low to high)	0,057	(0.034)
Executive Board in place (0=no, 1=yes)	-0,016	(0.080)
Project Office in place (0=no, 1=yes)	-0,03	(0.073)
Work Package Teams in place (0=no, 1=yes)	0,05	(0.118)
Scientific Advisory Board in place (0=no, 1=yes)	0,115	(0.071)
Stakeholder Advisory Board in place (0=no, 1=yes)	0,077	(0.080)
Other structure in place (0=no, 1=yes)	0,07	(0.127)
1b.region (baseline)		
2.region	0,142	(0.127)
3.region	-0.306**	(0.095)
4.region	-0,056	(0.091)
5.region	-0,011	(0.123)
ln_totalprojectcost	0,064	(0.051)
instrument=171	-0.778*	(0.374)
instrument=BSG	-0,125	(0.198)
instrument=CA	-0,025	(0.155)
instrument=CLR	-0.752*	(0.316)
instrument=CP	-0,07	(0.096)
instrument=CP-CSA	-0,069	(0.367)
instrument=CRAFT	-0.701***	(0.206)
instrument=CSA	-0,132	(0.168)
instrument=I3	0,824	(0.694)
instrument=II	-0,01	(0.302)
instrument=IP	-0,078	(0.138)
instrument=MCA	0,146	(0.163)
instrument=NOE	-0,305	(0.192)
instrument=SSA	0,195	(0.166)
o. instrument=STREP (baseline instrument)		
R-Squared	0,1676	
N	3227	

** p<0.05, ** p<0.01, *** p<0.001*

Table H-3: Results of the ordered logistic regression for project success, with FP6 and FP7 themes as independent variables

Project success (0-10), including themes FP6 and FP7		
Independent variable	*Coefficient*	*Std. error*
Nr. of physical meetings (average)	-0,012	(0.010)
Partners excluded, 0=no, 1=yes	-0,126	(0.069)
Partner involvement (low to high)	0,017	(0.057)
RMP importance	0,047	(0.048)
Manner of working together (very poor - very good)	0.529***	(0.062)
Frequency of contact with PC (high to low)	-0.076*	(0.036)
Trust at the start (low to high)	0,001	(0.044)
Trust at the end (low to high)	0,001	(0.045)
Use of management style 5 (low to high)	0.151**	(0.049)
Use of management style 1 (low to high)	-0,015	(0.038)
Use of management style 2 (low to high)	-0,072	(0.039)
Use of management style 3 (low to high)	-0.171**	(0.054)
Use of management style 4 (low to high)	0,017	(0.047)
Use of management style 6 (low to high)	-0,013	(0.033)
Alignment of interests (low to high)	0.343***	(0.054)
Executive Board in place (0=no, 1=yes)	-0,006	(0.078)
Project Office in place (0=no, 1=yes)	-0,05	(0.071)
Work Package Teams in place (0=no, 1=yes)	-0,166	(0.114)
Scientific Advisory Board in place (0=no, 1=yes)	0.249***	(0.068)
Stakeholder Advisory Board in place (0=no, 1=yes)	-0,011	(0.078)
Other structure in place (0=no, 1=yes)	0,145	(0.119)
FP7 project, 0=no (=FP6), 1=yes		
RMP	1.008***	(0.033)
1b.region (baseline)		
2.region	-0,116	(0.124)
3.region	0,021	(0.093)
4.region	0,136	(0.089)
5.region	0.245*	(0.120)
Theme: Life sciences, genomics and biotechnology for health (FP6)	-0,068	(0.196)
Theme: Information society technologies (FP6)	0,163	(0.176)
Theme: Nanotechnologies and nanosciences, knowledge-based multifunctional (FP6)	-0,359	(0.195)
Theme: Aeronautics and space (FP6)	-0,148	(0.231)
Theme: Food quality and safety (FP6)	-0,218	(0.223)
Theme: Sustainable development, global change and ecosystems (FP6)	-0,088	(0.190)
Theme: Citizens and governance in a knowledge-based society (FP6)	0,149	(0.252)
Theme: Activities of International Cooperation (FP7)	-0,348	(1.297)
Theme: Energy (FP7)	0,13	(0.311)
Theme: Environment (FP7)	0,301	(0.275)
Theme: Euratom (FP6)	-0,287	(0.328)
Theme: Food, Agriculture, and Biotechnology (FP7)	0,248	(0.293)
Theme: Fusion Energy (FP7)	-1,135	(1.450)
Theme: Health (FP7)	0,168	(0.257)

