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EVALUATION OF UK INVOLVEMENT WITH THE RESEARCH FRAMEWORK PROGRAMME AND OTHER EUROPEAN RESEARCH AND INNOVATION PROGRAMMES

Final Report

2017

Evaluation of UK involvement with the Research Framework Programme and other European research and innovation programmes

Final report

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Contents

Executive Summary i

1 Introduction and context 1

1.1 Scope and objectives of the study 1
1.2 Study context 2
1.3 Structure of this Report 13

2 Method of approach 14

2.1 Meeting the study objectives 14
2.2 Intervention Logic – BEIS support to Framework Programme participation 16
2.3 Study methodology 17
2.4 Limitations to the work – issues and problems encountered 20

3 UK participation and performance in EU research programmes 22

3.1 UK participation and performance in FP7 22
3.2 UK participation in successive Framework Programmes (FP6 – FP7 – Horizon 2020) 42
3.3 UK participation in EUREKA and COST 57
3.4 Factors influencing participation 66
3.5 Conclusions 80

4 UK outputs, outcomes and impacts from participation in EU research programmes 86

4.1 FP7 Outputs, outcomes and impacts 86
4.2 Outcomes/impacts of participation in EUREKA Eurostars 106
4.3 Outcomes/impacts of participation in COST 108
4.4 Conclusions 115

5 Additionality of the research Framework Programme and complementarity with other initiatives 120

5.1 Additional research activity due to FP7 funding 120
5.2 Complementarity with EUREKA and COST 124
5.3 Comparative advantages of EU Framework Programme and other initiatives 125
5.4 Conclusions 128

6 Feedback on administration and proposals for improvement 130

6.1 Feedback on FP7 administration and reporting from participants 130
6.2 Feedback on FP7 application and evaluation procedures from unsuccessful applicants 131
6.3 Advice from participants to future participants on how to maximise benefits from EU Framework Programmes 132
6.4 Changes that would enhance UK involvement and increase the benefits derived 138
6.5 Conclusions 144

7 Study conclusions 145

7.1 Strengths and weaknesses of the FP7 programme 145
7.2 Outputs, outcomes and impacts 149
7.3 Added value of FP7 for UK researchers 151
7.4 The role of national support services 153
7.5 Barriers to participation for businesses 153
7.6 Analysis of COST 154
7.7 Analysis of EUREKA Eurostars-1 154

ANNEXES 156

Annex 1: UK performance in FP7 157
Annex 2: UK performance in Horizon 2020 – first evidence from 2014-16 207
Annex 3: Case studies 220

Executive Summary

Introduction

This study has examined the participation of UK researchers in the EU's Seventh Framework Programme for Research and Innovation (FP7). The study also reviewed the UK's participation in Horizon 2020 up to February 2016 and UK involvement with EUREKA and COST (European Cooperation in Science and Technology). The study was commissioned in order to inform the UK's response to the European Commission's interim evaluation of Horizon 2020 and preparation in due course for the ninth Framework Programme.

The study aimed to provide evidence on the levels of participation and funding achieved and the associated results and added value of FP7 for the UK's university and business research base. Complementarity with other EU collaborative/non-collaborative activities (COST and EUREKA) and national initiatives was also examined.

The research sought to:

- Assess and analyse UK participation patterns across Framework Programmes (FP6, FP7 and the first two years of Horizon 2020).
- Identify and assess motivations, barriers and enablers to access and participation in FP7 and other European collaborative/non-collaborative activities.

The fieldwork for the study consisted of an interview programme with stakeholders in the UK's research base, online surveys of successful and unsuccessful applicants and five in depth case studies of purposely selected FP7 projects.

The research was commissioned before the UK referendum on 23rd June 2016. In this referendum, the UK voted to leave the European Union. The Government has made clear it would welcome agreement to continue to collaborate with European partners on major science, research and technology initiatives. As set out in the future partnership paper, "Collaboration on Science and Innovation", published on 6th September 2017, the UK will seek an ambitious Science and Innovation Agreement with the EU.

ICF would like to thank the COST Association, the EUREKA secretariat and Innovate UK for their contributions to the study.

Context for the evaluation

Overall, the UK's research and innovation system is characterised by a relatively low investment in research and development (R&D), compared to other EU member states, and very strong human capital and scientific output. In the period 2007-2013, the UK invested on average 1.69% of its Gross Domestic Product (GDP) in R&D - the UK ranked 11th out of all EU member states and below the EU average, behind countries such as Germany (2.71% on average) and France (2.16% on average). In terms of the total value of R&D investments, the UK came 3rd behind Germany and France, with a total investment of €227 billion in the period 2007-2013.

The largest performers of research in the UK are the business sector and the higher education sector – the UK does not have a large number of research organisations, which account for a large share of the basic and applied research undertaken in other countries such as Germany or France. The UK overall performs well in terms of developing human capital and scientific output, through an internationally renowned, efficient and high-performing higher education sector. However, UK business investment in R&D is below the EU average, as a percentage of GDP.

UK performance in FP7

Participation and funding success in FP7

In FP7, the UK's performance has been strong, both in terms of overall participation levels and the value of EU funding won. In absolute terms, the UK ranked second for participation and funding attracted, compared to all other countries in FP7. Taking into account the relatively lower investment by the UK in R&D, the UK performed very strongly in FP7 winning a total of €7 billion in EU funding from FP7 (or 15.4% of overall EU funding awarded in FP7), the second highest of all participating countries behind Germany.

In comparison with the other EU27 member states, the amount of EU funding secured was also high when adjusted for relative GDP, levels of government and business investment in R&D (GERD), and the number of researchers:

- Funding to the UK was 16% above what might have been expected based on GDP (ranking 11th out of the EU27 on funding relative to GDP).
- Funding to the UK was 34% above what might have been expected based on the level of UK GERD (ranking 14th out of the EU27 on funding relative to GERD).
- The UK's funding was 24% above what might have been expected based on the number of FTE researchers (7th out of the EU27 on funding relative to number of FTE researchers).

On all of the above metrics, the UK outperformed other large EU economies such as Germany and France.

Consequently, FP7 was a relatively more important funding source in the UK compared to other EU member states. From 2007-2013, FP7 funding constituted 3.1% of the UK's overall R&D investment, significantly more than in France (1.7%) and Germany (1.4%). FP7 was particularly significant for the UK's higher education sector (HE), where it represented 7.2% of total investments in HE R&D in the period 2007-2013.

The UK's proposal success rate was particularly high in the Health theme (24% of submitted proposals with UK participation were funded, compared to an average success rate of 14% of all proposals submitted). Higher than average success rates were also achieved in the areas of Nanosciences, Nanotechnologies, New Materials and New Production Technologies (23% compared to an average success rate of 12%), the Environment theme (22% compared to an average success rate of 12%)

and the European Research Council (13% compared to an average success rate of 10%).

UK participation in FP7 was dominated by universities

Universities represented 60% of all UK participations and received 70% of all funding allocated to the UK, a much larger presence than in other EU member states. This reflects the dominant presence of the higher education sector in the UK's research and innovation system, in contrast to the strong presence of other research organisations in other large countries such as Germany and France. In terms of participation, the top 25 UK organisations that participated include 22 universities, the Medical Research Council, the Natural Environment Research Council and TWI Ltd.

The UK industry share of UK participation in FP7 ranked 23th out of all EU27 member states during FP7 (26% compared to an average of 31%). Within FP7, UK had the second lowest proportion of EU funding allocated to industry (18% compared to an average of 25%). However, whilst the overall degree of industry participation was relatively low, all of UK's R&D performing sectors were represented in FP7.

In absolute terms, UK industry participants represented 11% of all industry participants in FP7, topped only by industry participation from Germany (15% of total).

FP7 was dominated by a relatively small group of key organisations – the top 100 UK participants in terms of the number of projects won (just 3% of UK participants) accounted for 76% of all EU funding awarded to the UK (or €5.3 billion) and 70% (or 12,397) of all UK participations in projects. This group of 100 organisations comprised 67 individual universities, 14 companies, 16 research organisations and three government bodies.

Motivations for participation in FP7

Key motives for participation in FP7 were access to research funding (72%) as well as the development of new or improved relationships or networks (55%), the desire to address specific scientific or technical questions or issues (54%), and to develop and extend internal knowledge and capabilities (53%).

Three-quarters (75%) of respondents indicated that the relevance of both the topics and the instruments of FP7 was high or very high for the research they wished to conduct.

Trends in participation in Framework Programmes over time

The UK has achieved a significant positive increase in participation rates and financial returns from FP7 as compared to FP6, and high levels of performance within FP7 appear to have been maintained within Horizon 2020 to date. The UK, as with other selected comparator countries, is involved in a diminishing proportion of the projects over time, but this is due to the fact that the programme increasingly consists of smaller and more targeted projects, a change that participants generally favour based on the feedback provided on the (larger) FP6 instruments.

UK performance over time also appears to be strong in comparison to the key comparator countries of Germany and France. While the UK's share of participations was higher in FP7 and Horizon 2020 than in FP6, both Germany and France have seen a slight decrease in their shares across the successive Framework Programmes.

Outputs attributed to FP7

UK participants were asked to quantify, where applicable, a range of different types of output produced by their FP7 project. Across all respondents (i) the opportunity to carry out research (96% of responses) and (ii) an improved access to networks (87%) were considered key outputs.

The results show that peer-reviewed journal articles were widely generated (87% of projects, 14.7 per project on average). A large proportion of FP7 projects recruited personnel specifically for the project (79%), with an average of just more than five Full Time Equivalents (FTEs) per project. Scientific exchanges were also very prevalent.

For more commercially oriented outputs across all participants, less than one in five (18%) of the respondents' projects generated one or more new patent applications, and just 7% applied for trademarks or registered designs as a result of an FP7 project. The relatively lower levels of commercially oriented outputs is unsurprising due to the focus on basic research in the majority of FP7 projects, and the large number of higher education institutions involved. When we look specifically at industry respondents, 26% of this category of participant generated a patent application and 8% applied for a registered trademark / design.

UK businesses considered (i) opportunities for prototype development and demonstrations / pilots (84% of responses), and (ii) newly-acquired knowledge about industrial processes or business parameters (81% of responses) as among the most important outputs. 62% of businesses considered that FP7 had met their expectation with regards to newly-acquired knowledge about industrial processes or business parameters, whilst 24% said that their expectations were exceeded. As regards prototype development and demonstrations / pilots, 58% said that FP7 had met their expectations, whilst 23% said their expectations were exceeded.

Outcomes attributed to FP7

The survey also asked about the extent to which participation in FP7 had resulted in positive impacts for their own organisation. The results show a very positive impact from FP7 participation. More than 40% of participants reported high impacts in terms of increased understanding and knowledge, in both new and existing areas, increased scientific capabilities, and improved relationships and networks. More than 75% reported high or medium impacts in these areas.

Increased technological capabilities, improved competitive position, improved career development for researchers and enhanced reputation also feature as areas where a large number (30% or more) of participants reported a high level of impact.

More than a third of projects (34%) delivered above participants' expectations with regard to providing opportunities for follow-up research, and almost a quarter (23%) delivered above expectations with regard to knowledge spillovers to other sectors or research areas. More than 90% of projects delivered at or above expectations in terms of improved ability to conduct R&D, provide training and attract staff.

Whilst the large majority of participants and projects achieved outcomes in line with expectations, there were some differences according to the types of outcomes. The majority of commercially orientated outcomes met the participants' expectations. Over four in five of the survey respondents reported that expectations in terms of development of new products and services, development of new codes and standards, access to new markets, and reduced time to market had either been met or exceeded. At the same time, businesses reported more frequently than universities that outcomes had been delivered below expectations.

Networking outcomes

High quality research collaboration is commonly accepted to influence the productivity of individual scientists and organisations, as well as the impact of their work. FP7 has had a significant impact on the ability of the UK research base to conduct collaborative research with non-UK partners who were often reported to be world leading in terms of their scientific competences and technology know how, and at a scale and scope much greater than other European or international programmes.

The average number of partners in FP7 projects with UK involvement was 13, and respondents had worked with on average 4.6 of these organisations before (or 35%). This suggests that 65% (on average 8.4 partners per project) were 'new' in the sense that the UK partner(s) had not previously worked with those organisations. Based on the survey responses:

- An estimated 45,500 **new** partnerships were formed between UK and non-UK FP7 participants (65% of all UK partnerships were new so 24,500 of the partnerships were with pre-existing collaborators (35%)).
- Estimates suggest UK partners expect to work with 32,200 (46%) of their FP7 partners again in future.
- An estimated minimum of 7,700 (24%) of these future collaborations will be with overseas partners that the UK partner first collaborated with during FP7.

Employment outcomes

Survey respondents (n=475) were asked whether their project had (or was likely to have) an impact on employment beyond the duration of the project. Whilst almost two thirds were unable to provide an answer, in 17% of cases respondents reported an increase in employment and in 16% of cases they reported a safeguarding of employment. Just two respondents (<1%) reported a decrease in employment as a result of their project. Of the respondents answering this question:

- 64% of universities reported an increase in employment.
- 57% of research organisations reported an increase in employment.

- 31% of industry reported an increase in employment.

Out of those respondents who reported an increase in employment, a total of 377 jobs had been created (3.9 FTEs on average within 96 organisations), 595 jobs safeguarded (5.6 FTEs on average within 107 organisations). By comparison just seven jobs had been lost (1.2 on average across six organisations).

Commercial Impacts attributed to FP7

UK participants were asked whether their FP7 project had produced (or was expected to produce) commercial benefits for their organisation. Out of all survey respondents, over half of respondents (53%) stated that the project would not result in any commercial benefit (other than the FP7 funding for their participation in the project). A further quarter (25%) were unable to say whether any commercial benefits had been realised. In the remaining 22% of cases participants reported that some commercial benefit had been achieved. In most of these cases (63%) the commercial returns came from the direct use of the project results within the participating organisation, but a significant proportion (37%) came from sale or licensing of products or intellectual property developed through the project.

As noted above, universities were the predominant beneficiary of FP7 funding in the UK, and this feature has to be considered when discussing commercial impacts attributed to FP7. It is also worth noting that much of FP7 was focused on basic research. As such, it is not surprising that many participants did not report commercial impacts that could be attributed to FP7.

Industry respondents reported commercial impacts much more frequently. 39% of industry respondents reported commercial impacts from the direct use of project results, 18% reported commercial impacts from sale or licensing of product, 11% of industry respondents reported commercial impacts from sale or licensing of intellectual property. 9% of university respondents reported commercial impacts from the direct use of project results, 2% reported commercial impacts from sale or licensing of product, and 2% of university respondents reported commercial impacts from sale or licensing of intellectual property.

9% of all respondents were able to quantify commercial benefits. On average, €937,368 per project was reported. Taking into account average EU funding and average project costs, this gave an average net gain of €815,000, and an estimated total net gain of around €35 million across the 9% of respondents who detailed commercial benefits.

Impact on additional investments

FP7 participants were asked to report on whether their project resulted in additional investments in new devices or equipment by their organisation, or was expected to do so in future. Of the 475 organisations responding to the survey, 109 (23%) reported that some investment had been made, of which 38 were able to provide some quantification. The remaining respondents indicated either that their project had not resulted in any additional investment (57%) or that they did not know (20%).

The 38 respondents who were able to quantify the investments reported investments of €30.6 million, an average of just over €780,000 per organisation. A wide range of organisation types made investments following participation in FP7. 32% of industry respondents (39 responses), 24% of research institute respondents (12 responses) and 21% of university respondents (63 responses) reported that some investment had been made.

Impact on policy development

Respondents to the online survey were asked whether their project had, or was expected to have, an impact on policy development. Almost 40% stated that their project had exerted an impact on policy, in most cases at European level (24%) but also at international / global level (11%). Only 4% of participants reported that their FP7 project had impacted on policy development at national level. A third of respondents (35%) said that their project had not had an impact on policy and a further quarter (26%) did not know.

Examples of policy impact

"I was invited to take part in the UK-Japan mission of the BIS Technology Strategy Board. The team of five academics and industrialists visited Japanese universities and companies to promote UK robotics and scout Japan for collaboration opportunities. The visit resulted in an advisory document presented to the TSB in November 2011. The recommendations informed a key speech by the Chancellor of the Exchequer, to the Royal Society, which informed the £35 million investment in robotics by the Department for BIS, as part of its investment in the UK's "eight great technologies"

"Influenced EU guidelines for Directives on CO2 storage and Emissions Trading scheme. Fed into practice of operators and National implementation of EU directives"

"Provided evidence to UK policy makers on wheat population performance and potential ways that regulations could be modified that resulted in the council decision 2014/150/EU." [decision on the organisation of a temporary experiment providing for certain derogations for the marketing of populations of the plant species wheat, barley, oats and maize pursuant]

Source: ICF online survey of FP7 participants, February 2016

Additionality of FP7 funding

FP7 provided substantial added value to existing national and European programmes, according to UK participants. Almost all (91%) of the UK participants stated that their projects would *not* have gone ahead without FP7 support.

This represents roughly 41,000 new partnerships between UK and non-UK participants which would not have been established without FP7 funding, and 29,000 future collaborations with non-UK participants that would have not materialised in the absence of FP7 funding.

The majority (75%) of these additional partnerships created helped UK participants to cooperate with world-class organisations, and thereby access scientific and technological expertise, know-how and equipment at the forefront of scientific discovery and knowledge.

These networking impacts contribute to an enhanced set of relationships for UK organisations, based on the addition of newer and more useful partnerships and the cessation of less productive ones.

Five percent of UK participants felt that their projects would have been able to proceed, and achieve similar levels of outputs and impacts, in the absence of FP7 funding. These projects represented €37.8 million of EU funding or 7.4% of the total EU funding secured by survey respondents. This represents a minimum estimate for the deadweight effect of the programme.

Around a third of unsuccessful applicants (34%) undertook similar research activities with other funding in absence of EU funding, though this was generally with more limited project scale, schedule, scope, partnerships and results than initially planned. Only 8% of unsuccessful applicants undertook similar research activities without any

change to project scale, schedule, scope, partnership or results. Only half of the projects which went ahead after an unsuccessful FP7 bid included non-UK partners.

Complementarity of FP7 outcomes with other European programmes

The analysis of FP7, EUREKA and COST suggests that whilst there are some overlaps in terms of the programme objectives, the activities funded and their results and outcomes are largely considered by participants to be complementary, aiming to address different objectives.

FP7 was generally perceived by survey respondents to provide stronger benefits, outputs and impacts relating to the implementation of research, improving knowledge and skills as well as in accessing research infrastructure or equipment than comparator programmes. COST was seen by stakeholders as equally effective or more effective in encouraging the mobility of researchers, supporting career development and the creation of new networks and partnerships, compared to FP7.

EUREKA Eurostars tends to fund activities more relevant to industrial application, and caters to mainly industrial beneficiaries. Eurostars-1, which ran from 2007-2013, was perceived by stakeholders to be more effective in delivering commercial impacts than FP7, and a crude comparison of responses to the FP7 participant online survey and Eurostars project reports confirms this. However this could not be confirmed robustly with the data at hand.

Complementarity of FP7 with national initiatives

When comparing the scope for added value of FP7 compared to national initiatives, the considerations most frequently raised by respondents were project size and networking opportunities. FP7 was largely seen to enable projects with a larger scale and wider scope than could be tackled with UK resources and partners alone. In turn, national programmes were seen to be more easily accessible and projects funded through national schemes were seen to have a lower administrative overhead.

Stakeholders and survey respondents were largely of the view that FP7 was complementary to R&D programmes at the national level. More than half (53%) of survey respondents stated that FP7 had supported topics not addressed by national programmes. Survey respondents indicated that a lack of available funds (54%), a requirement for international collaboration (49%), and the need for a critical mass of resources (41%) were the most common reasons they saw for work being supported at European level rather than at national level.

Feedback on FP7 administration and relevance of national support services

From feedback on administrative and reporting procedures, it can be concluded that successful FP7 participants were generally satisfied with various aspects of the administrative mechanisms and reporting procedures of FP7.

The areas of most satisfaction and least dissatisfaction concern (i) the information provided to applicants about how to apply, (ii) processes for dissemination and exploitation of results, and (iii) evaluation at national and EU level. The greatest levels of dissatisfaction were with monitoring and reporting procedures, contract negotiation procedures, and mechanisms for payment of the EU's financial contribution to the projects.

Whilst participants suggested that the European Commission should continue simplification efforts, these results from the online survey suggest that successful participants were generally satisfied with programme and project management processes.

Unsuccessful applicants were much less positive. They mostly gave negative feedback and emphasised that procedures were too complex and time consuming. Respondents also referred to the lack of transparency and insufficient guidance and feedback by evaluation panels regarding the selection of successful proposal. Some felt that the selection process was biased and not entirely based on merit.

National support services were not used by the majority of stakeholders interviewed and survey respondents – the majority of UK participants reported they used effective in-house support or experienced partner organisations. Where national contact points had been used, their support was useful in understanding FP7, and was deemed critical in around 25% of the applications supported. First-time applicants and applicants without strong in-house support were most likely to need and appreciate help in understanding the programmes themselves, and were likely to need or appreciate help with sorting out the project and consortium arrangements.

1 Introduction and context

This section provides a short summary of the study objectives. It also elaborates the study context by providing a brief description of the EU and UK research actors and activities.

1.1 Scope and objectives of the study

ICF Consulting (ICF) was commissioned in 2015 by the Department for Business, Innovation and Skills (BIS, now restructured since July 2016 as the Department for Business, Energy and Industrial Strategy (BEIS)) to evaluate the added value and effects of UK involvement with the Seventh EU Framework Programme for Research and Development (FP7), COST and EUREKA. The study also reviewed the UK's participation in the EU Horizon 2020 programme (H2020) up to February 2016. A BEIS-managed project steering group oversaw progress of the work and when necessary offered additional information, advice and clarification.

This is the final report of the study. It presents an analysis of the reasons that UK researchers provided for using the programmes under investigation, their success in securing funding and the perceived benefits from their involvement.

The study was commissioned in order to inform the UK's response to the European Commission's interim evaluation of Horizon 2020 and its preparation in due course for the ninth Framework Programme.

The study seeks to provide evidence on the added value and impact of the Framework Programme and other European collaborative/non-collaborative activities (COST and EUREKA) on UK's businesses and research base.

Given the overall objectives, the study followed two main lines of investigation. First, a major data collection and analysis exercise was undertaken to evaluate past and current UK performance in the Framework Programme. Second, complementary fieldwork has been conducted to qualify the performance data collected and understand in detail the pathways of participation and motivations of individual participation groups. This served to provide an understanding of:

- current impact and performance; and
- policy options to maximise participation and impacts.

The report sets out conclusions on the main motivations, nature and effects of involvement in the Framework Programme.