Theme: Horizontal research activities involving SMEs (FP6)	-0.608**	(0.214)
Theme: Human resources and mobility (FP6)	0.421*	(0.215)
Theme: Information and Communication Technologies (FP7)	0,157	(0.184)
Theme: Joint Technology Initiatives (Annex IV-SP1) (FP7)	0,711	(0.386)
Theme: Nanosciences, Nanotechnologies, Materials and new Production Technology (FP7)	-0,08	(0.216)
Theme: Nuclear Fission and Radiation Protection (FP7)	0,398	(0.354)
Theme: Policy support and anticipating scientific and technological needs (FP6)	0,206	(0.196)
Theme: Regions of knowledge (FP7)	-0,528	(0.832)
Theme: Research Infrastructures (FP7)	0.731*	(0.349)
Theme: Research and innovation (FP6)	0,063	(0.312)
Theme: Research for the benefit of SMEs (FP7)	-0.787***	(0.229)
Theme: Research infrastructures (FP6)	0,472	(0.297)
Theme: Research potential (FP7)	0,088	(1.590)
Theme: Science and society (FP6)	0,191	(0.340)
Theme: Science in Society (FP7)	0,801	(0.841)
Theme: Security (FP7)	-0,426	(0.354)
Theme: Socio-economic sciences and Humanities (FP7)	1.021**	(0.338)
Theme: Space (FP7)	0,459	(0.374)
Theme: Specific measures in support of international cooperation (FP6)	0,102	(0.243)
Theme: Support for the coherent development of research & innovation policies (FP6)	-0,279	(0.703)
Theme: Support for the coordination of activities (FP6)	0,123	(0.318)
o. Theme: Transport (including Aeronautics) (FP7, baseline)		
R-squared	0,206	
N	3436	

** p<0.05, ** p<0.01, *** p<0.001*

Table H-4: Results of the ordered logistic regression for project success, with FP6 and FP7 schemes as independent variables

Project success (0-10), including schemes FP6 and FP7		
Independent variable	*Coefficient*	*Std. error*
Nr. of physical meetings (average)	-0,013	(0.010)
Partners excluded, 0=no, 1=yes	-0.142*	(0.070)
Partner involvement (low to high)	0,021	(0.057)
RMP importance	0,063	(0.048)
Manner of working together (very poor - very good)	0.523***	(0.062)
Frequency of contact with PC (high to low)	-0.089*	(0.035)
Trust at the start (low to high)	0,021	(0.043)
Trust at the end (low to high)	-0,022	(0.045)
Use of management style 5 (low to high)	0.137**	(0.048)
Use of management style 1 (low to high)	-0,022	(0.038)
Use of management style 2 (low to high)	-0,065	(0.038)
Use of management style 3 (low to high)	-0.177**	(0.054)
Use of management style 4 (low to high)	0,029	(0.047)
Use of management style 6 (low to high)	-0,023	(0.033)
Alignment of interests (low to high)	0.356***	(0.053)
Executive Board in place (0=no, 1=yes)	-0,016	(0.077)
Project Office in place (0=no, 1=yes)	-0,058	(0.071)
Work Package Teams in place (0=no, 1=yes)	-0,176	(0.114)
Scientific Advisory Board in place (0=no, 1=yes)	0.268***	(0.068)
Stakeholder Advisory Board in place (0=no, 1=yes)	-0,018	(0.076)
Other structure in place (0=no, 1=yes)	0,144	(0.119)
RMP	1.007***	(0.033)
1b.region (baseline)		
2.region	-0,151	(0.123)
3.region	0,002	(0.093)
4.region	0,109	(0.089)
5.region	0.242*	(0.118)
instrument=171	0.717*	(0.360)
instrument=BSG	-0.802***	(0.186)
instrument=CA	0,158	(0.139)
instrument=CLR	-0.831**	(0.292)
instrument=CP	0,11	(0.089)
instrument=CP-CSA	0.830*	(0.374)
instrument=CRAFT	-0.506**	(0.192)
instrument=CSA	0,213	(0.157)
instrument=I3	0,294	(0.758)
instrument=II	0,444	(0.294)
instrument=IP	-0,167	(0.113)
instrument=MCA	0.363*	(0.162)
instrument=NOE	0,349	(0.181)
instrument=SSA	-0,076	(0.137)
o. instrument=STREP (baseline)		
R-squared		
N	3436	

** p<0.05, ** p<0.01, *** p<0.001*

I. Case study protocol

Not included in this document is the detailed introduction for individual case study investigators from PwC and Technopolis Group.

Table I-1 Research questions for the case studies

Survey items 64, 65 and 66, (may) contain free-format answers for the improvement of overall research management. Please consult these answers for your project's respondents, as these might provide valuable insights into the project's research management functioning like enablers and barriers.