The research was commissioned before the UK referendum on 23rd June 2016. In this referendum, the UK voted to leave the European Union. The Government has made clear it would welcome agreement to continue to collaborate with European partners on major science, research and technology initiatives. As set out in the future partnership paper, "Collaboration on Science and Innovation", published on 6th September 2017, the UK will seek an ambitious Science and Innovation Agreement with the EU.

1.2 Study context

This section provides a brief overview of the context for this study, briefly describing European research and innovation funding, and then describing in similar terms the UK research and innovation system.

1.2.1 European research and innovation landscape

The European research and innovation landscape is multi-layered and complex. The EU and other European initiatives offer funding and support alongside a variety of national funding programmes in individual European countries. Within the EU, some key strategies set the policy context for research and innovation funding:

- European Research Area (ERA) - The ERA was conceptualised as an instrument to integrate research resources and capacity across EU member states, mirroring the single market. The ERA was introduced to support the Lisbon Agenda, which set out the EU's strategic economic development goals (European Council, 2000). The Lisbon Treaty and its amendments established research policy as a shared competence between the European Commission and the member states, reinforcing the community dimension of research policy.
- Europe 2020 and the Innovation Union - The ERA operates alongside the EU's strategic growth agenda. Europe 2020 and the Innovation Union flagship initiative address framework conditions and access to finance to enable exploitation of research and innovation in products and services (EC, 2010). The Europe 2020 strategy includes specific development targets, including a target to spend 3% of the EU's GDP on R&D by 2020. The Innovation Union, announced as one of seven flagship initiatives in the Europe 2020 strategy, is intended to improve the framework conditions for research and innovation in Europe.

1.2.1.1 EU Framework Programmes for research and innovation

The EU's Framework Programme for research and innovation, Horizon 2020 (H2020), is the world's largest multinational programme for research, development and innovation with a budget of €75 billion.[1] It is the latest in a series of seven-year Framework Programmes, succeeding the Seventh Framework Programme for Research (FP7), which ran for the period 2007-2013. Activities eligible for support from the Framework Programme include, amongst others, collaborative research projects covering fundamental research to technology development and large-scale demonstration, as well as researcher mobility (through the Marie Skłodowska-Curie Actions). Specific instruments aim to support fast-growing SMEs and provide portable grants for leading scientists conducting pioneer research (through the European Research Council).

[1] https://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020 [accessed 26th June 2016].

The main focus of the present study is FP7.[2] Compared to the current H2020 programme, FP7 had a relatively greater focus on fundamental research but, in its concluding years, put increasing emphasis on applied research and technological development. Whilst many individual funding instruments of the current programme already existed in FP7, there is a markedly greater emphasis on strong societal and economic impacts alongside excellent research in H2020.

1.2.1.2 Other European initiatives

Besides the EU's Framework Programme, a number of other programmes offer support for research and innovation. European Structural and Investment Funds (ESIF) are designed to support structural and economic development in less developed regions of the EU.[3] Structural Funds may be spent on a range of funding priorities, including research and innovation. There is an increasing focus on coordinating funding between H2020 and ESIF.

A number of other EU funding programmes support research, development and innovation activities indirectly. These include COSME, a programme for small and medium-sized enterprises, Erasmus+, which supports student mobility, the Health programme and the Connecting Europe Facility.

COST is a pan-European intergovernmental framework, consisting of 36 Member Countries and a Cooperating State.[4] COST seeks to strengthen the European Research Area (ERA) by building networks of researchers and enabling them to jointly develop their own ideas and new initiatives across a number of academic domains.

Between 2007 and 2013, COST was funded by FP7. Over the course of this seven-year period, COST was allocated an overall budget of €240 million. Under Horizon 2020, the COST budget has been increased to €300 million to be spent from 2014-2020, largely drawing from two Horizon 2020 work programmes:

- Societal Challenge 6: Europe in a changing world – inclusive, innovative and reflective societies; and
- Spreading Excellence and Widening Participation.

The COST programme mainly supports networking activities such as meetings (e.g. travel, subsistence, and local organiser support), conferences and workshops, short-term scientific exchanges, training schools, as well as publications and dissemination activities. Networks established under COST are large partnerships with around 50 core participants on average (members of management committees), are usually highly interdisciplinary and dominated by academic organisations.

[2] https://ec.europa.eu/research/fp7/index_en.cfm [accessed 26th June 2016].

[3] https://www.gov.uk/european-structural-investment-funds [accessed 26th June 2016].

[4] The 36 COST Member Countries are: Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Montenegro, The Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom and the former Yugoslav Republic of Macedonia. The Cooperating State is: Israel.

Other relevant programmes funded directly by national governments or by a mix of national and EU budgets include:

- EUREKA – EUREKA facilitates market-driven industrial R&D, often at high technology readiness (TRL) levels.[5] This includes in particular collaborative R&D projects (network projects), collaborative R&D projects led by research-performing SMEs (Eurostars programme), industry-led cluster initiatives and capacity building thematic networks (umbrellas).[6] EUREKA is mainly funded by participating countries directly but Eurostars is co-financed from the EU budget.
- Joint Programming Initiatives (JPIs) – the JPIs aims to pool national research efforts to make better use of resources and to tackle European challenges more effectively in key areas. Member states agree voluntarily on so-called strategic research agendas which they then attempt to implement in joint effort.[7]
- ERA NET – ERA-NETs are communication, coordination and networking actions funded through Horizon 2020 to support the preparation, design and implementation of Joint Programme Initiatives.[8]

1.2.2 The UK research context

1.2.2.1 Structure and main actors

Research and Innovation policy is developed at a UK level by the Department for Business, Energy and Industrial Strategy (BEIS).

The UK's academic research base is underpinned by a system of funding that provides funds to institutions in two streams: block grant funding and competitive funding. Together they comprise the Dual Support system. Institutional block grant funding is commonly known as "Quality-Related research funding" (QR). QR is a non-hypothecated funding stream provided by the Higher Education Funding Councils (HEFCs) to universities based primarily on periodic quality assessment exercises. QR provides the basic research infrastructure/capacity which underpins a university's ability to carry out its own research program and research funded by others. Competitive funding awarded by Research Councils, government departments and others funds specific projects and programmes. Competitive funding is won by individual researchers in peer reviewed competition. The Haldane principle states that Government determines the division of funding amongst the Research Councils and overall strategic priorities in consultation with the Research Councils, who in turn

[5] There are different technology readiness scales in application. Throughout this report refers to the European Commission definition: https://en.wikipedia.org/wiki/Technology_readiness_level#European_Commission_definition ; For a more comprehensive discussion see EARTO (2014), The TRL scale as a Research & Innovation policy tool. http://www.earto.eu/fileadmin/content/03_Publications/The_TRL_Scale_as_a_R_I_Policy_Tool_-_EARTO_Recommendations_-_Final.pdf [accessed 26th June 2016].

[6] Cf. EUREKA website http://www.eurekanetwork.org/ ; European Commission (2014), Final Evaluation of Eurostars Joint Programme, http://ec.europa.eu/research/sme-techweb/pdf/ejp_final_report_2014.pdf [accessed 26th June 2016].

[7] http://ec.europa.eu/research/era/joint-programming-documents_en.htm [accessed 26th June 2016].

[8] http://ec.europa.eu/research/era/era-net_en.html [accessed 26th June 2016].

are advised by senior members of their academic communities, and academic experts recommend which projects deserve funding through independent expert peer review.

The Government Office for Science (GO-Science), based within BEIS, plays the lead role in improving the quality of science advice to the UK government, alongside departmental Chief Scientific Advisers. It is headed by the Government's Chief Scientific Adviser (GCSA) who reports directly to the Prime Minister and the Cabinet. The GCSA also co-chairs the independent Prime Minister's Council for Science and Technology (CST), which provides advice to government on cross-cutting science and technology issues.

Innovate UK (formerly the Technology Strategy Board) is the national innovation agency, given responsibility by BEIS for developing and delivering a national strategy for increasing levels of innovation within businesses.

To support the links between excellent research and innovation locally, and to help build a joint understanding with local areas of the UK's potential for global competitive advantage, the Government has launched Science & Innovation Audits.

While the role of universities in publicly-funded research is very prominent in the UK, it is less so in other EU countries such as Germany, where a more substantial part of government-funded research is conducted by non-university institutes and universities of applied sciences. Germany, with the largest research & innovation system in Europe, counts more than 800 publicly funded research institutions as opposed to 29 research institutes funded directly by the UK government.[9,10]

1.2.2.2 Trends in the UK researcher population

Overall growth of the UK's researcher population has been modest at 8% between 2007 and 2014, below the overall growth trend in Europe (21%), Germany (22%) and the United States (12%). It is interesting to note that between 2007 and 2014, the number of researchers in the higher education sector grew by only 5% in the UK (as compared to 16% in EU28 and 37% in Germany), whilst the number of researchers in the business enterprise sector grew by 17% (as compared to 27% in EU28 and 14% in Germany).[11]

Apart from the total researcher population, looking at the number of PhD graduates can provide an understanding of supply in talent and research capacity. In 2012, the UK was the second largest producer of PhD graduates in the EU (behind Germany), and the fourth largest in the world (behind the US, China and Germany).[12]

A further element contributing to the UK's strong research base is its international mobility. A recent report by Elsevier analysed the mobility of UK researchers based

[9] Considering scientific research institutes funded directly by UK government departments or UK Research Councils. See Cunningham (2015), Research and Innovation Observatory, Country Report United Kingdom 2014.
[10] Sofka (2015), Research and Innovation Observatory Country Report Germany 2014.
[11] Eurostat Total R&D personnel by sectors of performance, occupation and sex [rd_p_persocc].
[12] Eurostat Graduation from tertiary education (ISCED 1997) by sex, level and field of education [hrst_fl_tegrad].

on their publication patterns.[13] The report concluded that up to 72% of UK researchers who have published in peer-reviewed journals between 1996 and 2012 have published whilst affiliated to a non-UK institution during this period. The UK had a much lower proportion of researchers who remained 'sedentary' during this period, at 28% compared to Germany (36%), France (37%) and the US (47%).

During the same time, the UK recorded a total net outflow of researchers of 3.3% between 1996-2012 – compared to a net outflow of 2.6% in Germany and a net outflow of 1.8% for the US. The most prominent recipient countries of UK researchers were the US, Australia, Canada, Germany and Ireland, whilst the most prominent countries supplying researchers to the UK were the US, Germany, Australia, France and Italy.

Overall, these figures suggest that the UK's research base is a critical component of Europe's research capacity. While the UK's higher education sector remains the largest in Europe, growth of the UK's research base in recent years has been driven by the business enterprise sector. The data also show that the UK has a strong domestic supply of PhD graduates, however the fact that mobility is an important component of researcher careers makes it difficult to ascertain how much new graduates contribute to research outputs and the overall research performance of the UK. The UK's researcher population is also much more mobile and reliant on international collaboration than that of comparator countries, when measured by institutional affiliation and publications in peer reviewed journals.[14]

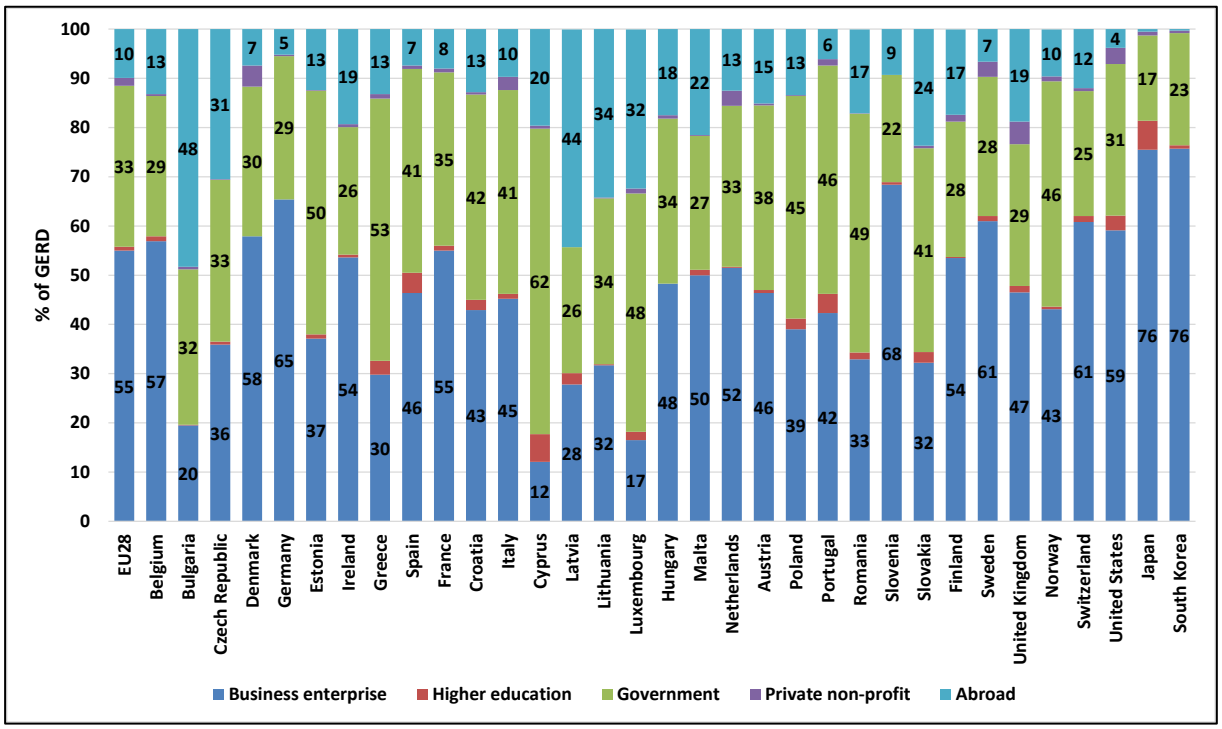
1.2.2.3 Sources of funding for R&D investment

The most important sources of funding for R&D investment in the UK are the business enterprise sector (47% of total expenditure in 2014) and government sources (29% of total expenditure in 2014).

In 2014, the relative investments by the business enterprise sector in the UK were below the EU-28 average (55%) and substantially below that of competitor regions such as the United States (59%) or South Korea (76%). Slovenia (68%), Germany (65%) and Sweden (61%) are the EU member states with the highest proportion of business enterprise investment in R&D. Figure 1.1 provides an overview of the sources of funding as a share of Gross Expenditure on R&D (GERD), for all EU member states and a selection of competitor regions in 2014.

[13] Elsevier (2014), International Comparative Performance of the UK Research Base – 2013.
[14] Ibid.

Figure 1.1 Gross Expenditure on R&D by source of funds, EU-28, Norway, Switzerland, United States, Japan and South Korea, 2014 or latest available year (%)



Source: Eurostat

Compared to other EU countries such as Germany (7% in 2014) or France (8% in 2014), the UK tends to make use of overseas funding sources to a much higher extent (19% in 2014). FP7 was also a more important funding source in the UK compared to other EU member states. Over the period 2007-2013, FP7 funding constituted 3.1% of the UK's overall R&D investment but made up less than 2% of the total in France (1.7%) and Germany (1.4%).[15] FP7 was particularly significant for the UK's higher education sector, where it represented 7.2% of total investments in HE R&D between 2007 and 2013.[16]

Funding for R&D performed in the higher education sector came mainly from Higher Education Funding Councils and similar bodies (30%) and from the Research Councils (27%). While only 6% came from government directly, 15% originated both from the private, non-profit sector (charities) and overseas sources (of which €750 million came from EU sources).[17]

1.2.2.4 Performers of R&D in the UK

The largest performers of research in the UK are the business enterprise sector and the higher education sector – the UK does not have a large presence of research organisations, which account for a large proportion of applied and fundamental

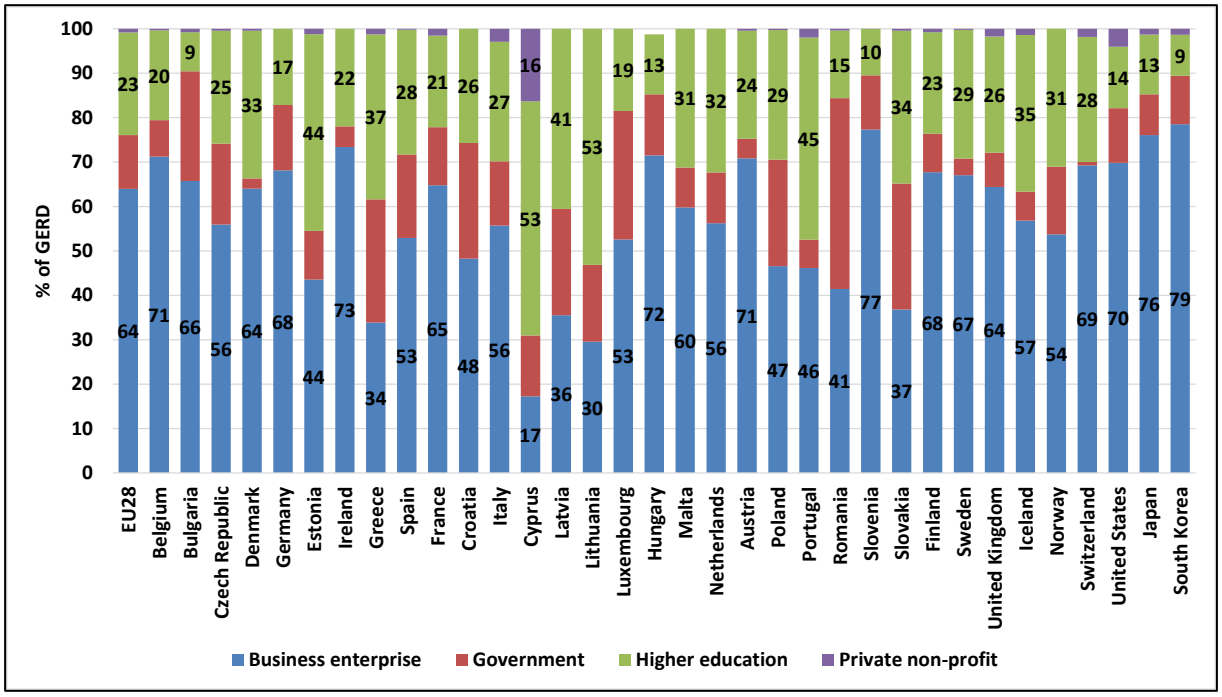
[15] Based on Eurostat [rd_e_gerdtot] and CORDA data on EU funding committed to projects during this period.

[16] Based on Eurostat [rd_e_gerdtot] and CORDA data on FP7 funding committed to UK HE during this period. It should be noted that other EU sources of R&D funding, such as the European Structural funds, are not included in this figure.

[17] Office for National Statistics, research and development expenditure 2007-2014.

research in most other EU member states. Figure 1.2 provides a comparison of total R&D expenditure between the UK, other EU-28 member states and international competitors in 2014.

Figure 1.2 Gross Expenditure on R&D by sector of performance, EU-28, Norway, Switzerland, United States, Japan and South Korea, 2014 or latest available year (%)



Source: Eurostat (data for Hungary does not cover private non-profit sectors).

Figure 1.2 shows that in 2014, the largest performers of research in the UK were the Business Enterprise (64%) and the Higher Education (HE) (26%) sectors, continuing a trend visible throughout recent years. In Germany the government sector is more important than in the UK (15% compared to 8% in the UK), demonstrating the significance of its public research institutes. However, a large share of R&D performed by the HE sector is funded by government.

1.2.2.5 Investment levels in R&D

The UK's research and innovation system is characterised by a relatively low overall investment in R&D, compared to other EU member states. From 2007-2014, the UK invested on average 1.7% of its GDP in R&D - the UK ranked 11th out of all EU member states and below the EU average, behind countries such as Germany (2.7% on average) and France (2.2% on average). In terms of total investments in R&D, the UK came 3rd behind Germany and France, with a total investment of €265 billion in the period 2007-2014.[18]

Between 2007 and 2014, annual UK gross expenditure on R&D (GERD) was on average €33 billion (around 13% of average EU GERD during this period). The ratio

[18] Eurostat t2020_20.

of UK GERD to GDP has remained broadly steady since 2007, oscillating around 1.7% and peaking at 1.75% in 2009.

Business enterprise sector R&D

The business enterprise sector was the largest investor in research and development (BERD) between 2007 and 2014, providing 73% of the total investments. From 2007-2014, annual UK BERD was on average €21 billion, contributing about 13% of overall EU BERD. UK's GERD and BERD tend to be low in international comparison, and compared to that of other large EU member states such as France and Germany. The UK has seen a steady increase in R&D expenditure by foreign-owned businesses – in 2013, this stood at 50%, up from 39% in 2007.[19]

In 2014 the business enterprise sector accounted for €24.7 billion of R&D investments, 65% of the total R&D expenditure in the UK. The largest product areas of investment were pharmaceuticals (€4.8 billion), computer programming and information service activities (€3 billion), motor vehicles and parts (€2.9 billion), aerospace (€2.1 billion), miscellaneous business activities and testing (€1.7 billion), machinery and equipment (€1.2 billion) and telecommunications (€1.2 billion).[20] In comparison, Germany recorded the largest total business enterprise R&D expenditure of all EU member states with €53.6 billion, dominated by its large automotive industry (€17.4 billion), machinery and equipment (€5.4 billion), aerospace (€3.9 billion) and pharmaceuticals (€4.1 billion).[21]

In terms of relative R&D investments by product group since 2007, pharmaceuticals has been the dominant area of investment (representing 20% of all investments in 2014) in the UK, however the relative share accounted for by this product group declined over the period (from 25% in 2007). The proportion of investment in telecommunications, machinery and equipment, and aerospace also decreased in the period 2007-2014. However, there have been strong relative increases over the same period in motor vehicles and parts research (rising from 6% to 12%), miscellaneous business activities (from 3% to 7%) and in R&D services (from 1% to 4%).

Furthermore, UK businesses invest a large share of their overall R&D expenditure in service sectors when compared with other major EU countries – in 2014 this represented 57% of the overall business enterprise investment in R&D, compared to 13% in Germany and 46% in France.[22] This is largely accounted for by the relatively small role of the manufacturing sector in the UK and the larger role of manufacturing in Germany. In the UK, manufacturing accounted for around 10% of overall value added in the economy in 2014 – compared to 23% in Germany and 11% in France.[23]

[19] Office for National Statistics, research and development expenditure 2007-2014; Eurostat rd_e_berdfundr2.
[20] Office for National Statistics, business research and development 2014.
[21] Eurostat rd_e_berdfundr2.
[22] Eurostat, Business enterprise R&D expenditure (BERD) by economic activity (NACE Rev. 2) [rd_e_berdindr2].
[23] World Bank, national accounts data – manufacturing, value added as % of GDP.

1.2.2.6 Output and performance of the UK research and innovation system

Research and innovation performance is measured across a range of metrics such as citation impact, intellectual assets, linkages and entrepreneurship, as well as commercial and wider economic impacts.

Research outputs

Overall, the UK performs very strongly in terms of research output, courtesy of an internationally renowned and highly productive higher education sector.

The UK's research base is active in all major subject areas, with some change in focus noticeable. From 2002 to 2012, there has been an increase in the number of peer-reviewed articles published by UK researchers in clinical sciences, health & medical sciences and humanities, social sciences and business studies. UK research output measured by the number of peer-reviewed articles published decreased during the same period in biological sciences, environmental sciences, mathematics, physical sciences and engineering.[24] Whilst a stronger focus on articles in business studies can be observed as well in other countries, Germany and France at the same time largely maintained a focus on physical sciences and mathematics.

In terms of total numbers of citations, articles by UK researchers represented 11.6% of global citations in 2012, and 28% of all EU27 articles cited during this year. This demonstrates that on aggregate, the quality and importance of UK research was a major force within the EU and on a global scale. It is also interesting to note that the UK's citation share rose more quickly than that of all EU member states (a growth of 1.5% compared to 1.13% for EU27 between 2008 and 2012).

Furthermore, the UK's share of the top 1% of the most highly cited articles is high (at 15.9% in 2012) and rising (up from 15% in 2008).

The UK's field-weighted citation impact[25] in terms of peer-reviewed publication is high in all major research fields and, on an aggregate level, overtook the US during the period 2008-2012. The UK's field-weighted citation impact is particularly high in mathematics, physical sciences and engineering. Germany performs comparably strong across the board, whilst France has strong impacts in environmental sciences, clinical sciences and biological sciences offset by low impact in the health & medical sciences, humanities and social sciences fields.[26]

In addition, the UK shows strong performance in public-private co-publications, pointing to a high level of collaboration between the public sector and industry.[27] The EU's Innovation Union Scoreboard placed the UK's research system well above the EU28 average and highlighted in particular the UK strong performance in terms of international scientific co-publications – the UK scores almost three times higher than the EU28 average in 2015.

[24] Elsevier (2013), International Comparative Performance of the UK Research Base – 2013.

[25] Field weighted citation impact is an indicator accounting for the mean citation impact in a subject area, normalised by its expected citation impact according to the type of document, the publication year and the subject area.

[26] Elsevier (2013), International Comparative Performance of the UK Research Base – 2013.

[27] Ibid.

Innovation outputs

Innovation outputs provide an approximation of the economic and social impact of R&D activities. However, serious challenges exist in measuring the full extent of innovations realised through investment in R&D.[28]

As seen above, the UK's business enterprise investment in R&D as a share of GDP has been below the EU average throughout recent years. A number of benchmarking studies[29], as well as the European Commission's Innovation Union Scoreboard, provide an overview of the UK's strengths and weaknesses as regards its innovation outputs. Whilst methodologies and data sources differ, a number of high level conclusions have been identified across all recent work.

The UK scores well in exporting medium and high-tech products and knowledge-intensive services, the level of collaboration among innovative SMEs, entrepreneurship and start-up support, but sees a relatively high share of firms which do not engage in innovation activities and a relatively low share of patent applications and other intellectual assets.

Recent work has also identified a strong positive relationship between innovation, exporting and business performance – highlighting the critical role of international collaboration for the UK's innovation performance and overall success of UK businesses.[30]

1.2.2.7 Productivity

The UK is a highly productive research nation in terms of its publication output and impact. The UK represented 13% of the EU's total investment in R&D, 16% of the EU's researcher population between 2007 and 2012, but accounted for 28% of the worldwide citations of Europe's articles in 2012, and represented 35% of Europe's share in the world's most highly cited articles in 2012. The UK's field weighted citation impact was 1.61 in 2012, higher than that of the US, Germany, France and the EU27 average of 1.28.[31] However, the UK lags behind other EU member states and global competitors in in terms of firms introducing new products to the market,

[28] Challenges in measuring benefits and impacts of R&D funding programmes include issues of attribution, deadweight, additionality and timing problems. For a more detailed discussions of some of these points see e.g. European Court of Auditors (2007), Special Report No 9/2007 concerning 'Evaluating the EU Research and Technological Development (RTD) Framework Programmes — could the Commission's approach be improved?' Underlying theory also often assumes a linear process of technological development and innovation, whilst many observable breakthrough are the result of an iterative process and exposed to a complex set of framework conditions – hence making attribution of an observed event to a specific funding programme difficult.

[29] E.g. Department for Business, Innovation and Skills (2014), Insights from international benchmarking of the UK science and innovation system. BIS Analysis Paper Number 03; World Economic Forum (2013), Global Competitiveness Report, 2013-14; BIS (2014) Innovation Report 2014. Innovation, Research and Growth.

[30] BIS (2014), UK Innovation Survey: Highly Innovative Firms and Growth, and Love & Roper (2013), SME Innovation, Exporting, and Growth, Enterprise Research Centre.

[31] Normalised against a global average of 1 - Elsevier (2014), International Comparative Performance of the UK Research Base – 2013; Cunningham (2015) RIO Country Report United Kingdom 2014; Elsevier & Science Europe (2013), Comparative Benchmarking of European and US Research Collaboration and Researcher Mobility.

and has a limited role in contributing to disruptive technologies in terms of patenting.[32]

Past research has suggested that relative increases observed in the UK's research productivity have been alongside an increase in the UK's international research collaborations – and may be associated with the UK's focus on international collaboration with higher citation impact.[33]

1.2.3 Summary of features of the study context

This brief review suggests that:

- The European context is complex and multi-layered, with a wide selection of funding programmes catering to different research-performing actors. Within EU programmes, there has been an increased focus on economic and societal impacts in recent years.
- The UK has some unique features in comparison with the average EU research base profile. This is characterised by relatively low overall investments in R&D, a substantially larger role of universities, strong human capital, and an associated very high impact on the UK's research outputs.
- The role of business-driven research and innovation performance in the UK is somewhat smaller than in the EU overall and other large economies such as France and Germany. Business led research has some significant strengths, for instance in supporting exports of high-tech products, but some persistent weaknesses, especially the high proportion of businesses which do not invest in research and innovation.
- The UK also shows a marked difference in terms of its main areas of research, when compared to Germany and (less so) with France.

These aggregate findings provide the context for the results of the study fieldwork, presented in sections 3 - 6, as well as the study conclusions.

[32] OECD (2015), OECD Science, Technology and Industry Scoreboard 2015, UK country note. http://www.oecd.org/sti/UK-CN-EN-Scoreboard.pdf [accessed 20th October 2016].]
[33] Ibid.

1.3 Structure of this Report

The remainder of this report is structured as follows:

- Section 2 provides an overview of the method of approach for the study.
- Section 3 describes participation and performance of the UK in the FP7 programme as well as in successive Framework Programmes (including Horizon 2020 up to February 2016). It includes an overview of UK's participation in COST and EUREKA.
- Section 4 summarises the outputs, outcomes and impacts of FP7 participation as reported by UK participants. The section also discusses perceived benefits and impacts of participation in COST and EUREKA.
- Section 5 discusses the complementarity and additionality of EU Framework Programmes and other European initiatives.
- Section 6 presents feedback from UK participants on administration and proposals for improvement of the EU Framework Programmes.
- Section 7 presents the conclusions from the research.

The report contains the following Annexes:

- Annex 1: UK performance in FP7 – data tables and detailed analysis;
- Annex 2: UK performance in Horizon 2020 – first evidence from 2014-16; and
- Annex 3: Case studies.

2 Method of approach

This section provides a description of the study methodology. This includes a description of the programme logic and a description of the primary research undertaken.

2.1 Meeting the study objectives

The study objectives are summarised below with a description of how these were addressed by the method of approach, and the main sources of evidence (Table 2.1).

Table 2.1 Study objectives and sources of evidence

Study objectives	Key research questions	Sources of evidence
To evaluate the pathways and mechanisms that affect UK R&D communities' interaction with FP7, COST and EUREKA.	■ Barriers and enablers to participation, including whether these programmes are reaching the right people	■ UK performance analysis / CORDA[34] data, Online surveys, interview programme, case studies, literature review
	■ Specific decision processes businesses go through in deciding whether to participate in national or European collaborative programmes	■ Online surveys, interview programme
	■ UK applicant motivations, and whether these affected perceptions of barriers & benefits	■ Online surveys, case studies, literature review
	■ Evidence of formal or informal linkages following collaboration	■ Online surveys, case studies
	■ Preferences for specific instruments and the reasons for those preferences (including EUREKA and COST)	■ Online surveys, interview programme, analysis of EUREKA programme data, literature review
	■ Evidence of the impact of national support services on applicants	■ Online surveys
	■ Impact of national strategies and programmes on applicants behaviour	■ Online surveys, interview programme

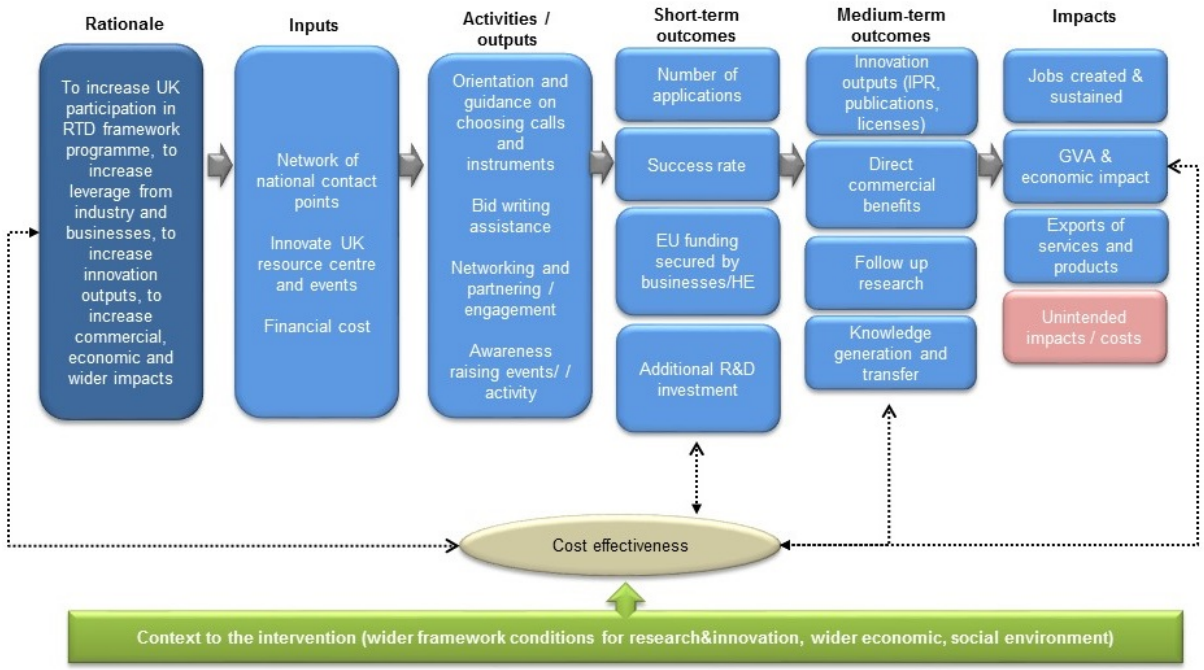
[34] CORDA (Common Research Data Warehouse) is the European Commission's database containing data on applicants/proposals and signed grants/beneficiaries of the EU's Framework Programmes.

Study objectives	Key research questions	Sources of evidence
To evaluate UK performance relating to FP7, the first years of Horizon 2020, COST and EUREKA, and develop a range of success measures	■ Success rate of UK applicants for FP7 funding (incl. comparator countries – all member states and associated countries) ■ Levels of funding awarded to UK participants (incl. comparator countries – all member states and associated countries)	■ UK Performance analysis / CORDA data
	■ Volume and type of collaborations arising from programme funding ■ Typology of successfully funded projects and unsuccessfully funded projects	■ UK Performance analysis / CORDA data
To evaluate the impacts of UK engagement with the programmes (principally FP7).	■ Benefits of participation for applicants ■ Outcomes of collaborations, with respect to different types of collaborations, and how those compared with what participants were expecting – what outcomes provided most value? ■ Impacts arising from research involving UK participants ■ Leveraged additional funding arising from successfully funded projects ■ Assess the additionality of research funding	■ Online surveys, interview programme, case studies, UK Performance analysis / CORDA data
	■ Innovation outputs and scientific outputs ■ Wider economic and social impacts (GVA, jobs, exports of services and products)	■ Frequency of outputs and wider impacts reported through online surveys

2.2 Intervention Logic – BEIS support to Framework Programme participation

Figure 2.1 (below) sets out a basic intervention logic for BEIS support activities to secure greater value to the UK from Framework Programme participation, reflecting the general process through which research performance might generate outputs, outcomes and longer-term commercial and economic impacts.

Figure 2.1 Intervention logic – BEIS support to Framework Programme participation



2.3 Study methodology

The study methodology comprised a number of research activities summarised below.

2.3.1 Literature review

An in-depth literature review of academic research and previous impact assessments was conducted to help frame the approach and the design of individual research instruments used in the study. The review examined in particular:

- the main types of outputs, outcomes and impacts from R&D funding programmes with a focus on the links between R&D and commercial impacts;
- the approaches used to estimate the nature and size of these impacts (including the comparison of impacts across different groups, such as non-participants) and the information sources used;
- the high-level findings on impacts; and
- the main limitations of these approaches.

2.3.2 Composition analysis

A full analysis of the CORDA database relating to the Sixth Framework Programme 2002-2006 (FP6), the Seventh Framework Programme 2007-2013 (FP7) and Horizon 2020[35] proposals, participations in proposals, projects and participations in projects was carried out. The analysis was organised into four main components, as described in Table 2.2 below – the results of this analysis are presented in Section 3. Annex 1 provides data tables of the analysis performed on FP7 programme data.

Table 2.2 Approach to the data analysis

Component	Performance and impact metrics	Strata
Analysis of demand for participation (applications)	■ Total number of UK applicants, average number of UK applicants, number of proposals with UK applicants, total EU funding requested, average EU funding requested	■ Subject area, Specific programmes, calls for proposals; Funding instrument; Applicant/participant organisational type; Location of applicant/participant (NUTS)[36]; Demographics such as gender; Technology Readiness Level (TRL) of calls – basic or applied research, country level (UK and
Analysis of projects and participants	■ Total number of UK participants, average number of UK participants, number of projects with UK participants, total EU funding awarded, average EU funding awarded, total cost of projects funded, average costs of projects funded ■ Top collaborative links (i.e. highest number of collaborations on aggregate and disaggregated level, top collaborating countries)	

[35] Horizon 2020 is a running programme - only proposals and signed grant agreements up to February 2016 were included in the analysis.

[36] Nomenclature of Territorial Units for Statistics. NUTS is a hierarchical classification of spatial units used for statistical production across the European Union.

Component	Performance and impact metrics	Strata
Analysis of success rates	■ Success rate by proposals/projects, applicants/participants, EU funding requested/awarded	innovation leaders/innovation followers as per Innovation Union Scoreboard)

In addition to unadjusted performance, UK performance was calculated with reference to scale factors such as the size of the UK economy, research base, public and private investments in R&D in order to illustrate how the UK performs relative to other countries. Available data from the COST and EUREKA programmes was also assessed using the framework outlined in Table 2.2.

2.3.3 Online surveys

Two online surveys were conducted. One survey was directed at UK participants in FP7. A second survey was directed at unsuccessful UK applicants to FP7. The online survey of FP7 participants investigated the following areas:

- Basic information on the respondent, covering type of organisation, number of proposals and participations, and thematic / research focus;
- The relevance of RTD framework thematic areas, calls and instruments, and the extent to which these align with the capabilities of the respondents;
- Motives and drivers for participation;
- Outputs and outcomes realised as a result of participation;
- The costs and benefits of participation, and the main reasons underlying high / low cost benefit ratios;
- The wider, long-term impacts of FP7 for participants;
- The extent to which FP7 has helped to broker new partnerships, particularly between industry and academia and the extent to which these new relationships endure beyond the project activity; and
- The relative advantages and disadvantages of FP7 over other European funding programmes such as EUREKA and COST.

The online survey of unsuccessful FP7 applicants examined:

- Whether the planned research was carried out in the absence of FP7 funding, and if yes whether and what type of other external funding was used;
- Whether the projects underwent changes in terms of their content, structure or partnership in order to continue in the absence of FP7 funding; and
- The outcomes realised in the absence of FP7 funding.

Table 2.3 presents an overview of survey populations and responses.

Table 2.3 Overview of survey population and responses

	FP7 participants	FP7 unsuccessful applicants[37]
Contact database (individual contacts)	10,269	33,199
Number of contacts in pilot survey	200	1,000
Number of valid contacts for main survey	7,573	24,323
Number of responses	488	735
Number of valid responses	475	643
Response rate (%)	6.4%	2.6%
Confidence interval[38]	4.39	3.83
Number of FP7 projects covered	453	-
EU funding awarded to FP7 projects covered in survey responses (€m)	590	-

2.3.4 Interview programme

The study included an interview programme, comprising 46 semi-structured interviews with a representative selection of relevant policy leads and programme managers in UK government, UK research funding organisations and from relevant European programmes.

This included people in BEIS, Innovate UK, the UK Research Office (UKRO), Universities UK and Research Councils UK. Further interviews were carried out at a later stage including the COST office, as well as contacts in the UK Research Councils and Catapults focussing on specific thematic areas of research.

Interviews were also undertaken with:

- businesses who participated in FP7 and in EUREKA/Innovate UK projects; and
- businesses who did not apply for FP7 but participated in EUREKA/Innovate UK projects.

These interviews investigated the motivations and pathways behind non-participation of UK firms which could have benefited from participation in the EU Framework Programmes and their comparative assessment of different European and national funding options (FP7, EUREKA, Innovate UK).

[37] Those who incorrectly selected the survey for unsuccessful applicants were redirected to the survey of successful participants.
[38] Confidence level of 95%, assuming even split of responses (e.g. 50% yes, 50% no).

2.3.5 Case studies to illustrate the reasons for applications to and effects of participation in FP7

A long list of candidate projects was provided by the steering group. Five case studies were selected, interviews with participants undertaken and written up. Interviews focused on the motivation and the experience of participating in FP7 projects, and examining the wider outcomes and impacts of these projects.

The case studies followed a standard reporting template to permit some degree of synthesis and aggregation. The case studies were written up based on CORDA programme data available and interviews with UK participants in these projects, as well as interviews with project coordinators.

The projects proposed by the Steering Group for the case study work were mainly ongoing at the time of the research. Case studies selected comprise a mix of finished FP7 projects with impacts reported and ongoing FP7 projects that are close to completion and have already produced impacts, or have strong potential for impacts. All case studies are presented in Annex 3.

2.4 Limitations to the work – issues and problems encountered

This section provides an overview of the main issues and problems encountered, and how the study mitigated these.

2.4.1 Data on outputs from FP7 projects

The study team hoped to conduct an analysis of outputs reported by completed FP7 projects to the European Commission. However, confidentiality restrictions currently in place prevent the European Commission from releasing final reporting data to outside parties. As a next best alternative, FP7 participants were asked to report on the outputs produced in the online surveys. However the picture is less complete than if output data held by the European Commission had been available.

2.4.2 Contact details of FP7 participants

Data available to the study team contained only administrative contacts for FP7 participating organisations. As the online surveys were targeted at individual researchers who have either participated in FP7 or unsuccessfully applied to FP7 funding, this presented a major challenge to the study design. The study team mitigated the issue of missing contacts by asking administrative contacts to forward the survey questionnaire to relevant principal investigators / lead researchers. During the survey analysis, duplicate entries (responses from the same organisation covering the same project) were removed. However, uncertainty on the sample population of individual researchers who have either participated in FP7 or unsuccessfully applied to FP7 funding remained.

2.4.3 Contact details of FP7 unsuccessful applicants

The CORDA data available on FP7 applicants was less structured and less complete than the data provided on FP7 project participants. This meant that the study team was less certain of the characteristics of the contacts included in the list. Around 27% of the contacts of unsuccessful applicants provided were either invalid or not in use anymore. Overall, this meant that the contact database compiled and used for the online survey of unsuccessful applicants provided only a rough approximation of the sampling frame, and should not be taken as a complete and comprehensive population of unsuccessful applicants.

2.4.4 Comparison with COST and EUREKA

Aggregate statistics of the UK's participation in COST have been provided by the COST Association. Furthermore, disaggregated data was made available by the EUREKA secretariat. However given the differences in programme rationale and programme implementation, the data provided was in principle not comparable to the FP7 participation data provided through CORDA. Furthermore, out of the EUREKA programmes Eurostars-1, which ran calls for proposals from 2008-2013, provided the most comprehensive picture on project results and impacts, therefore the analysis of EUREKA programmes is limited to EUREKA Eurostars-1.

3 UK participation and performance in EU research programmes

Section 3.1 presents a summary of the overall levels of participation and funding secured by UK organisations and research individuals within FP7. Section 3.2 provides a comparative analysis of UK performance across successive Framework Programmes - FP6, FP7 and Horizon 2020. Both sections are based on analysis of the European Commission's CORDA database. Sections 0 and 3.4 review UK performance in COST and EUREKA and factors influencing participation.

Note: The analysis of FP7 and Horizon 2020 presented here is based on data exported from CORDA in September 2015 and February 2016. Both the FP7 data and Horizon 2020 data have undergone further updates since the data was extracted.

3.1 UK participation and performance in FP7

3.1.1 UK participation in FP7 versus key comparator countries

This section presents a summary of the overall levels of participation and funding secured by UK organisations and individual researchers within FP7. Results for the UK are compared with the average levels of participation and funding achieved across all the EU27 member states (the FP7 average) and with the results for five selected countries: Germany, France, Sweden, Denmark and Finland. These countries were chosen either because they are classified as Innovation leaders in the Innovation Union Scoreboard or because they have a significant importance in FP7. Together with the UK, these countries represent half (50%) of the total EU funding allocated by FP7.

More information and full tables on the UK's performance in FP7 are provided in Annex 1.

3.1.1.1 Overall participation in FP7 by UK organisations

The UK achieved a very substantial participation in, and funding from, FP7:

- The UK had the greatest share of applications submitted to FP7, being present in almost 53,000 proposals (33% of all proposals), making up 12% of participations in proposals, and accounting for 13% of the EU funding requests.
- The UK participated in 10,372 projects (41% of the total). A total of 17,695 UK participations (13% of all participations)[39] collectively secured funding of some €7 billion (15.4% of the total awarded).

[39] A total of 2,909 discrete organisations from the UK participated in FP7 (10% of all organisations involved).

- The UK achieved the highest level of representation in FP7 projects out of all countries and achieved the second greatest share of participations and EU funding behind Germany, which had the greatest share in absolute terms.

Table 3.1 summarises the levels of demand (number of proposals, participations in proposals, and the amount of EU funding requested) and actual involvement rates, overall and for the UK and selected countries.