Question	Sources
1. **What are the different functions and roles within a team involved in FP research projects?**	Project documents, survey results, interviews
2. **Who is the manager? What is her/his profile? (Age, gender, nationality, expert level, type of contract)**	Project documents, survey results (survey item 5-14), interviews
3. **Who are those managed? What are their profiles? (age, gender, nationality, expert levels, types of contracts)**	Interviews
4. **What are the factors that define the actual size and composition of a team or a consortium?**	Interviews
5. **How was the team/consortium set up? Who are the "initiators" (e.g. degree of FP experience, organisation type and size, initiating countries, etc.)? Which channels/networks are used to search for partners?**	Interviews, survey results (item 22)
6. **To what extent has the team remained stable during the different phases of the project (from writing proposal to communicating about project results)?**	Project documents, survey results, interviews. Note that the survey items 23-25 on this topic may have been misinterpreted, as numbers returned are higher than expected. Therefore ensure to validate any survey findings in an interview before reporting them.
7. **Is there a tendency to form more than once a consortium with the same partners?**	Interviews
8. **Based on these findings, what are the main typical types or models of partnerships (i.e. typology of FP research teams)?**	Project documents, interviews, survey results (item 42-45)
9. **How is the work organised (administrative and scientific/intellectual management) from preparing a tender to disseminating the research results?**	Project documents, interviews, survey results (item 47)

10. **Which management processes are typically put in place by research teams for the management of their FP-funded projects, in particular to organise….**	
…Division and delegation of tasks	Interviews
…Top-down decisions taking vs consensus decision-making	Survey results (item 49), interviews
…Which processes are put in place to detect and solve problems/ bottlenecks?	Project documents, Interviews
…Financial management	Survey results (item 36 and 40), interviews
…Quality control, evaluation and validation	Project documents, survey results, interviews
…Monitoring (progress and results of) the projects and reporting	Project documents, interviews, survey results (item 35)
…Human resource management	Interviews
…Internal communication (within the consortium): how do project teams deal with the fact that partners are often physically located in different countries?	Project documents, survey results (items 34-36, 39, 50), interviews
…External communication (towards the European Commission, wider research community, public)	Project documents, survey results (item 35, 60, 62), interviews
…Knowledge transfer and intellectual property rights	Survey results, interviews
11. **Which processes are in general well-established; which processes are less emphasized?**	Interviews, survey results (64-66)
12. **What is the cost for project management in terms of average budget and time dedication? How much of the EU contribution is dedicated to management?**	Project documents, interviews, survey results (item 16, 17)
13. **To what extent do the instruments put in place by the European Commission support the project management, for example the reporting tools? What could be improved?**	Interviews, survey results

J. List of interviewees

Table J-1: Case study interviews

#	Interviewee	Organisation	Sector of employment
1	Adrian Messmer	Zurich Instruments	PRC
2	Andreas Ioannides	Johnsun Heaters	PRC
3	Andreas Isacsson	Chalmers University of Technology	HES
4	Ane Lothe	Sintef	REC
5	Ane Miren Irazustabarrena Murgiondo	Tecnalia	PRC
6	Athanasios Stubos	Institute of Nuclear Technology and Radiation Protection – National Center of Scientific Research Demokritos	REC
7	Beatriz González López-Valcárcel	University of Las Palmas de Gran Canaria	HES
8	Bjørn Berger	Statoil	PRC
9	Carla Sala	Instituto Di Neuroscienze	REC
10	Carlos Semino	Institut Químic de Sarria – Universitat Ramon Llul	HES
11	Catherine Baldo	Enersun System	PRC
12	Charlotte Teunissen	University of Ulm	HES
13	Christian Kleijn	Controllab	PRC
14	Christian Opp	Philipps-Universität Marburg	PRC
15	Christian Zacherl	Fraunhofer IVV	REC
16	Christiane Bielefeldt	Edinburgh Napier University	HES
17	Edgar Willenborg	Fraunhofer	REC
18	Eduardo Alves	Universidade de Lisboa	HES
19	Elmar Neitzert	Max Planck Institut für Plasmaphysik	REC
20	Felix Herzog	Federal Department of Economic Affairs FDEA - Research Station ART	PUB
21	Fernando Moreno-Insertis	Instituto de Astrofísica de Canarias	REC
22	Florence Delprat-Jannaud	IFP Energies Nouvelles	REC
23	Geir-Harald Strand	Norsk institutt for skog og landskap	REC
24	Gerard Lecina	Dassault Systemes	PRC
25	Gina Alioto	Centro Nacional de Supercomputación	REC
26	Hans-Ulrich Endress	Herbstreith & Fox Unternehmensgruppe	PRC
27	Ion Tiseanu	Romanian National Institute for Lasers, Plasma and Radiation Physics	REC
28	Jacques Neguer	UNIVERSITÀ DEGLI STUDI DI PADOVA	HES
29	Jan Broenink	University of Twente	HES
30	Jens Wiltfang	LVR-Klinikum Essen – University of Duisburg-Essen	HES
31	Jocelyn Gaudin	Airbus	PRC
32	Jouni Ahopelto	VTT Micro and Nanoelectronics	REC
33	Juan Carlos Chachques	Pompidou Hospital	HES