Table 3.1 Total FP7 applications and grant awards for the UK and other selected countries

	FP7 total (all countries)	UK total in FP7	UK share in FP7	Germany share in FP7	France share in FP7	Sweden share in FP7	Denmark share in FP7	Finland share in FP7
Applications								
Proposals	158,609	52,696	33.2%	28.5%	21.4%	9.6%	5.9%	6.1%
Participations in proposals	656,732	80,050	12.2%	11.9%	7.9%	3.1%	1.8%	2.0%
Funding requested (€m)	303,196	38,649	12.7%	12.4%	7.4%	3.7%	2.3%	2.2%
Awards								
Projects	25,282	10,372	41.0%	34.8%	28.5%	12.2%	8.0%	7.1%
Participations in projects	134,737	17,695	13.1%	13.5%	9.4%	3.4%	2.1%	2.0%
Funding allocated (€m)	45,335	7,002	15.4%	15.8%	11.5%	3.8%	2.4%	1.9%

Source: ICF CORDA analysis

3.1.1.2 Rates of success in competitions

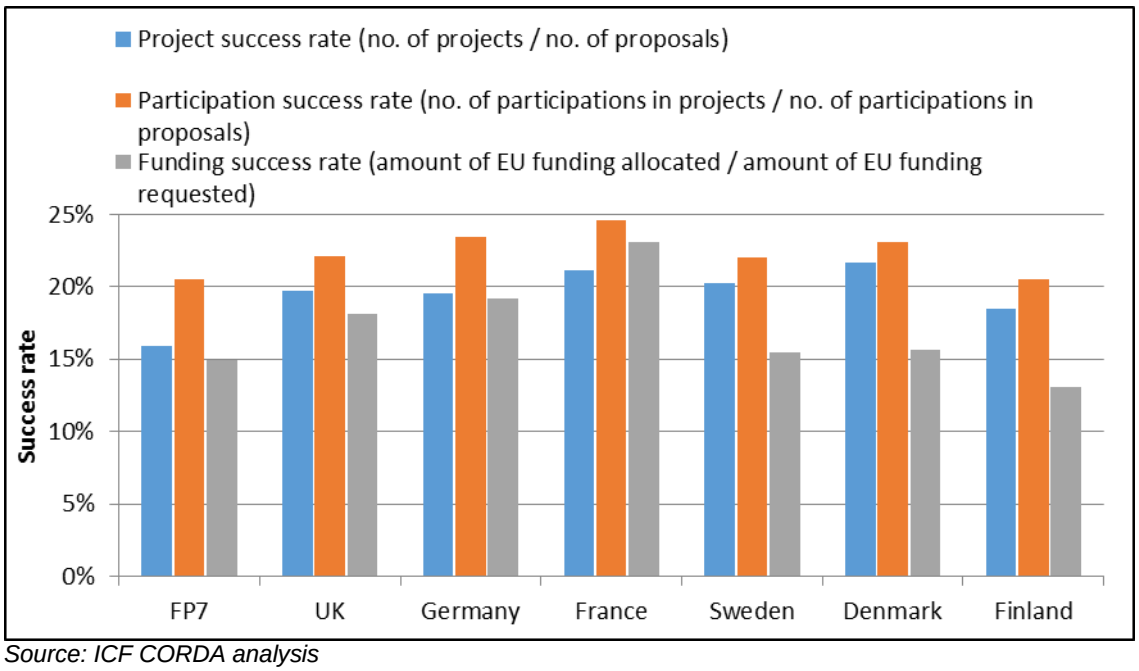
Figure 3.1 below shows three types of success rate to show how the number of projects, participations and funding achieved in competitions compares with what was bid for and shows these for FP7 overall, for the UK and for selected comparator countries. Figure 3.1 shows that the UK achieved higher than average FP7 success rates, but was not leading, against these specific measures.

Overall, the UK performance was strong: the UK project and funding success rates in competitions were more than three percentage points higher than the FP7 averages (20% versus 16%, and 18% versus 15% respectively), while participation success rates for the UK were more than 1.5 percentage points higher than the FP7 average for all participating countries.

However, the UK's success rates in competitions, compared to what was bid for, were below those of the comparator countries in most cases. Compared to the UK:

- France, Sweden and Denmark achieved a project success rate slightly higher than the UK, but the UK outperformed Germany and Finland.
- Germany, France and Denmark achieved participation success rates higher than the UK, but the UK achieved higher success rates than Sweden and Finland.
- Germany and France achieved higher funding success rates than the UK, but the UK outperformed Sweden, Denmark and Finland.

Figure 3.1 Rates of success in competitions for the UK and other countries



Source: ICF CORDA analysis

3.1.1.3 Levels of EU funding secured, adjusted for scale factors

As outlined above, in total the UK secured EU funding of some €7 billion (15.4% of the total awarded) in FP7, compared to €7.2 billion secured by Germany and €5.2 billion secured by France. Smaller comparator countries secured lower nominal amounts: Sweden secured €1.7 billion, Denmark secured €1.1 billion and Finland €877 million of EU funding.

Putting this nominal level of EU funding into context is an important performance metric for member states, as achieving a share of the available funding that is greater than the share of GDP indicates strong relative participation. Similarly, achieving a high share of funding having adjusted for other relevant factors such as national R&D investment or FTE researchers can also provide a more accurate picture of true performance.

There was a very strong overall performance by the UK in terms of the amount of EU funding secured when compared to other EU27 member states, after adjusting for GDP, Gross Expenditure on R&D (GERD), Government Expenditure on R&D (GOVERD) and the number of FTE researchers.[40]

The UK's funding was above what might have been expected using GDP as a variable of normalisation (+16%). The UK was 11th out of the EU27 in terms of the amount of EU funding adjusting for the levels of GDP of member states.

The UK's funding was substantially above what might have been expected using the level of UK GERD as a variable of normalisation (+34%). The UK was 14th out of the

[40] Normalising EU funding won by the above measures tends to make smaller countries perform better, hence these results highlight the strong relative performance of the UK. Data used is from Eurostat: Eurostat tec00001, Eurostat [rd_e_fundgerd], Eurostat t2020_20, Eurostat [rd_p_persocc].

EU27 in terms of amount of EU funding adjusting for the R&D expenditure by government (GERD).

The UK's funding was substantially above what might have been expected using the level of UK GOVERD as a variable of normalisation (+47%). The UK was 10th out of the EU27 in terms of amount of EU funding adjusting for the R&D expenditure by government (GOVERD).

The UK's funding was above what might have been expected adjusting for the number of FTE researchers as a variable of normalisation (+24%). The UK was 7th out of the EU27 in terms of the amount of EU funding adjusting for the number of FTE researchers.

In comparison with the selected comparator countries (Figure 3.2), the UK has performed very well overall. It is the only country under consideration to have achieved a funding share higher than expected when all of GDP, GERD, GOVERD and number of FTE researchers have been taken into account[41].

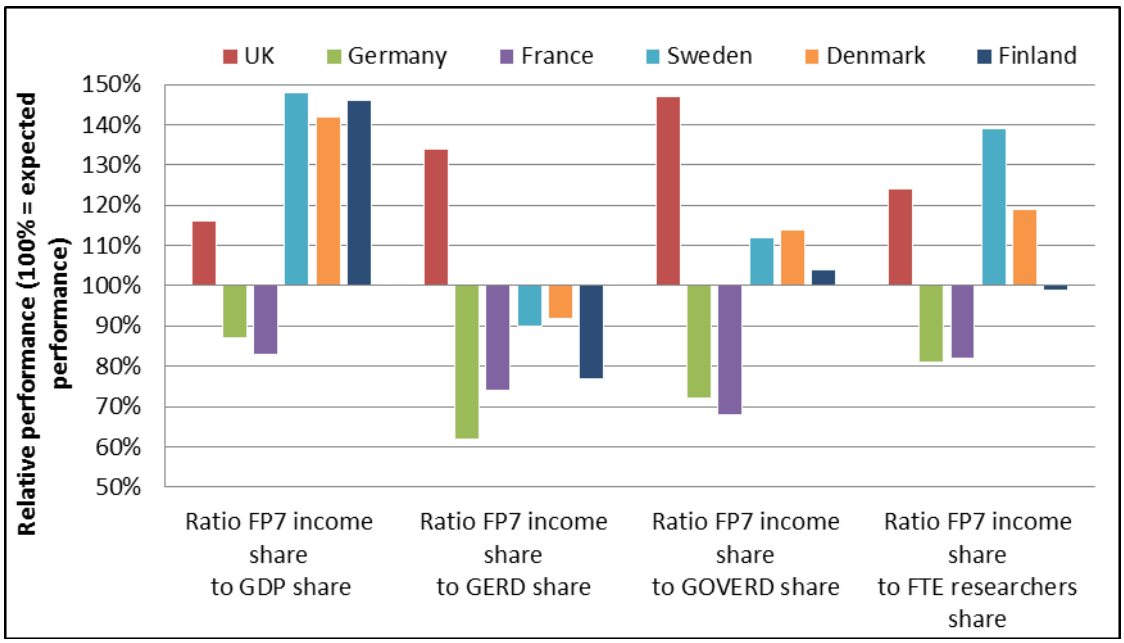
When taking account of GDP size in particular, the Scandinavian countries performed best, and the larger western European countries less well. However, the UK outperformed Germany and France by some margin on this metric.

The UK performed particularly well in comparison with other countries when considering its FP7 funding factored against its GERD and GOVERD. In both cases the UK achieved funding amounts far higher than could have been expected, and much higher than each of the five comparator countries.

The UK's funding from FP7 factored against the number of FTE researchers employed was higher than Germany, France, Denmark and Finland, but below that of Sweden.

[41] Ratio of actual to expected FP7 income shares = Share of total EU27 funding between 2007 and 2013/ Share of total EU27 GDP/ GERD/ GOVERD between 2007 and 2013. For FTE researchers averages between 2007-2013 were used.

Figure 3.2 FP7 EU funding allocations, factored by key scale metrics



Source: ICF CORDA analysis, Eurostat Eurostat tec00001, Eurostat [rd_e_fundgerd], Eurostat t2020_20, Eurostat [rd_p_persocc].

3.1.1.4 Participation and funding in FP7 by specific programme

FP7 was organised into five specific programmes, as follows[42]:

- **Cooperation** – With an initial budget of €32.4 billion, Cooperation was the largest FP7 programme, supporting collaborative research projects across Europe and other partner countries carried out by transnational consortia of industry and academia.
- **Ideas** – The Ideas programme was implemented by the European Research Council (ERC) and supported "frontier research" on the basis of scientific excellence. There was no obligation for cross-border partnerships. The programme had an initial budget of €7.5 billion.
- **People** – The People programme supported researcher mobility and career development, both inside the European Union and internationally. It was implemented via a set of Marie Curie actions, providing fellowships and other measures to help individual researchers throughout their careers. People had an initial budget of €4.75 billion.
- **Capacities** – The Capacities programme aimed to strengthen the research capacities that Europe needs if it is to become a thriving knowledge-based economy, covering areas such as research infrastructures, SME actions, and Science in Society. Capacities had an initial budget of €4.1 billion.

[42] https://ec.europa.eu/research/fp7/understanding/fp7inbrief/structure_en.html
The actual amounts spent can be found in Table A1.3 in Annex 1. Total spent was larger than the initial budget for the specific programmes Ideas, People and Euratom. Total spent was smaller than the initial budget for the specific programmes Cooperation and Capacities

- **Euratom** – Euratom is the programme for nuclear research and training, comprising research, technological development, international cooperation, dissemination of technical information, and exploitation activities, and training. It was the smallest of the five programmes with an initial budget of €2.7 billion.

The different types and sizes of projects in the different specific programmes means that it is important to look at not only participation levels but also the amounts of funding secured in each area.

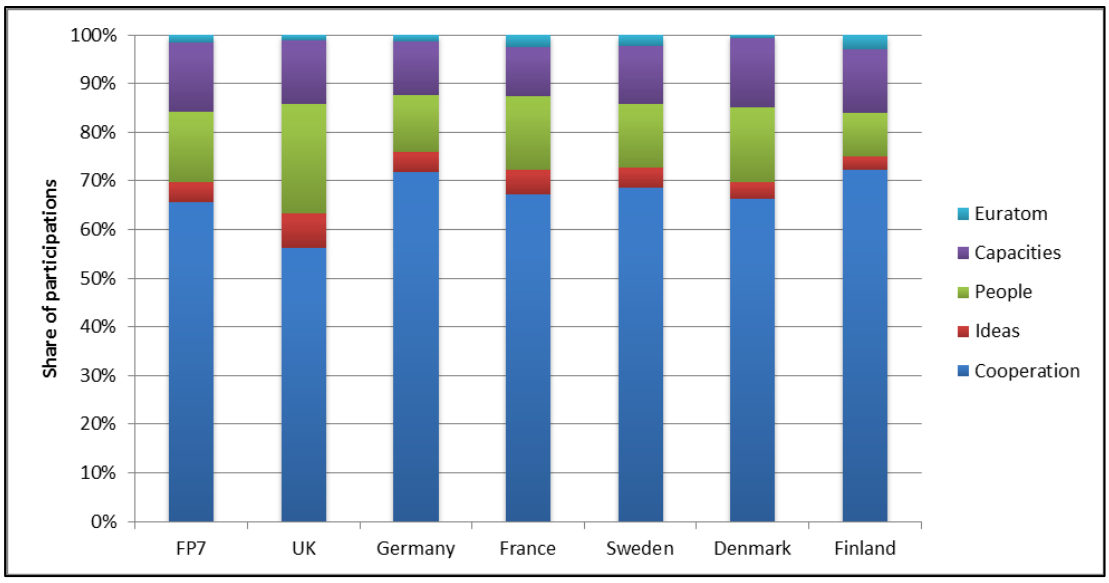
3.1.1.4.1 Participation by specific programme

Within FP7 as a whole (Figure 3.3), the major specific programmes based on numbers of participations were Cooperation (by some margin at 66%), followed by People (15%), and Capacities (14%). Ideas and Euratom had relatively small numbers of participations (4% and 2% shares respectively).

The UK profile of participations followed loosely that of FP7 as a whole, with most participations coming in the Cooperation programme (56%), followed by People (23%), and Capacities (13%), then Ideas (7%) and Euratom (1%). Based on these ratios the UK had a relatively high rate of participation in the Ideas and People programmes and a relatively low participation in Cooperation, Euratom and (to a lesser extent) Capacities. These results indicate that the UK participation profile followed the character of its national research and innovation system. UK organisations participated strongly in leading edge research (Ideas) and in mobility programmes (People) – areas where UK universities are primarily involved – but the UK participated relatively less in the more traditional R&D projects conducted under the Cooperation and Capacities programme (which have a greater involvement of research institutes, industry and public bodies).

France, Sweden and Denmark followed the average profile in most respects, while Germany and Finland participated relatively more in Cooperation and less in most of the other areas - reflecting stronger involvement of industry and research institutes from these countries in FP7.

Figure 3.3 Share of FP7 participations for the UK and selected countries, by specific programme



Source: ICF CORDA analysis

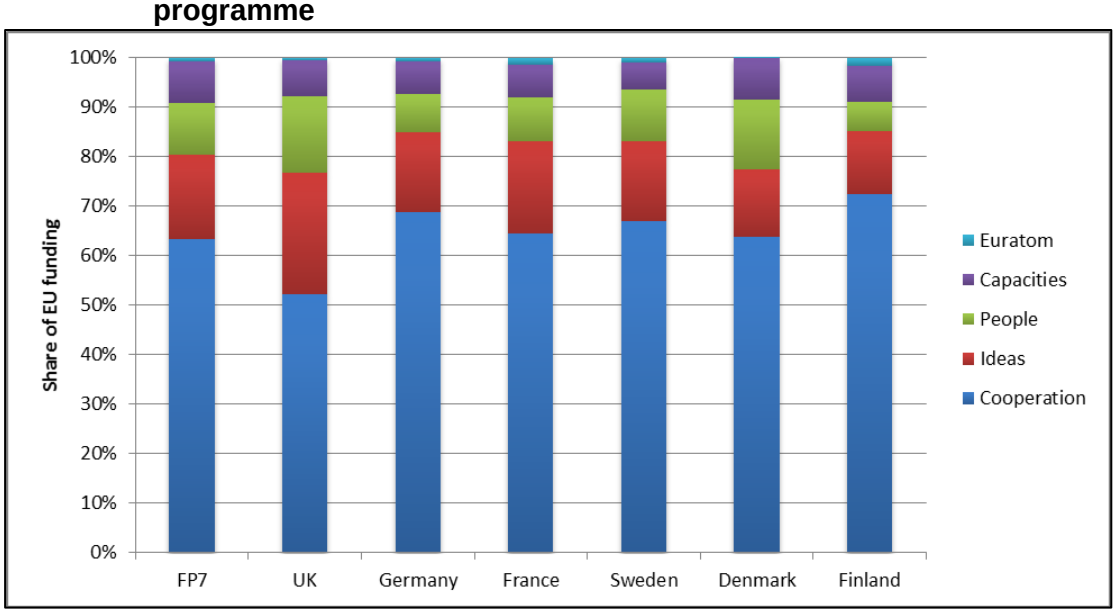
3.1.1.4.2 EU funding by specific programme

Due to the very different average sizes of the projects within the different FP7 programmes, the profile of funding by specific programme looked somewhat different to the profile of participations (Figure 3.4). Here the Ideas programme (ERC) becomes far more prominent, accounting for 17% of the EU FP7 funding (as compared to just 4% of the participations). This is because an average Ideas project attracted €1.4 million per participation, while the other four programmes provided an average of between €173,000 and €324,000 in EU funding per participation.

Compared to the overall FP7 funding profile, the UK had a relatively very high amount of funding from both the Ideas and People programmes, accounting for 24% and 16% of UK funding respectively, as compared to 17% and 11% for FP7 as a whole. The share of funding received from these two programmes was higher for the UK than for any of the comparator countries, a result of the UK's high specialisation in leading edge research and university-based research. The UK share of funding from the Capacities programme (at 7%) was close to the FP7 average (8%) and in line with most of the comparator countries.

The corollary to the UK's relative specialisation in the Ideas and People programmes is that the UK secured a relatively smaller share of EU funding from the Cooperation programme, which accounted for 52% of the UK's total EU funding (but between 64% and 72% among the comparator countries. The share of the UK's FP7 funding from Euratom participation was also relatively low, and smaller than all comparator countries apart from Denmark.

Figure 3.4 Share of EU funding for the UK and selected countries, by specific programme



Source: ICF CORDA analysis

3.1.1.4.3 Participation within Cooperation programme priority areas

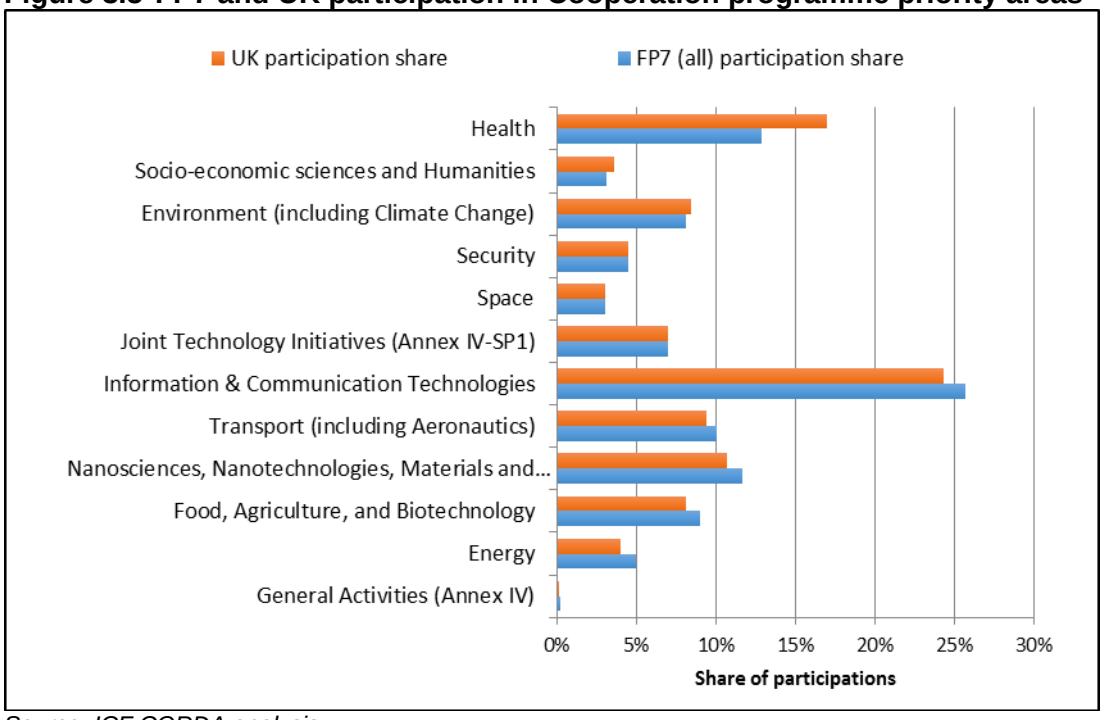
Cooperation, being the largest of the FP7 specific programmes, is subdivided into 11 priority areas, as shown in Figure 3.5.

The most significant programmes in terms of participation (overall and for the UK) were Information and Communication Technologies, Health and Nanosciences, Nanotechnologies, Materials and new production Technologies. However, compared to the overall FP7 profile, the UK's participation rates were highest in the Health, Socio-economic Sciences and Humanities (SSH), Environment (including climate change), Security and Space priority areas. In each case the share of participations held by the UK was higher than the share within FP7 as a whole. This was particularly so for Health, where the UK participation rate was 33% higher than the FP7 rate.

Conversely, the UK had a relatively low share of its participations within the General Activities (Annex IV)[43], Energy, and Food, Agriculture & Biotechnology priority areas. In each case the UK participation rate was at least 10% lower than would have been expected had the UK followed the average profile.

[43] This priority area covers the following activities: dissemination, knowledge transfer and broader engagement, coordination of non-Community research programmes and the risk-sharing finance facility. For more information, see: http://ec.europa.eu/research/participants/data/ref/fp7/88225/cooperation_annex4_wp_200702_en.pdf

Figure 3.5 FP7 and UK participation in Cooperation programme priority areas



Source: ICF CORDA analysis

The relative share of the EU funding received by the UK in each of the Cooperation priority areas followed a broadly similar pattern to the one shown in Figure 3.5 above. A small number of differences were noted:

- While security was an area of relative strength in terms of participations, the amount of EU funding received by the UK was below the level that would have been expected given the participation rate. This is because UK participants in the Security priority area attracted lower amounts of funding per participation than in other areas.
- The opposite situation was found within the Food, Agriculture & Biotechnology priority area. This was an area of relative weakness in terms of the UK's participation share, but it accounted for a higher than average share of EU funding. This is due to the UK participants attracting larger amounts of funding per participation, relative to others, within this particular priority area.

The relative strengths in areas such as health (Figure 3.5 above) as well as food, agriculture & biotechnology (in terms of EU funding won) could to some extent reflect the relative importance of these areas to UK's economy – considering the large share of business R&D in pharmaceuticals throughout 2007-2014. Throughout 2007-2014, pharmaceuticals was the product group which saw the highest amounts of business R&D investment (20% in 2014).

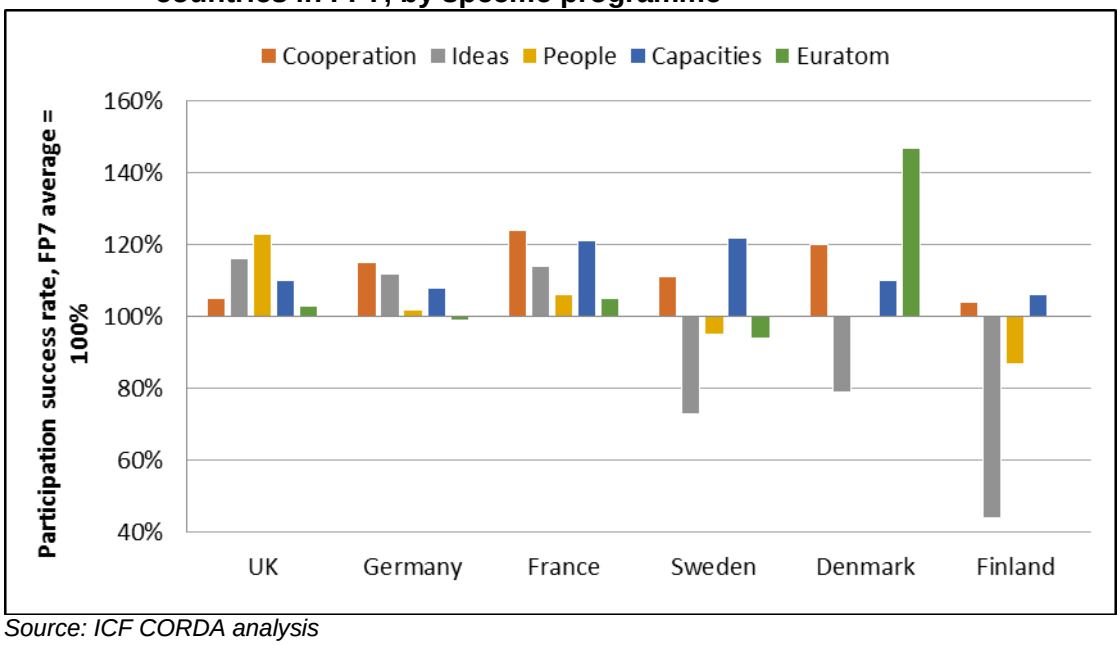
3.1.1.4.4 Success rates by programme

Average success rates across all countries varied considerably between specific programmes, from a high of 60% in Euratom to a low of 10% in Ideas (success rate by applications). In each Specific Programme the UK's success rates were higher than the FP7 average.

The UK's success rates were highest relative to other countries in the People programme (23% higher success rate than average across all countries) and above the rate achieved by all five of the comparator countries (Figure 3.6). UK success rates in Ideas were also very high, being 16% above the overall FP7 success rate, and again higher than of all the comparator countries.

UK applicants did least well in Euratom[44] (3% higher success rate than overall average), although this level of performance was still strong and higher than that achieved by Germany, Sweden and Finland. UK success rates within Cooperation were 5% higher than the FP average, but were significantly below those achieved by Germany, France, Sweden and Denmark, each of which achieved success rates 15-24% higher than average.

Figure 3.6 Participation success rates for the UK and other selected comparator countries in FP7, by specific programme



Source: ICF CORDA analysis

3.1.2 Participation in FP7 by type of organisation

3.1.2.1 Participation rates, by type of organisation

The relative participation of different types of organisation within the FP7 programme reflects the nature of the R&D work carried out. Across the programme as a whole and across all countries (Figure 3.7) there was a strong level of involvement from Higher and secondary education (HES) establishments, Research organisations (REC) and Private commercial (PRC), along with a lesser participation by Public Bodies (PUB) and Others (OTH).

When viewed from a national (UK) perspective, the pattern of participation by different types of organisation reflected both the national research and innovation system itself, in terms of its constituents and their roles, and their relative

[44] Success rate under Euratom was largely influenced by the continued funding for the Joint European Torus (JET) facility located at the Culham Centre for Fusion Energy, a major facility of the European fusion research programme; http://www.ccfe.ac.uk/jet.aspx [accessed 27th June 2016].

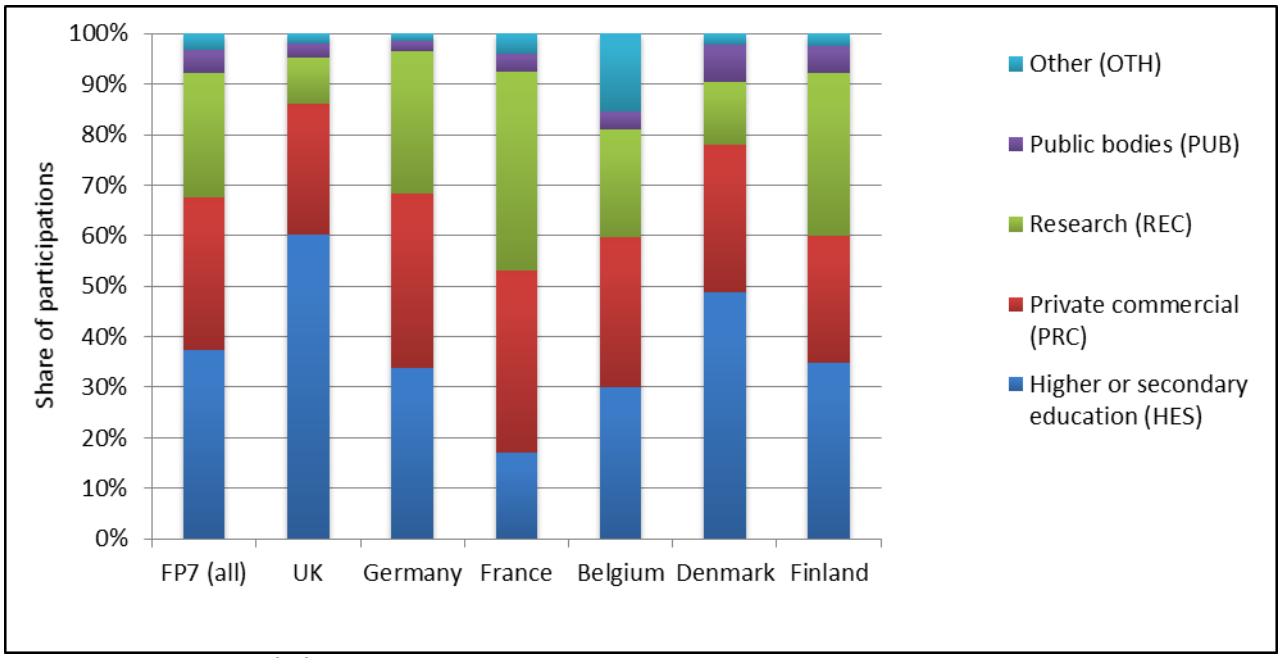
engagement with and success within the Framework Programmes. The main features of the UK system, as described in Section 1.2 above, are relevant to the results reported here.

HES accounted for more than half (60%) of all UK participations, a much larger share than they held in FP7 as a whole (37%) and larger than the share they held within any of the comparator countries (HES held between 17% and 51% of the participations in the five comparator countries). The dominant presence of the higher education sector in the UK's FP7 participation reflects structural differences between the countries. In the UK there are relatively few REC and as such they accounted for just 9% of participations in the UK (as opposed to 25% in FP7 overall). REC play a more significant role in each of the other countries considered and as such account for a larger share of their participations.

The share of UK participations held by PRC (26%) was below the FP7 average figure (30%). However, whilst the relative degree of industry participation was low - most of UK's R&D performing sectors were represented in FP7. Finland was the only comparator country in which PRC organisations represented a lower share of participations than in the UK.

PUB accounted for just 3% of UK participations, lower than in FP7 as whole (5%). The participation rate of UK PUB was higher than Germany, the same as France but below that of Sweden, Denmark and Finland.

Figure 3.7 Share of participation in the UK and selected comparator countries, by organisation type



Source: ICF CORDA analysis

In the UK, as with most countries, FP7 participation was dominated by a relatively small group of key organisations – the top 100 UK organisations (in terms of the number of projects involved in) represented just 3% of UK participants but accounted for 76% of all EU funding awarded to the UK (or €5.3 billion) and 70% (or 12,397) of all UK participants in projects. This group of 100 organisations comprised 67

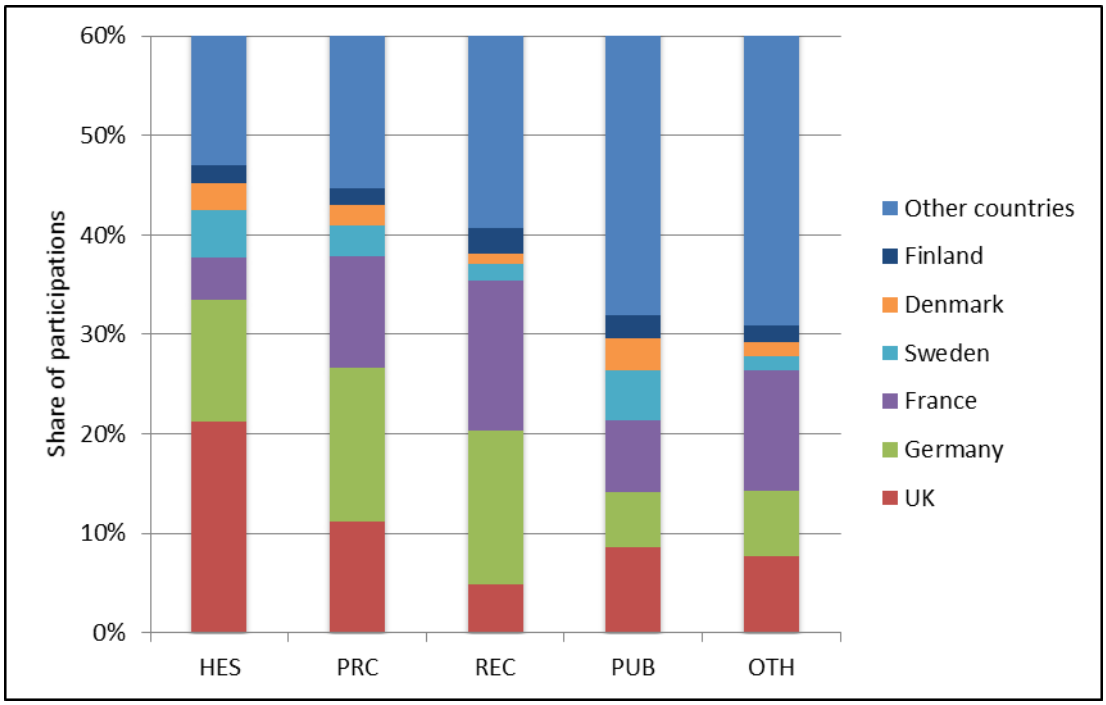
individual universities, 14 companies, 16 research organisations and three government bodies.

In terms of participations, the top 25 UK organisations include 22 universities, the Medical Research Council (MRC), the Natural Environment Research Council (NERC) and TWI Ltd.

The UK held by far the largest share out of all HES participations across the FP7 programme(21%), ahead by a margin of Germany (12%) which held the second highest share of overall HEs participations.

UK industry participants represented 11% of all industry participants in FP7, topped only by industry participation from Germany (15% of total). REC from the UK represented only 5% of overall REC participation in FP7, clearly behind Germany (16%) and France (15%), coming 6th overall out of all participating countries. Furthermore, UK participants from the public sector (PUB) represented the largest share out of all PUB participations (9%) when compared to selected countries (France held 6% and Germany held 6% of all PUB participations across FP7), holding the second highest share out of all countries participating in FP7. Figure 3.8 provides an overview of UK participation by organisation type as proportion of overall FP7 participation of the same organisation type, and compared the UK to five comparator countries.

Figure 3.8 Share of overall FP7 participations, by organisations from selected countries



Source: ICF CORDA analysis

3.1.2.1.2 Success rates in competitions, by type of organisation

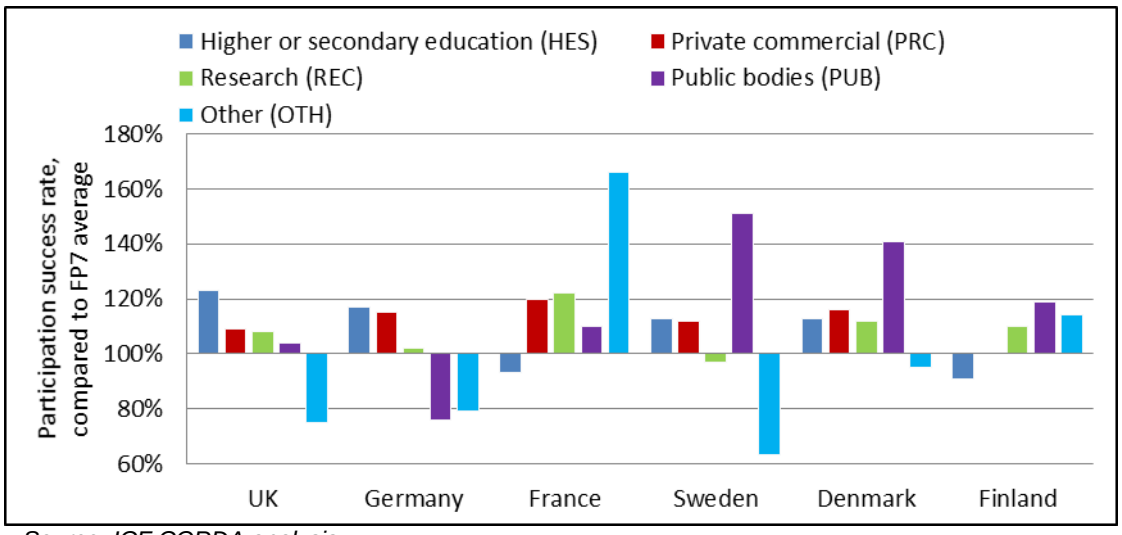
Analysis of UK success rates in competitions (Figure 3.9) indicates that all types of organisation in the UK with the exception of 'Others' (OTH) achieved participation success rates higher than the FP7 average.

UK HES did the best, achieving success rates 23% higher than the FP7 average. While German, Swedish and Danish HES also outperformed the FP average, UK HES had the highest success of all the countries considered.

UK private commercial organisations (PRC) and research organisations (REC) both achieved success rates slightly above the FP7 averages (9% above and 8% above respectively). While UK PRC did reasonably well against the FP average, PRC in four of the five comparator countries performed better, achieving success rates between 12% and 20% above the average. UK REC performed well in comparison to two of the other countries, outperforming REC in Germany and Sweden.

Public bodies in the UK also performed better than average but less markedly so with a success rate only 4% higher than the FP7 average. Public bodies in Germany did less well than the UK; however, the other comparator countries performed much better: Sweden's and Denmark's PUB success rates were 51% and 41% higher than the FP7 average respectively.

Figure 3.9 Participation success rates for the UK and selected comparator countries, by organisation type



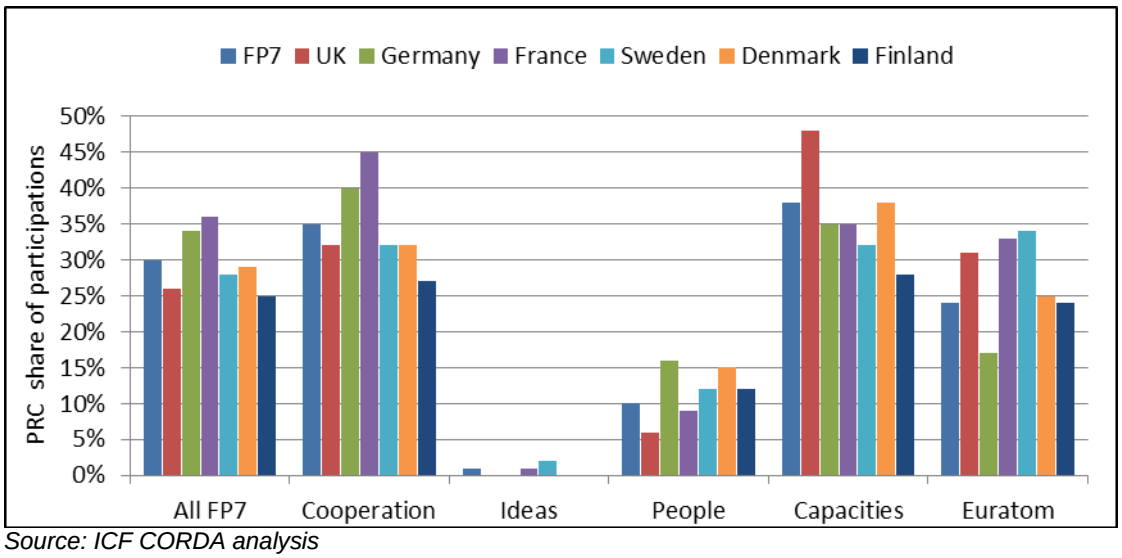
Source: ICF CORDA analysis

3.1.3 Participation by UK industry

Within FP7 as a whole private commercial organisations (PRC) accounted for almost 30% of participations, but made up just 26% of participations by the UK (Figure 3.10). The UK PRC participation rate was slightly higher than Finland's (25%), but below that of Sweden and Denmark, and below that of Germany and France (34% and 36% respectively).

Industry participation overall was highest in the Capacities programme, and here as well as in Euratom, UK industry had a higher involvement rate than average, and above that of most comparator countries. However, in both Cooperation (the largest programme) and in People, UK industry participation rates were below average (32% versus 35% and 6% versus 10% respectively). In both programmes the UK industry participation rate was below that of most of the comparator countries.

Figure 3.10 Participation rate of private industry (PRC), by specific programme

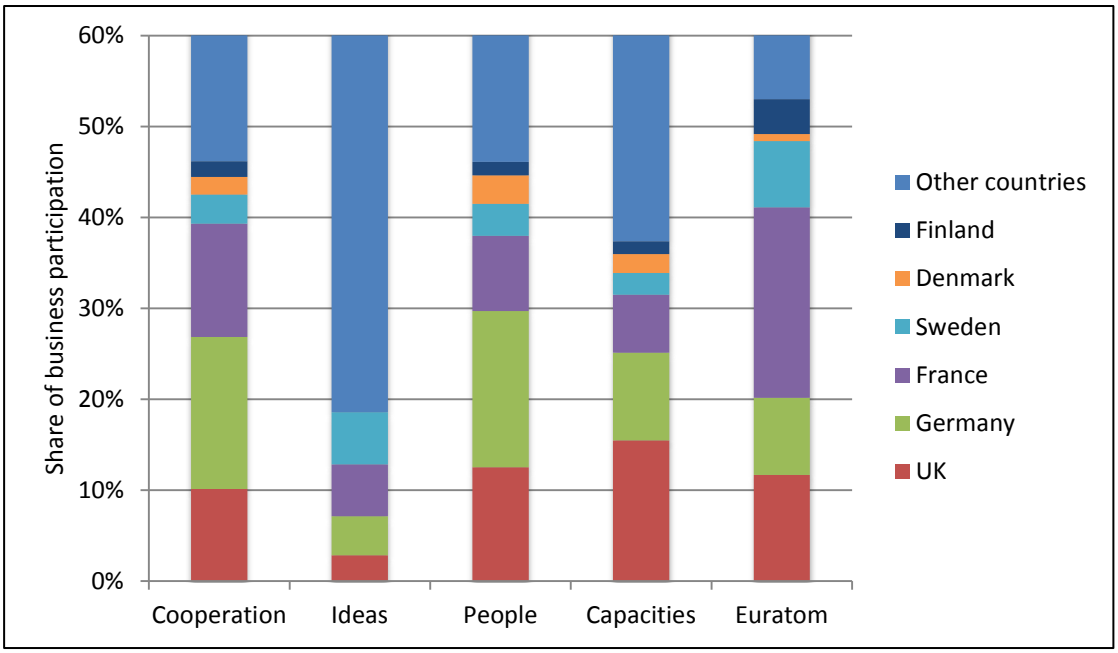


Source: ICF CORDA analysis

Lower relative participation of industry is likely a result of various factors, such as the predominant role of HES in UK's FP7 participants, the overall lower proportion of innovating businesses in the UK compared to other economies of similar size (see section 1.2) and the prominence of private/commercial research institutes which are classed as PRC participants in some of the comparator countries.

The UK's share of industry participation overall was largest in the Capacities programme (15%), and lowest in the Ideas programme (3%). Notably, the UK's share of industry participation overall was substantially behind Germany and France in the Cooperation programme – the UK accounted for 11% of all FP7 industry participation here, whilst Germany accounted for 17% and France for 11%. Figure 3.11 provides further detail as regards the share of UK industry participation out of all FP7 industry participation, and compares it against a selection of countries.

Figure 3.11 Share of business participation out of all FP7 business participation, UK and selected comparator countries



Source: ICF CORDA analysis

3.1.4 Participation by UK SMEs

Given the relatively low involvement rate of UK industry compared to other UK organisation types, the relative participation rate of UK SMEs in FP7 was quite respectable, and only very slightly below the FP7 average - SMEs made up 17% of UK participations as compared to 18% within the programme overall (Figure 3.12), and UK SMEs made up 12% of all SMEs participated in FP7.[45] The UK's SME participation rate was higher than that of Sweden, Denmark and Finland but below that of the other comparator countries in Figure 3.12. Differences between the countries were relatively small, all being in the range of between 14%-18%.