34	Kenneth Holmberg	VTT Technical Research Centre of Finland	REC
35	Liliana Cucu-Grosjean	LORIA - Lorraine Research Laboratory in Computer Science and its Applications	REC
36	Ludvig M. Sollid	University of Oslo	HES
37	Luis Mateus	Monumenta	PRC
38	Manfred Dangelmaier	Fraunhofer IAO	REC
39	Maria Luisa Mearin	Leiden University Medical Centre	HES
40	Michael Groll	Philips-Universitaet Marburg	PRC
41	Monica Di Luca	Universita degli Studi di Milano	HES
42	Nicolas Le Sauze	Alcatel-Lucent Bell labs	PRC
43	Peter Buttiens	European Specialist Printing Manufacturers Association (ESMA)	PRC
44	Peter Coleman	Airbus UK	PRC
45	Philippe Renaud	Ecole Polytechnique Federale de Lausanne	HES
46	Rafael C. Molina	ESA-ESTEC	REC
47	Riccardo Carelli	Sapienza Innovazione - Sapienza Universita di Roma)	HES
48	Sergio Persoglia	OGS - Istituto Inazionale di Oceanografia e di Geofisica Sperimentale	REC
49	Stefaan Poedts	KU Leuven	HES
50	Stephen Crabbe	Crabbe Consulting Ltd	PRC
51	Steve Jones	Printed Electronics Ltd	PRC
52	Sue Black	Centre for Anatomy and Human Identification College of Art	HES
53	Thomas Arnold	Arnold Ravensburg	PRC
54	Thomas Panagopoulos	Algarve University	HES

Table J-2: Non-case study interviews

#	Name	Inclusion criterion	Organisation	Sector of employment
1	Andreas Schoth	Serial Entrepreneur	Inno Group	PRC
2	Anne-Cécile de Giacomoni	Serial FP participant	Alma Consulting Group	PRC
3	Benno Pokorny	Low response projects	Albert-Ludwigs-Universität Freiburg	HES
4	Christian Czychowski	FP Expert	Boehmert & Boehmert Patentanwälte	Legal Services
5	Epaminondas Christofilopoulos	FP Expert	PRAXI / HELP-FORWARD Network	PUB
6	Jan Andersen	FP Expert	European Association of Research Managers and Administrators.	PUB
7	Jose Labastida	FP Expert	ERC Executive Agency Director	EU Institutions
8	Leo Klomp	FP Expert	VU/VUmc	HES
9	Manfred Horvat	FP Expert	Technical University Vienna	HES
10	Marc Bonazountas	Serial FP	Epsilon	PRC

		participant		
11	Peter Heydebreck	Low response project	Albert-Ludwigs-Universität Freiburg	HES
12	Rob Verhofstad	FP Expert	European Association of Research Managers and Administrators.	PUB
13	Roberto Palermo	Low response projects	ISI Foundation	REC
14	Toshiyasu Ichioka	FP Expert	EU-Japan Centre for Industrial Cooperation,	PUB
15	Yegor Dubynskyi	FP Expert	National Academy of sciences of Ukraine	REC

K. Participants of the round table

On 4 September 2014, a round table discussion was conducted at the Commission's premises. The round table was aimed at validating the findings and conclusions of the report among a group of experienced FP participants, as well as strengthening the recommendations of the study by making them more relevant to FP project practice.

Participants of the round table were selected based on their experience in multiple FP projects. Their organisational backgrounds vary, and include universities, RTOs, SMEs, large firms and specialised project management consultancies. The participants received a draft of the Final Report in advance of the round table.

Table K-1: Participants of the round table

Name	Organisation
Erik Arnold	Technopolis UK (chair of the round table)
Peter Stollemayer	Eurescom (Germany)
Ab Osterhaus	Erasmus Medical Centre (The Netherlands)
András Dinnyes	BioTalentum (Hungary)
Scira Menoni	Politecnico di Milano (Italy)
Yolanda Ursa	Grupo Inmark (Spain)
Erich Prem	Eutema (Austria)
Alexander Holleis	AVL (Austria)
Marc Bonazountas	Epsilon Group (Greece)
Michael Nilsson	Luleå Technical University (Sweden)
Rob Smeets	Philips (The Netherlands)
Leen Bastiaens	Vito (Belgium)
Wouter Jansen	PwC The Netherlands (Project leader of the study)
Alfred Radauer	Technopolis Austria (IP expert)

The outcomes of the round table have been used in developing this Final Report.