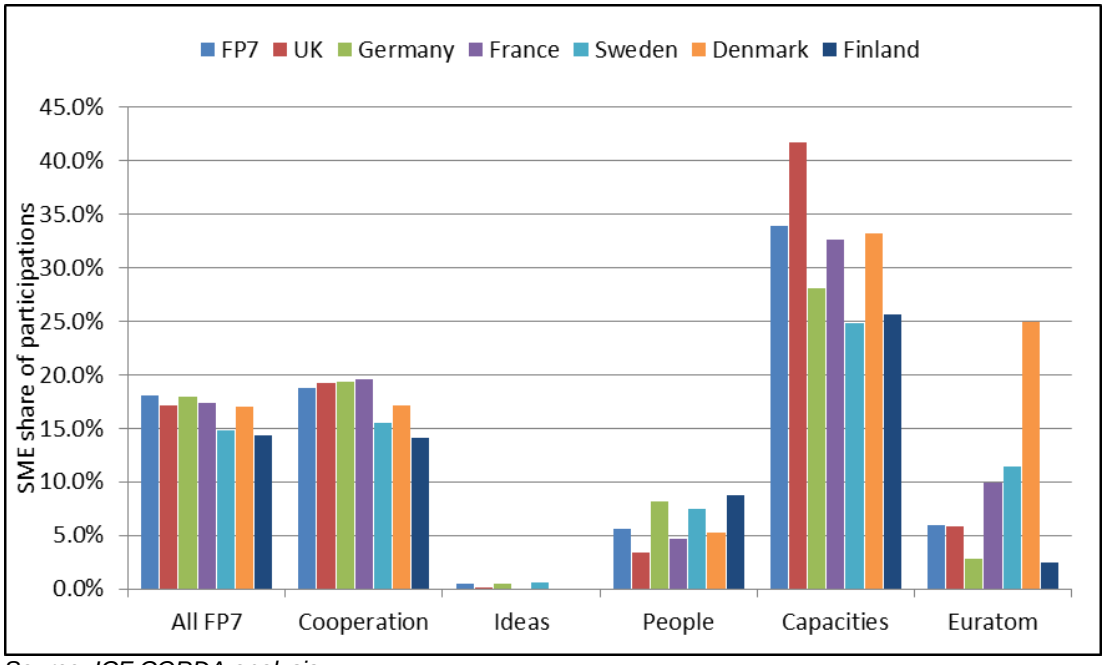
SME involvement rates were highest in the Capacities programme, which contains SME-specific sub-programmes. Here the UK SME participation rate was highest overall, and in relative terms, making up 42% of UK Capacities participations, versus 34% within the programme as a whole. All of the comparator countries had much lower SME participation rates within Capacities, ranging from 25-33%.

UK SME participation in the Cooperation programme was also reasonably strong, being in line with the programme average (19%) and above that of Sweden, Denmark and Finland (14-17%). However, UK SME involvement in the People

[45] This compares to an above average number of UK SME which are innovating, when compared to EU28 and comparator countries. 60% of small businesses in the UK were innovation active between 2012 and 2014, compared to 48% across EU28, 66% in Germany, 55% in France, 54% in Finland and 53% in Sweden – see Community Innovation Survey 2014/15, BEIS https://www.gov.uk/government/statistics/uk-innovation-survey-2015-statistical-annex-and-interactive-report [accessed 7th February 2017] and Eurostat [inn_cis9_type] [Innovative enterprises (including enterprises with abandoned/suspended or on-going innovation activities) with FTE between 10-249].

programme was lower than average, with SMEs accounting for 3% of the UK participations as compared to 6% within that programme overall. All of the comparator countries in Figure 3.12 outperformed the UK in terms of relative SME involvement in the People programme.

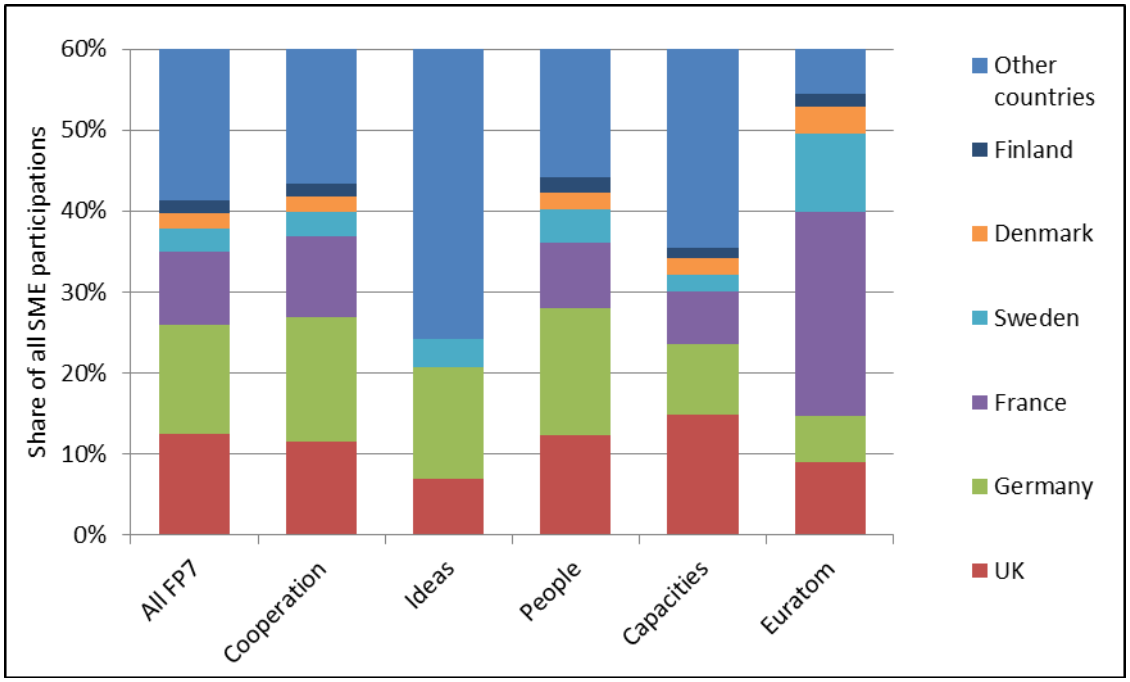
Figure 3.12 Share of participations accounted for by SMEs, by specific programme



Source: ICF CORDA analysis

UK SME participation as a proportion of overall SME participation in FP7 is 12% – coming second behind Germany's 14%. UK SMEs were particularly present in the Capacities programme (15%), People programme (12%) and Cooperation programme (12%) (see Figure 3.13 below).

Figure 3.13 SME participation from UK and comparator countries as proportion of overall SME participation in FP7



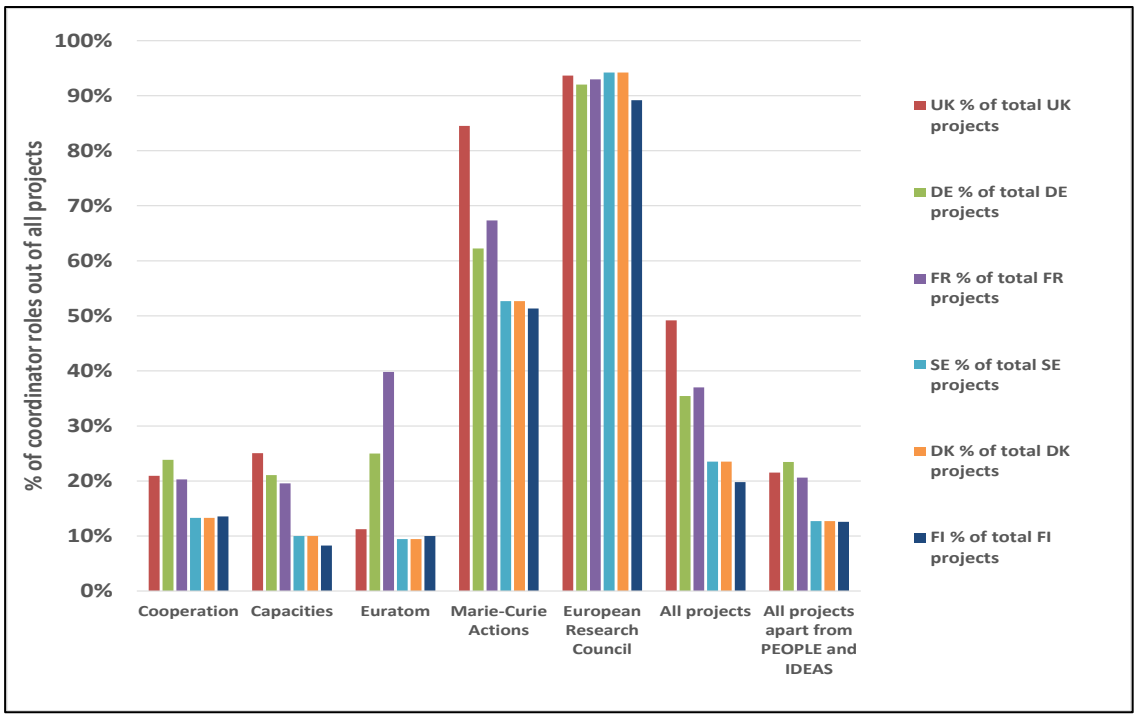
Source: ICF CORDA analysis

3.1.5 Project coordination rates

Project coordination rates are a good indicator of the extent to which UK partners occupy a leading role within their projects. Overall, the UK had the highest amount of coordinator roles out of all participating countries (5,101 coordinators), before Germany (3,119) and France (2,664). A large number of UK coordinators have led projects in the Marie Curie and European Research Council programmes, which are largely dominated by singe beneficiary projects (75% of all UK coordinators were coordinating Marie Curie or European Research Council projects), a larger proportion than in Germany (50%) and France (61%).

Figure 3.14 presents the UK coordination rates across specific programmes in FP7 and compares them to those of other countries. It shows how many projects that one country was involved in were coordinated by an organisation from that country. It shows that the UK coordinated a larger share of the projects in the Capacities and Marie Curie projects it was involved in when compared to other countries, whilst it came second behind Germany in the Cooperation programme. Due to the focus on single beneficiary projects under the European Research Council, the UK and comparator countries all coordinated a similar share of projects they were involved in - slightly above or below 90%.

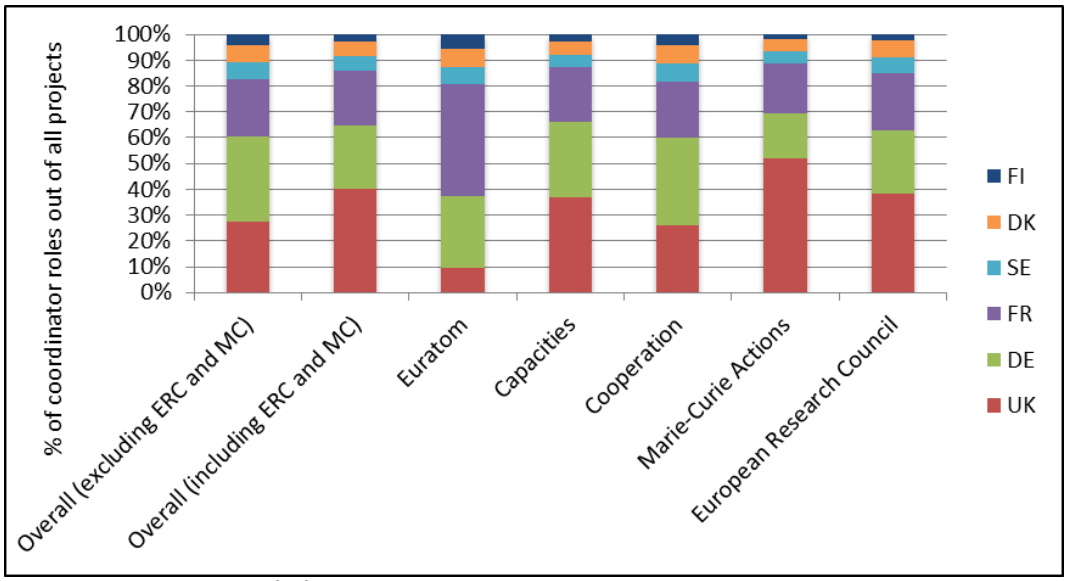
Figure 3.14 Share of UK coordinator roles out of UK projects compared to other countries



Source: ICF CORDA analysis

The UK provided the largest share of project coordinators out of all countries for the Marie Curie Actions (26.3% of all project coordinators), the European Research Council (22.1% of all project coordinators) and the Capacities programme (13.2% of all project coordinators). It came second behind Germany in the Cooperation programme, where the UK provided 12.8% of all project coordinators compared to Germany's 16.7% (Figure 3.15).

Figure 3.15 Share of coordinator roles out of all projects



Source: ICF CORDA analysis

Within the Capacities programme, UK participants were most prominent in the priority area, 'Research for the benefit of SMEs', where the UK supplied 18.7% of all coordinators, much higher than the share of coordinators represented by Germany (9.6%) and France (3.8%). Within the Cooperation programme, UK participants were the most prominent in the priority area 'Socio-economic sciences and humanities', where 19.8% of all project coordinators where affiliated to a UK organisation, compared to Germany (15%) and France (8.3%). The UK also provided the highest share of coordinators in the priority area Health (17.9%), followed by Germany (16.4%) and France (10.4%).

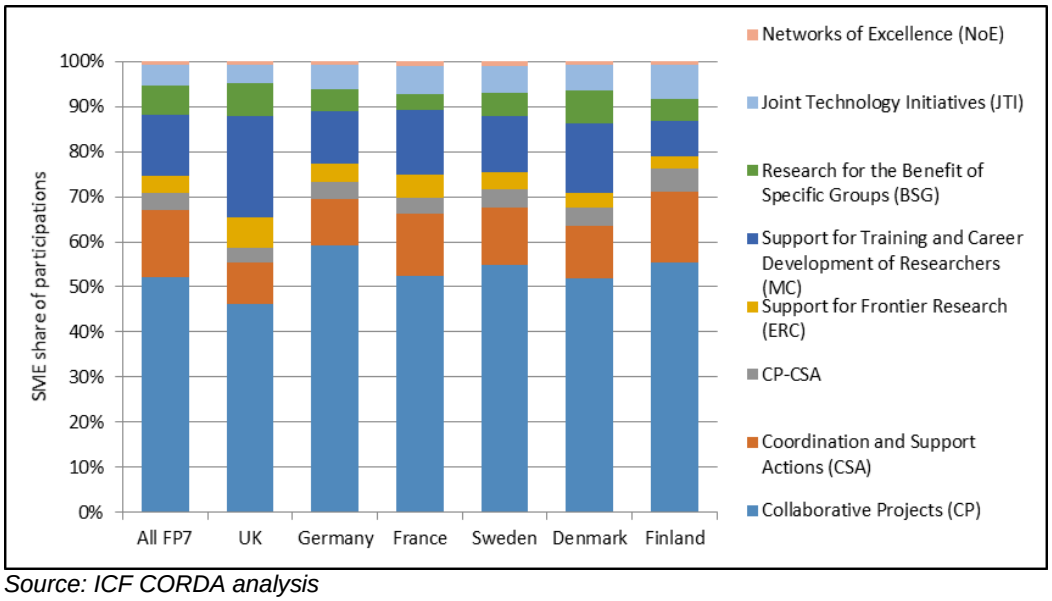
This section has shown that UK participants in FP7 projects were more often involved in lead roles than participants from all other countries – underlining the major contributions UK participants made to their projects, compared to participants from other countries.

Taking to one side coordination roles in Marie Curie and European Research Council programmes, the UK still provided a large number of coordinators for the other elements of FP7 – coming second only behind Germany in the Cooperation programme and coming first in the Capacities programme.

3.1.6 Use of FP7 instruments

FP7 used eight main types of instrument, as shown in Figure 3.16. Compared to the overall profile, UK participants made particular use of Support for Frontier Research (ERC) and Marie Curie actions, reflecting the UK's strong participation in the Ideas and People programmes. For both instruments the UK participation rate was higher than that of all five comparator countries. In contrast the UK made less use of Collaborative Projects and Coordination and Support actions when compared to other countries; instruments that were used mainly within the Cooperation and Capacities programmes where UK involvement rates were lower.

Figure 3.16 Share of participations, by type of instrument



Source: ICF CORDA analysis

3.2 UK participation in successive Framework Programmes (FP6 – FP7 – Horizon 2020)

This section provides a comparative analysis of UK performance across successive Framework Programmes - FP6, FP7 and Horizon 2020 - based on data from CORDA. Where relevant, UK performance is also compared to that of other countries.

It is important to note that the Horizon 2020 programme began in 2014 and will award grants until 2020. The database used for the analysis covers only Horizon 2020 grant contracts signed up until 26th February 2016. Data on UK participation in Horizon 2020 is thus preliminary and provides only a very early indication of UK performance. In addition, structural differences between FP7 and Horizon 2020 mean that the extent to which any performance changes can be confidently identified is limited.

3.2.1 Overall statistics

Table 3.2 presents the number of proposals, participations in proposals, projects, and participations in projects, as well as the amount of EU funding allocated to UK organisations for FP6, FP7 and Horizon 2020 (to date). A number of trends can be seen:

- The share of proposals with UK participation was higher in FP6 than in later programmes, falling from 40% in FP6 to 33% in FP7 to 28% in Horizon 2020 (to date). This fall is not an indication of diminishing performance but of changes to the FP instruments (in particular smaller projects with fewer partners and countries involved in each), as well as demand from a growing number of countries (new EU member states and new associated countries).
- The UK saw a larger share of participations in FP7 and Horizon 2020 (to date) than in FP6, with Horizon 2020 levels very close to those achieved in FP7 (12%), a good indicator of growing demand from UK actors for FP funding – particularly against the trend of an increasing number of countries being funded overall.
- In absolute terms, the UK secured almost three times as much income from FP7 as compared to FP6. However, the percentage share of EU funding allocated to UK organisations remained broadly stable over the three programmes, rising only slightly from 14% to 15% from FP6 to FP7, and remaining stable at that level in Horizon 2020 to date.
- The share of EU funding requested by UK applicants is unchanged from FP7 to Horizon 2020 (12.7%) to date, indicating sustained levels of demand for funding. Figures for FP6 are not available.
- The share of projects with UK involvement has decreased over time. While the UK was present in 45% of projects in FP6 and 41% in FP7, it is present in only 36% of projects funded under Horizon 2020 to date. This mainly reflects a reduction in the numbers of partners and countries in an average FP project, and similar falls can be seen for comparator countries such as Germany and France.

- The share of UK participations in projects has been growing over time, increasing from 11.8 in FP6 to 13.1% in FP7 and 13.4% during Horizon 2020 to date. To maintain and even increase its share of participations as more countries participate indicates a continued very strong performance of the UK within the FPs.

Based on these main indicators we can conclude that the UK has achieved a significant positive increase in participation rates and financial returns from FP7 as compared to FP6, and that the high levels of performance within FP7 appear to be being maintained within Horizon 2020 to date. The UK, as with other selected comparator countries, is involved in a diminishing proportion of the projects over time, but this is due to the use of smaller and more targeted projects, a change that participants generally favour based on the feedback provided on the (large) FP6 instruments.

Table 3.2 Overall statistics for the UK

Indicator	FP6	FP7	Horizon 2020
Total number of proposals	55,957	158,609	75,518
UK proposals	22,333	52,696	21,297
UK share of proposals	39.9%	33.2%	28.1%
Total number of participations in proposals	389,737	656,732	258,519
UK participations in proposals	40,724	80,050	31,176
UK share of proposal participations	10.4%	12.2%	12.1%
Total FP budget requested (€m)	No information	€303,195m	€132,281m
UK requested FP budget	No information	€38,649m	€16,814m
UK share of requested FP budget	No information	12.7%	12.7%
Total number of projects	10,058	25,282	8,598
UK projects	4,559	10,372	3,112
UK share of projects	45.3%	41.0%	36.2%
Total number of participations in projects	74,400	134,737	35,359
UK participations in projects	8,791	17,695	4,731
UK share of project participations	11.8%	13.1%	13.4%
FP budget (€m)	€16,669 m	€45,335 m	€14,492m
UK FP allocation	€2,370 m	€7,002 m	€2,172m
UK share of FP budget	14.2%	15.4%	15.0%

Source: ICF CORDA analysis

UK performance over time also appears to be strong in comparison to the key comparator countries of Germany and France. While the UK's share of participations was higher in FP7 and Horizon 2020 than in FP6, both Germany and France have seen a slight decrease in their shares across the successive Framework Programmes.

In terms of EU funding allocated, the share of the UK increased by 0.8 percentage points from FP6 to Horizon 2020, while the share held by Germany fell by 0.3 percentage points and France by 2.6 percentage points. These data again confirm

the strong continued performance of the UK across successive FPs, overall and in relation to key competitor countries.

3.2.2 EU funding in context

The UK attracted €2,370 million of EU funding commitments under FP6, €7,002 million under FP7 and €2,172 million under Horizon 2020 so far.[46] This corresponds to a share of EU funding allocated to the UK of 14.2%, 15.4% and 15.0% under the three programmes respectively.

Figure 3.17 shows how performance across the three programmes compares when seen in relation to the scale factors used in section 3.1.1.3 above, namely the UK's gross domestic product (GDP), gross domestic expenditure on R&D (GERD), government expenditure on R&D (GOVERD) and the number of FTE researchers in comparison with other EU member states (EU28 for Horizon 2020, EU27 for FP7 and EU25 for FP6).

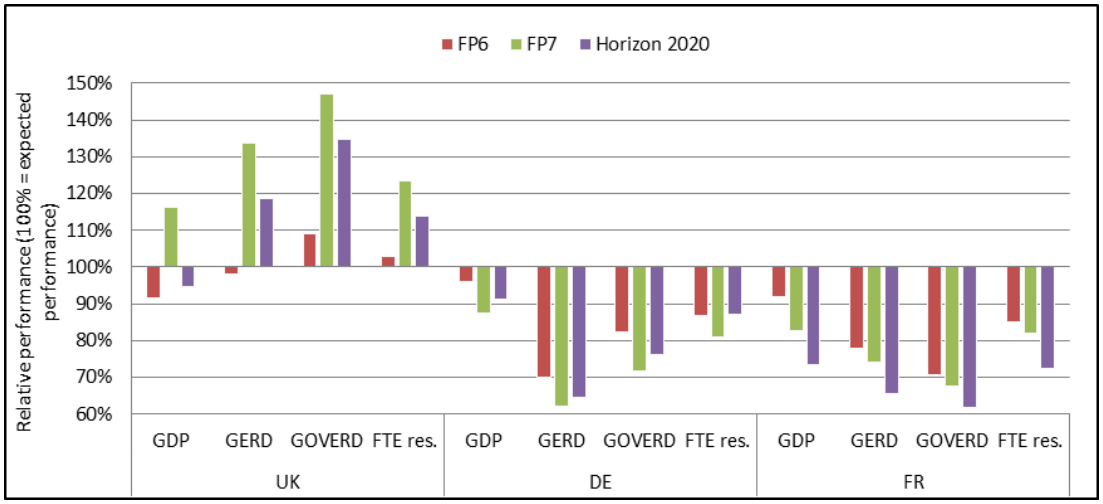
Under FP6, the UK received a high share of the EU funding when the scale of its GOVERD and FTE research base is taken into account, but below the amount that might have been expected considering the size of its GDP and GERD. Within FP7, a combination of improved performance within the programme (a higher share of the funding) and a contracting economy during some of the FP7 programme lifetime meant that the UK's performance relative to GDP was exceptionally high. Stagnating domestic R&D expenditure over the period of FP7, relative to other countries, meant that the UK's good performance within the competition translated into very much larger than expected returns when factored against GERD and GOVERD.[47]

The situation has changed a little under the first years of Horizon 2020. A small fall in the share of EU funding allocated to the UK has coincided with strong growth in the UK economy and R&D investments, relative to other EU countries. This has meant that EU funding returns, normalised in this way, are not as great under Horizon 2020 (to date) as they were under FP7. However, in comparison with the UK's investments in R&D and the size of its research base, it still receives a greater than expected share of EU funding under Horizon 2020. Ratios above 100% indicate that the UK received more funding that can be expected given its economic strength, domestic and government expenditure on R&D, as well as the size of its research sector. A ratio below 100% means that the UK received less than can be expected given these key metrics. Figure 3.17 shows that the UK not only outperforms the EU average, but also consistently and considerably outperforms Germany and France when looking at how much funding is received from the Framework Programmes compared to the size of the economy and the research base.

[46] EU funding is paid out across and beyond the lifetime of an FP7 project, hence the actual EU payments made to date for FP7 and Horizon 2020 projects will be below these figures.

[47] Ratio of actual to expected income shares was calculated as follows: Share of total EU funding allocated to EU Member States in respective years was divided by share of total EU27 GDP/ GERD/ GOVERD in respective years corresponding to run time of Framework Programme investigated. For FTE researchers averages for each period were used. Data was sourced from Eurostat, using same sources as in section 3.1.1.3 above.

Figure 3.17 Ratio of actual to expected EU funding given key metrics - UK, DE, and FR – successive FPs



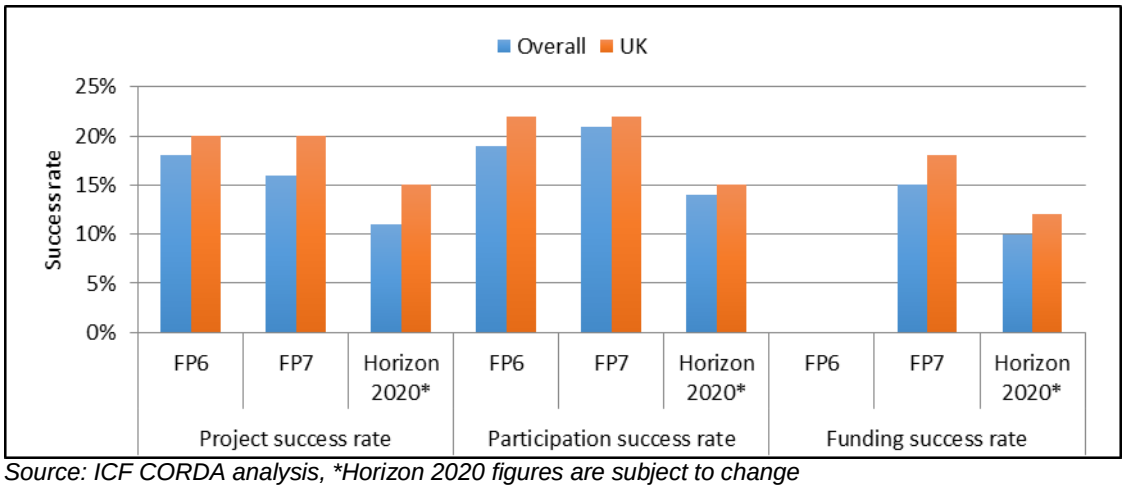
*Source: ICF based on CORDA analysis; *Horizon 2020 figures are subject to change*

3.2.3 Rates of success in competitions

As shown in Figure 3.18, the UK's rates of success in competitions in terms of projects, participations and funding (compared with what was bid for) have been consistently higher than average across all three Framework Programmes. The UK's success rate in terms of project involvement have been very high, being 25% higher than average in FP7 (20% versus 16%) and 36% higher than average in Horizon 2020 to date (15% versus 11%). Funding success rates have also been consistently higher for the UK than the average for all countries, running at 20% above average for both FP7 and Horizon 2020.

While success rates in competitions have been broadly similar for FP6 and FP7, the data presented in Figure 3.18 may seem to suggest at first glance that rates have fallen sharply under Horizon 2020. This is not necessarily the case, however, as the data for Horizon 2020 are subject to change. Funding decisions are still pending on a proportion of the submitted proposals and success rates might well be higher than indicated here.

Figure 3.18 Success rates in competitions, overall and UK - successive FPs



*Source: ICF CORDA analysis, *Horizon 2020 figures are subject to change*

When comparing the UK with a wider group of other EU countries, the UK's relative performance was similarly high in FP7 and (as of February 2016) Horizon 2020. In both programmes, the UK received the second-most EU funding after Germany. While the UK was ranked 5th in terms of success rate by EU funding and 6th in terms of success rate by applications in FP7 out of all countries, it currently is ranked 5th and 7th (for the same metrics respectively) in Horizon 2020. The associated ratios of successful to unsuccessful applications in the three Framework Programmes are 2:7 for FP6 and FP7 and 1:6 for Horizon 2020 so far.

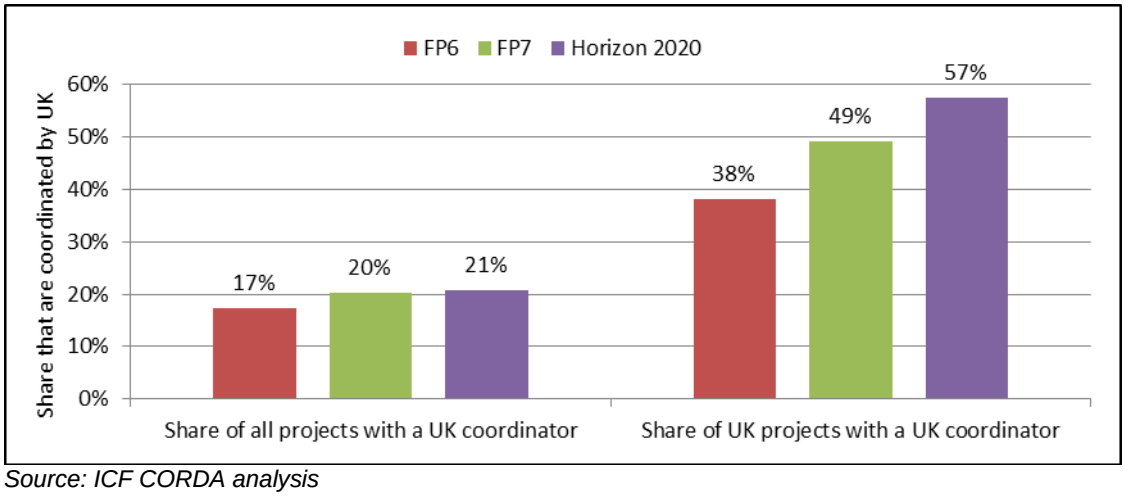
3.2.4 Project coordination rates

As previously discussed, project coordination rates are a good indicator of the extent to which UK partners occupy a leading role within their projects. Figure 3.19 presents the UK coordination rates across successive Framework Programmes, both in terms of the share of all projects coordinated, and the share of projects with UK involvement that have a UK coordinator. It shows that UK coordination rates have increased steadily over time on both metrics.

The share of all projects with a UK coordinator increased slightly over time (from 17% for FP6 to 21% for Horizon 2020). This suggests that UK organisations are taking the lead role in projects in an increasing share of cases, a very positive achievement considering the growing number of countries involved over time.

The share of the UK's own projects with a UK coordinator increased much greater, from 38% in FP6 to 49% in FP7 and 57% in Horizon 2020. However, specific patterns of participation by the UK within the FPs, such as a dominant role within the basic research (Ideas in FP7) and mobility (People in FP7) parts of the programmes, means that the UK will by definition coordinate a relatively high share of the projects in which it is involved. That is because within these two programmes where UK involvement is strongest, most projects have only a single partner (the coordinator) and as such project coordination rates are exceptionally high.

Figure 3.19 UK project coordination rates – successive FPs



Source: ICF CORDA analysis

UK coordination rates have been above those of Germany and France across FP7 and during the early stages of Horizon 2020. The UK coordinated a total of 5,101 FP7 projects (49% of projects with UK participation), substantially more than either

Germany (3,119, 35% of projects with German participation) or France (2,664, 37% of projects with French participation). In Horizon 2020, the UK held 1,785 coordinator roles out of 3,112 participations so far (57%), a much higher proportion that either France (794 out of 1,885, 42%) or Germany (984 out of 2,427, 41%).

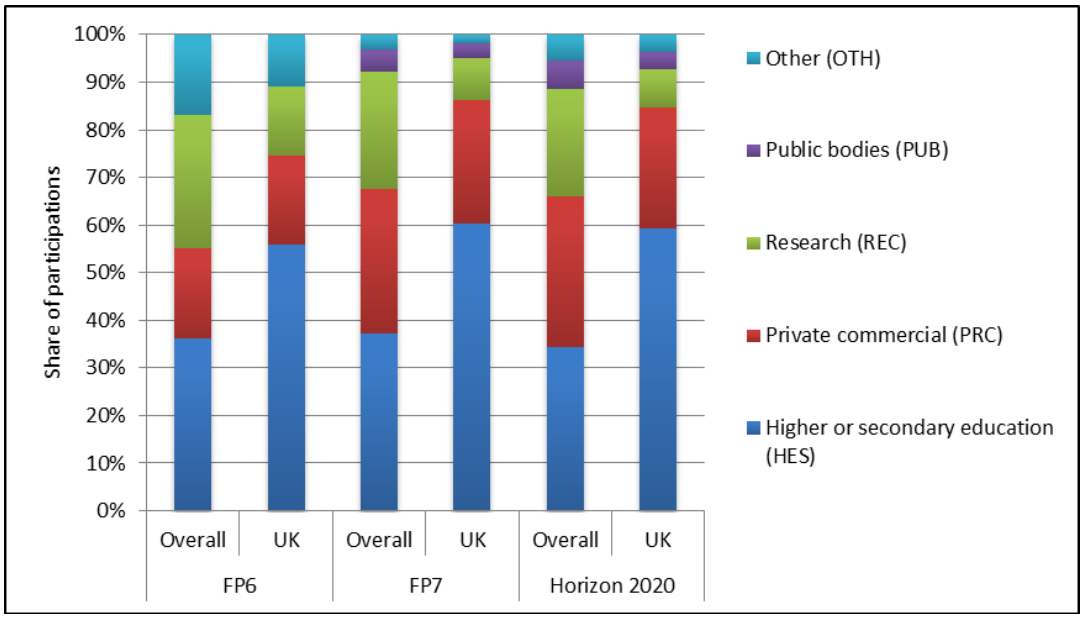
3.2.5 Participation by type of organisation

Figure 3.20 shows the relative share of UK participations by organisation type in comparison to the overall FP profile, for successive FPs. It confirms that the UK universities (HES) have had a relatively high participation rate as compared to the FP average throughout the past three FPs. HES have made up between 50% and 60% of the UK participations but just 30% - 40% of participations from across all three Framework Programme up to February 2016. This is largely due to structural differences wherein research organisations (REC) from other countries play a larger role in the FPs than is the case for the UK, where fewer such organisations exist.

Overall involvement by industry (PRC) has increased within the FPs over time, increasing from 19% in FP6 to 30% in FP7 to 32% in Horizon 2020. However, relative UK industry participation has not kept up with the average levels, from 19% in FP6 (the same as the overall FP level) to 26% in FP7 (4% behind the FP level) and 25% in Horizon 2020 (7% behind the FP rate). Survey responses don't provide any hints as to possible reasons for this trend, however three aspects which might play a role are the dominant role of HES participants in the UK, a lack of awareness of FP7 and EU funding opportunities as well as the relatively low number of innovating businesses (see section 1.2).

Involvement of public bodies can only be tracked from FP7 to Horizon 2020, but the indications are that UK public bodies have in both cases played a lesser role than is typically the case. This indicates that on aggregate, research activities have more prominent roles in government bodies and agencies in other countries.

Figure 3.20 Share of participations by type of organisation, overall and for the UK - successive FPs

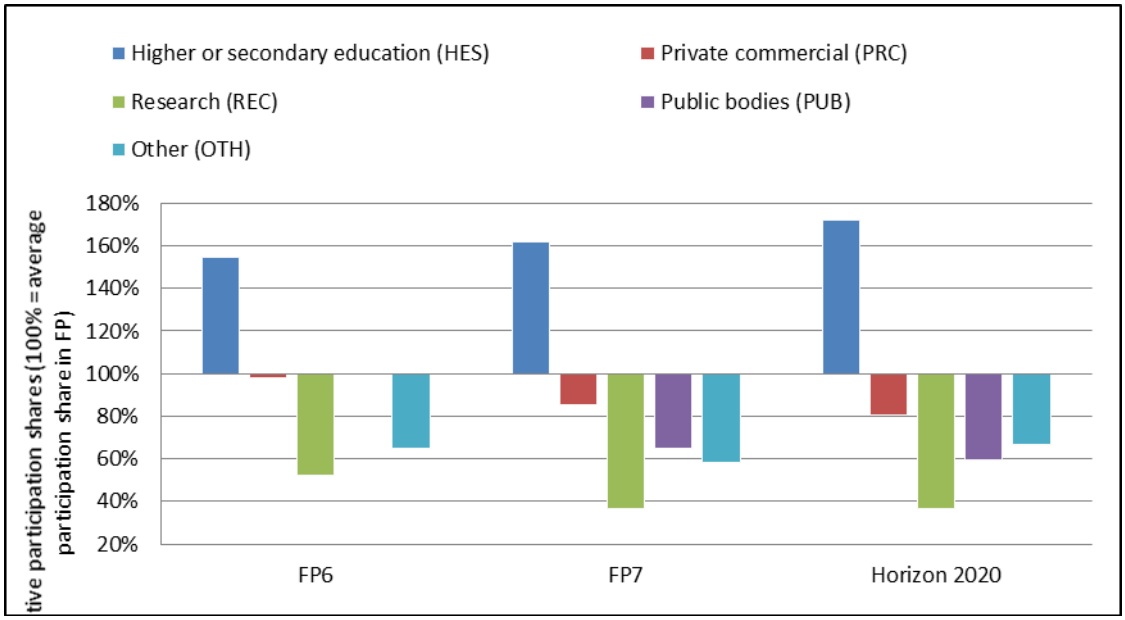


Source: ICF CORDA analysis

The ratio of UK participation rates to FP average participation rates, over time, can be used to identify trends more easily in the patterns of participation of UK organisation against what is 'typical' within the FPs. Figure 3.21 shows that the strong involvement by UK HES has been growing steadily in comparison to average HES participation rates. Shortfalls in participation by REC (of which there are few in the UK) largely account for the high share held by UK HES.

Relative participation by UK industry shows a declining trend when compared against average industry participation across FPs. In Horizon 2020 UK industry involvement is to date running at 20% below the overall average. Again, it is difficult to discern specific reasons and root causes for this trend from survey responses – a combination of differences in how EU Framework Programmes are perceived as well as a relative lack of capacity to access the programmes are likely causes.

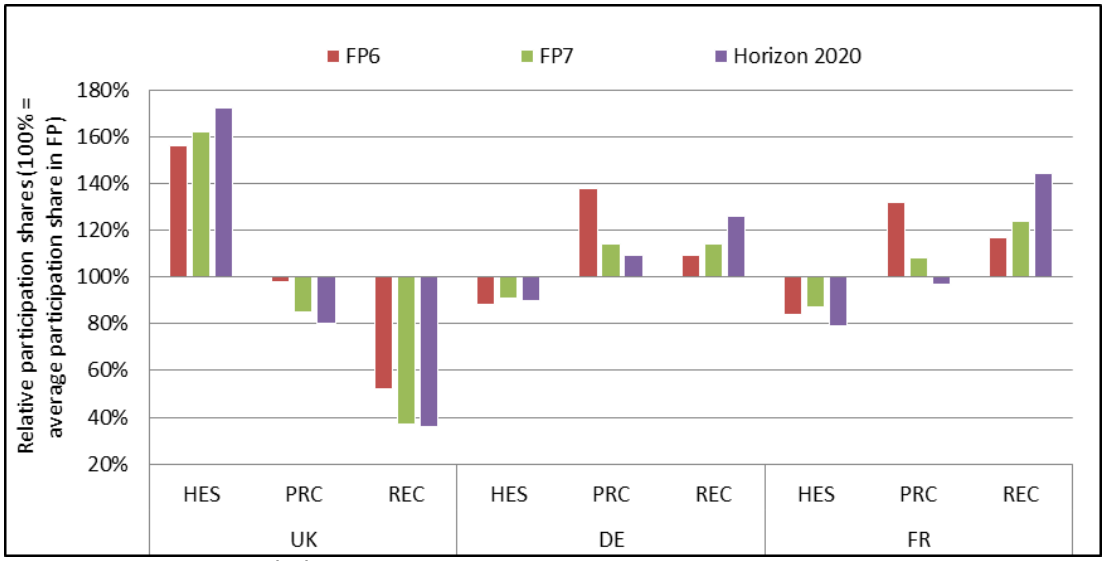
Figure 3.21 Ratio of UK to average participation shares, by type of organisation – successive FPs



Source: ICF CORDA analysis

Figure 3.22 compares the ratios of country participation over overall participation of HES, PRC and REC across programmes and competitor countries. It shows that HES organisations were more prominent in the UK than in Germany or in France, where for all three programmes participations were lower than in the overall programme profile. On the other hand, the relative importance of participation of PRC and REC organisations was higher in Germany and France than the UK in all three programmes.

Figure 3.22 Ratio of actual to average participation shares by type of organisation - UK, DE and FR in successive Framework Programmes

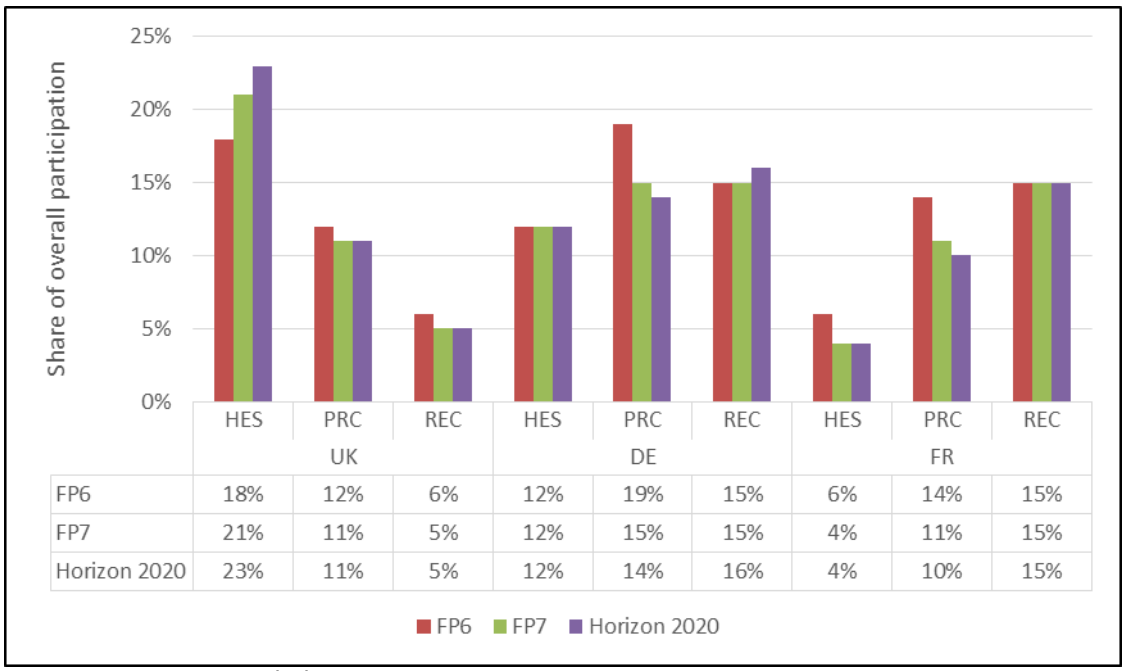


Source: ICF CORDA analysis

The overall share of UK organisations out of all participations by similar organisations is presented in Figure 3.23 below and compared against France and Germany. It can be seen that the share of UK HES organisations out of all HES organisations funded rose significantly from FP6 to Horizon 2020, from 18% to 23%, representing the largest share out of all countries throughout the three framework programmes. At the same time, there was a slight decrease in the overall share of industry participation held by UK PRC organisations (from 12% to 11%, coming 3rd out of all countries in FP6 and FP7, and 4th in Horizon 2020).

Compared with Germany and France, the UK has held a much higher proportion of overall HES participation across the three framework programmes. Germany has maintained the largest share of industry participation throughout the three framework programmes up to now, whilst France has decreased in its overall share of industry participation from 14% in FP6 to 10% in Horizon 2020 up to now. The strong presence of German and French research organisations (REC) can also be seen when compared to the UK - France has overtaken Germany as the country with the highest share of overall REC participation. The UK share of overall REC participation has decreased slightly between FP6 and Horizon 2020 up to now, down from 6% to 5% (coming 5th out of all countries in FP6, as well as 6th in FP7 and in Horizon 2020 up to now).

Figure 3.23 Share of overall participation, by organisation type and country



Source: ICF CORDA analysis

3.2.5.2 *Involvement of SMEs*

As shown in Table 3.3, the relative importance of SMEs both in terms of participation and funding received has been consistently lower in the UK than on average. Over time, however, the role of SMEs has been given more attention, leading to increases in the rate of participation by SMEs. This upward trend can be seen in the UK data as well as for the FPs as whole. In terms of relative share of participations, the gap between UK and average SME involvement rates is widening, with two clear percentage points between the Horizon 2020 participation rate of 20.2% versus the UK figure of 18.2%. However, in terms of funding, the UK SME share under Horizon 2020 (15.4%) is very close to the average (15.8%), indicating that UK SME involvement is strengthening in financial terms.

Table 3.3 Share of UK SME participations and EU funding allocated

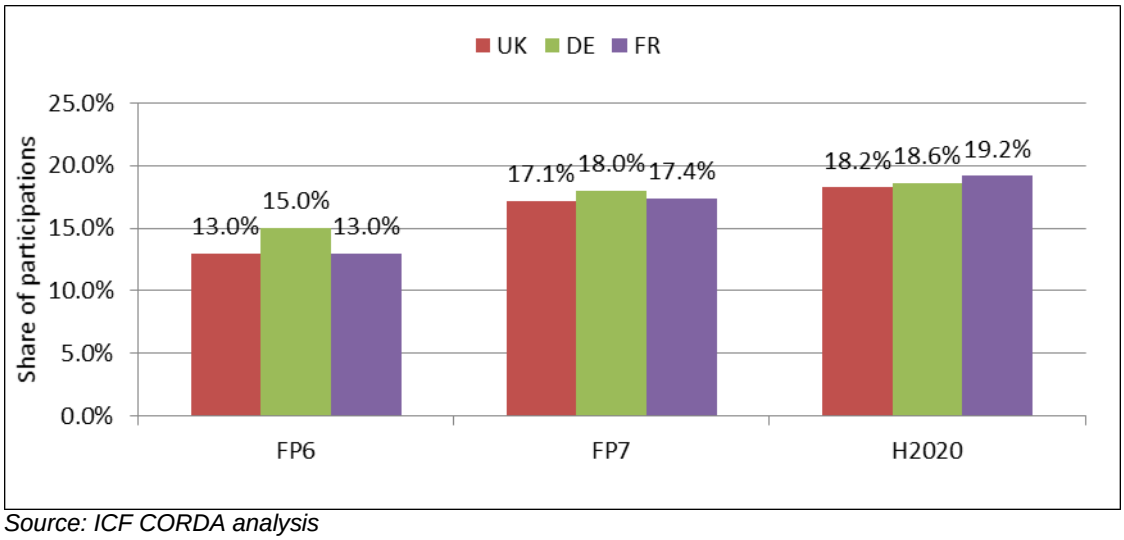
	FP6	FP7	Horizon 2020
Share of participations (whole programme)	13.4%	18.1%	20.2%
Share of participations (UK)	13.3%	17.1%	18.2%
Share of EU funding received (whole programme)	9.4%	14.0%	15.8%
Share of EU funding received (UK)	7.6%	12.7%	15.4%

Source: ICF CORDA analysis

Relative UK SME participation rates have been at or below those of German and French SMEs since the beginning of FP6, with the gap between UK and Germany closing from 2% to 0.4% and the gap between UK and France widening from 0% to

1% (Figure 3.24). All three countries have seen growth in their SME participation rate over time. However, the increases have been largest in France, and smallest in Germany.

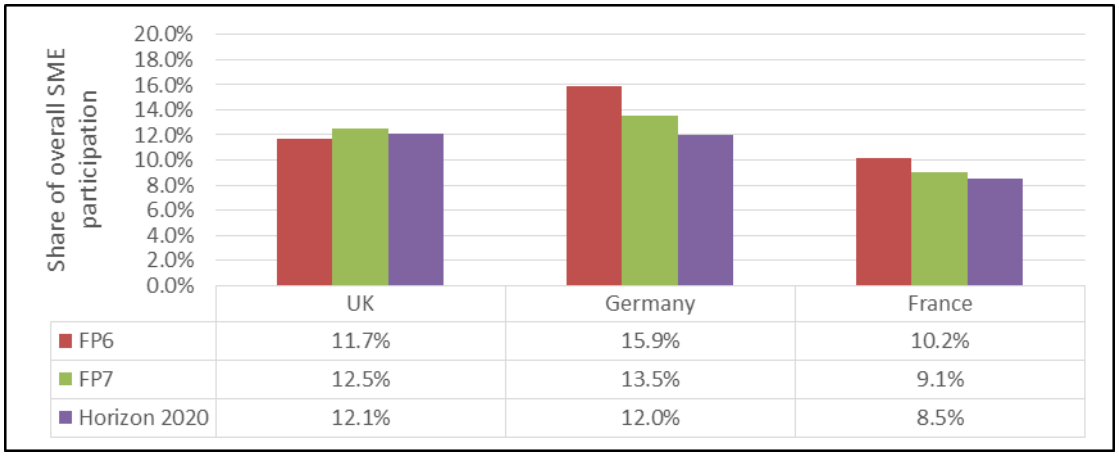
Figure 3.24 SME participation rates of UK, DE and FR across successive Framework Programmes



Source: ICF CORDA analysis

Figure 3.25 gives an overview of the UK's share of overall SME participation across successive FPs, and compares it against Germany and France. It can be seen that the UK's overall share remained stable around 12%, whilst the share of overall SME participation fell for both Germany and France. The UK had the 2nd highest proportion of overall SME participation throughout FP6 and FP7 behind Germany, and to February 2016[48] has the 2nd largest share of SME participation in Horizon 2020 behind Spain. To February 2016, the UK has the largest share of EU funding allocated to SMEs in Horizon 2020, and came 2nd in FP6 and FP7 behind Germany.

Figure 3.25 Share of overall SME participation in successive FPs



	UK	Germany	France
FP6	11.7%	15.9%	10.2%
FP7	12.5%	13.5%	9.1%
Horizon 2020	12.1%	12.0%	8.5%

Source: ICF CORDA analysis

[48] The cutoff point for Horizon 2020 data used in the present study.

3.2.6 UK participation in Marie Curie actions and European Research Council grants

Marie Curie Actions (from FP6-Horizon 2020 – renamed Marie Skłodowska-Curie Actions in Horizon 2020) and European Research Council grants (from FP7-Horizon 2020) have played a very important role in UK participation in the Framework Programmes. These are the two areas where the UK secures its highest relative participation rates, and where most of its net gains in terms of EU funding from the FPs originate. Table 3.4 shows the numbers and shares of FP6, FP7 and Horizon 2020 participations accounted for by the Marie Curie actions and the European Research Council, both overall and for the UK.

Marie Curie Actions have become more important over successive FPs, making up 11% of the participations in FP6, 15% in FP7 and 17% in Horizon 2020 (to date). A consistently high share of UK participations have been within this part of the programme compared to other elements of the Framework Programmes, with Marie Curie Actions accounting for 18%, 23% and 30% of UK participations in FP6, FP7 and Horizon 2020 respectively. The UK accounted for 19% of all Marie Curie Actions participations in FP6, 20% in FP7, and 24% in Horizon 2020. These data indicate that the UK's exceptionally strong performance in Marie Curie Actions is increasing across successive FPs, and confirm that the UK continues to be the top destination in Europe for researcher training and career development.[49] Interviewees confirmed the importance of Marie Curie Actions (and the European Research Council) and their added value to the UK. The Marie Curie Actions are seen as a particularly effective instrument to recruit high potential researchers at the beginning of their career – interviewees suggested that in many cases these individual fellows would stay in the UK beyond the Marie Curie project and provide substantial added value to the UK's research base.

The UK has also performed extremely well in relation to European Research Council grants. In both FP7 and Horizon 2020 European Research Council grants have made up 7% of UK participations as compared to just 4% and 5% respectively within the programmes as a whole. In FP7 the UK was awarded 23% of all European Research Council participations – an exceptionally high share. The equivalent figure for Horizon 2020 to date is slightly lower at 20%, but is still exceptionally high.

[49] Whilst Marie Curie Actions funded both researchers leaving and joining the UK, a crude analysis of the researcher recruitments and secondments in FP7 Marie Curie Actions suggest that the UK saw a net income of researchers through these programmes – with proportionately less researchers leaving the UK than in comparator countries.

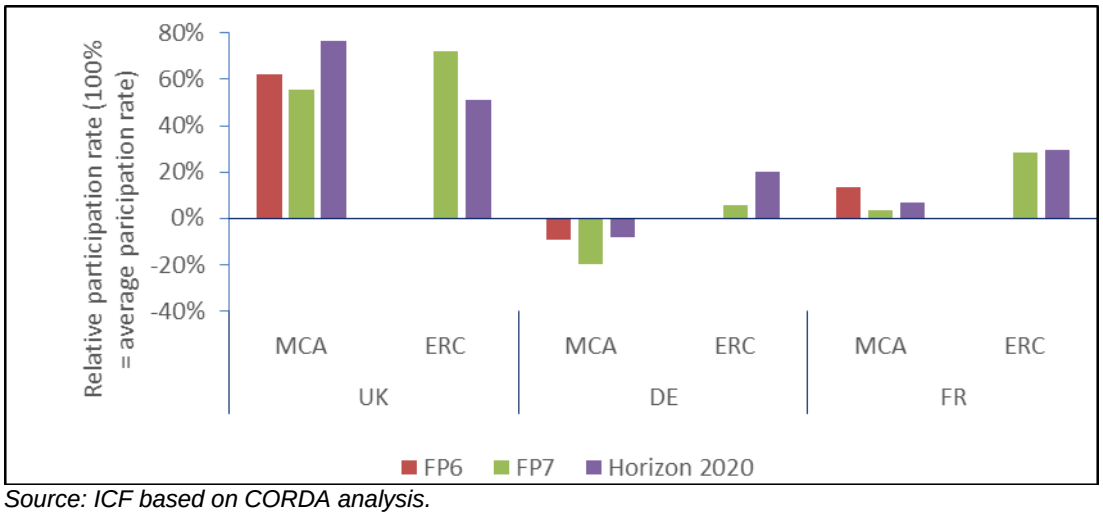
Table 3.4 Number (and share) of Marie Curie actions and European Research Council participations, UK and overall

	FP6		FP7		Horizon 2020	
	UK	All	UK	All	UK	All
MCA (n)	1,568	-	4,000	19,565	1,437	6,083
MCA (%)	17.8%	-	22.6%	14.5%	30.4%	17.2%
ERC (n)	-	-	1,235	5,462	344	1,703
ERC (%)	-	-	7.0%	4.1%	7.3%	4.8%

Note: Marie Curie Actions (MCA), European Research Council (ERC). There was no ERC in FP6. Source: ICF CORDA analysis.

The European Research Council was seen by interviewees to have a particularly strong effect on retaining world class researchers in the UK. Interviewees independently highlighted European Research Council funding as useful as it provided comparably large budgets and from the start focussed strongly on world leading, excellent research. It therefore is seen as a 'quality label'. Interviewees also highlighted that the European Research Council's bottom-up approach and its lean and flexible management are regarded as very positive. Figure 3.26 shows that the very high relative participation of the UK in Marie Curie actions and European Research Council over time (with participation rates 40% to 80% higher than average) is not matched by either Germany or France. Additionally, the UK's relatively strong engagement in Marie Curie actions has grown steadily in relation to these two comparator countries. However, the UK's share of participations accounted for by European Research Council relative to the average, while still high, has fallen slightly in Horizon 2020 as compared to FP7, while France has maintained their share and Germany has increased theirs.

Figure 3.26 Actual versus average participation rates in Marie Curie actions and ERC of UK, DE and FR – successive FPs



Source: ICF based on CORDA analysis.

3.2.7 UK participation across successive Cooperation programme areas

The structure of the FPs change from one to the next, as do the balance of priorities and expenditure, making it hard to make accurate comparisons across time with respect to involvement in the FP7 Cooperation programme priority areas (such as Health, Energy, Transport, etc.). However, a reasonable mapping has been attempted from FP6 – FP7 - Horizon 2020 areas, as shown in Table 3.5. The table lists the corresponding priority areas for FP6, FP7 and Horizon 2020 along each row (note some areas did not exist in FP6), and also shows the ratio of the UK share of participations in that area to the average share of participations in that area. This allows identification of the areas where the UK has had a relatively high and low involvement, and changes within this over time.

Table 3.5 Ratio of UK participation share to overall participation share – FP6 - FP7 cooperation priority areas – Horizon 2020 mapping

FP6		FP7		Horizon 2020	
Area	Ratio UK share to average share	Area	Ratio UK share to average share	Area	Ratio UK share to average share
Life sciences, genomics and biotechnology for health	123%	Health	132%	Health, demographic change and wellbeing	124%
Citizens and governance in a knowledge-based society	115%	Socio-economic sciences and Humanities	115%	Europe in a changing world - inclusive, innovative and reflective Societies	96%
Sustainable development, global change and ecosystems	87%	Environment (including Climate Change)	103%	Climate action, environment, resource efficiency and raw materials	87%
-	-	Security	101%	Secure societies - Protecting freedom and security of Europe and its citizens	112%
Aeronautics and space	111%	Space	100%	Space	97%
-	-	Transport (including Aeronautics)	93%	Smart, green and integrated transport	100%
Information society technologies	96%	Information & Communication Technologies	95%	Information and Communication Technologies	99%
Nanotechnologies and nanosciences, knowledge-based multifunctional materials and new production processes and devices	94%	Nanosciences, Nanotechnologies, Materials and new Production Technologies	91%	Nanotechnologies, Advanced Materials and Production	106%
Food quality and safety	105%	Food, Agriculture, and Biotechnology	90%	Food security, sustainable agriculture and forestry, marine and maritime and inland water research	90%
-	-	Energy	80%	Secure, clean and efficient energy	88%

Source: ICF based on CORDA analysis.

The ratios are presented graphically in Figure 3.27. The figures shows that the UK has maintained a very strong presence in the area of Health across successive FPs, with participation shares around 20-30% higher than average within each FP. Another area of historical strength has been the Socio-economic sciences and Humanities area. Visible UK performance in the corresponding societal challenge in Horizon 2020 has been less strong to date, however it has to be noted that with Horizon 2020 the Socio-economic sciences and Humanities area has been mainstreamed across the whole programme and is only partly represented by a distinct societal challenge.[50]

Security was a reasonably strong area for the UK under FP7 and has grown in importance under Horizon 2020, now standing as the area where the UK has its second highest share of overall participations (after Health). Transport and ICT– major programmes where the UK has not historically done well – and Nanosciences and Nanotechnologies are other areas where UK performance has lifted from FP7 to Horizon 2020.

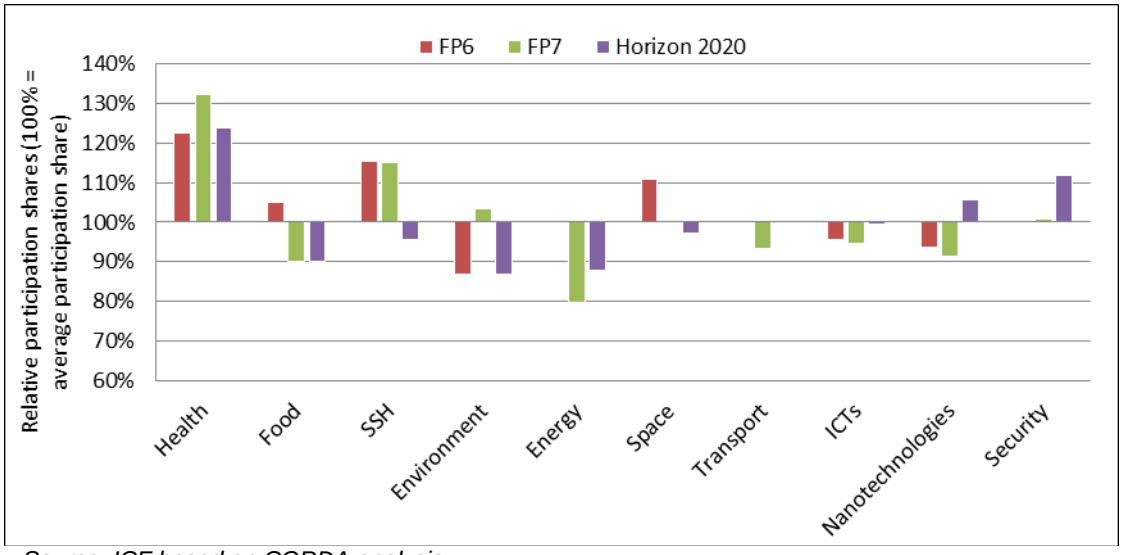
The UK performed reasonably well in the area of Environment and climate change under FP7, but previous and subsequent participation rates are below average. The UK also performed reasonably well in Space under FP7, but the UK share has been declining since FP6 and, and in Horizon 2020 Space is no longer an area of comparative strength. This coincided with BERD for aerospace products decreasing in relative terms – from 12% of overall BERD in 2007 to 9% in 2014.[51]

Food was an area of relative strength in FP6, but is not an area where the UK has performed well since that time. Energy is another area where the UK has not performed very strongly over time.

[50] Socio-economic sciences and humanities (SSH) are not fully contained in the Horizon 2020 societal challenge 'Europe in a changing world - inclusive, innovative and reflective Societies'. SSH is indeed embedded across the whole Horizon 2020 programme, and this performance of the UK in SSH overall should not only be judged on the societal challenge 'Europe in a changing world - inclusive, innovative and reflective Societies'.

[51] The study did not investigate in detail to what extent relative strengths in FP thematic programmes coincided with changed national priorities. In a future exercise, it would be interesting to look at whether the decline in some areas relates to an increasing focus on these areas as national priorities and/or increasing opportunities for collaboration at EU level through mechanisms like JPIs, which in some cases may mean potential participants of the EU Framework Programmes make less use of it.

Figure 3.27 Ratio of actual to average participation shares for Cooperation areas FP6 - Horizon 2020



Source: ICF based on CORDA analysis

3.3 UK participation in EUREKA and COST

3.3.1 UK participation in COST

3.3.1.1 Some principal differences

COST is a pan-European intergovernmental framework, consisting of 36 Member Countries and a Cooperating State[52]. COST seeks to strengthen the European Research Area (ERA) by building networks of researchers and enabling them to jointly develop their own ideas and new initiatives across a number of academic domains. This is typically achieved through supporting trans-European coordination of research activities (referred to as 'COST Actions')[53]. It is important to note that the COST funding focusses on supporting networking and coordination, and does not fund R&D activities.

COST actions typically support activities such as meetings (e.g. travel, subsistence, local organiser support), providing access to research infrastructure, conferences and workshops, short-term scientific exchanges, training schools and publications and dissemination activities. As per the above, the COST programme is substantially different from the EU Framework Programmes in objectives and types of activities supported. Therefore, this section will not attempt to compare UK participation in COST like-for-like with that in FP7. First, an average COST action has around 50 participating organisations, tenfold more than an average FP7 project (with an average number of five participants per projects). Second, COST almost exclusively supports academic organisations – 87% of participants are academic compared to 60% in FP7. Participants from 80 different countries participated in COST between 2007 and 2013, whilst the largest proportion of participants in FP7 was represented by the EU15 countries.[54] Table 3.6 presents an overview of the top ten participating countries in COST between 2007 and 2013. It is noticeable that the UK, as was the case for FP7, was the most frequent coordinating country.

[52] The 36 COST Member Countries are: Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Montenegro, The Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom and the former Yugoslav Republic of Macedonia. The Cooperating State is: Israel.

[53] COST website http://www.cost.eu/about_cost

[54] Technopolis (2014) COST Impact Assessment.

Table 3.6 Top ten participating countries based on country affiliation of Action Chairs and Vice Chairs[55]

Country	Number of MC Chairs	MC Chairs,% of all COST actions	Number of MC Vice-Chairs	MC Vice-Chairs,% of all COST actions)
United Kingdom	41	14%	31	11%
Italy	39	14%	24	9%
Germany	30	10%	43	15%
France	27	9%	28	10%
Netherlands	24	8%	17	6%
Spain	16	6%	12	4%
Switzerland	16	6%	11	4%
Finland	15	5%	7	3%
Greece	14	5%	9	3%
Belgium	12	4%	14	5%
Total (top 10 countries)	234	81%	196	70%
All Actions	287	100%	280	100%

Source: Technopolis (2014) COST Impact Assessment

3.3.1.2 UK demand for COST funding

UK research interest in participating in COST actions has risen consistently over recent years (Figure 3.28). Data provided by the COST office indicates that the number of UK-based researchers participating in COST Action proposals has almost doubled over the period 2011- 2014.[56] More than 1,200 UK researchers applied to the COST Open Call collection 2014-1, up by 77% when compared to participation rates recorded for the COST Open Call collection 2011-1.[57] This increase however corresponds by and large with an increase in programme budget and the overall number of funded projects throughout the period investigated. When compared to the average number of researchers involved in proposals across COST Member Countries, it appears that UK-based researchers by far exceeded the average number of researchers from other countries for each COST Open Call since 2011 (see Figure 3.28 below).[58]

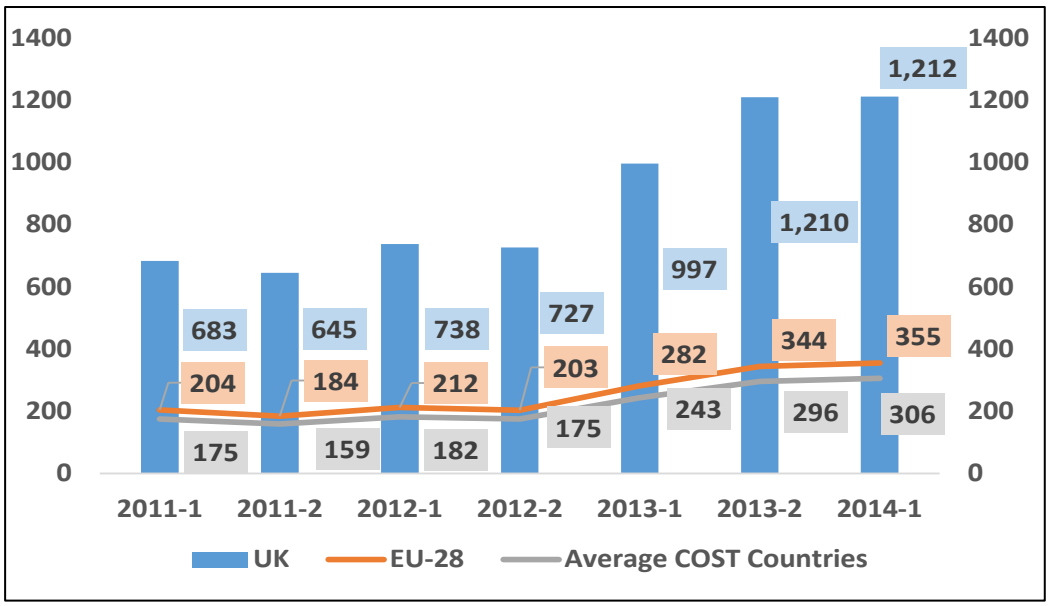
[55] COST Actions are led by Chairs and Vice-Chairs, individual researchers responsible for the coordination and implementation of the projects.

[56] Data provided by COST association.

[57] Data provided by COST association.

[58] This is an average of the difference between the number of UK researchers and the average number of researchers from COST Member Countries (excluding the UK) recorded for each call launched between 2011 and 2014, notably the following Open Call collections: 2011-1, 2011-2, 2012-1, 2012-2, 2013-1, 2013-2 and 2014-1 (source: analysis from ICF based on data provided by COST association)

Figure 3.28 Number of researchers from the UK, EU-28 and all COST countries involved in COST proposals, 2011-2014, by COST calls for proposals



Source: COST

3.3.1.3 UK participation in COST Actions

COST member states actively encourage national researchers and engineers to get involved in running COST Actions, and COST Actions are generally open to new entrants throughout their lifetime. This results in high numbers of countries participated in the average COST project, and larger countries participated in a significant proportion of COST Actions.

UK's participation in COST Actions has grown steadily in absolute terms in recent years, from 286 running Actions in 2011 to 369 Actions in 2014 with UK participation (+ 30%).[59] In real terms, UK's involvement in COST Actions remained stable, with UK researchers accessing almost every COST Actions (99.7%) from 2011-14 and thereby representing a dominant proportion of the overall participations in COST Actions.[6061]

Although stable, the UK's participation rate was higher than the average participation rate of COST Member Countries, with an average difference of nearly 40 percentage points over the period 2011-14.[62]

Figure 3.29 presents the number of running COST Actions accessed by UK participants, and compares these to the amount of COST actions accessed by

[59] Data provided by COST association.

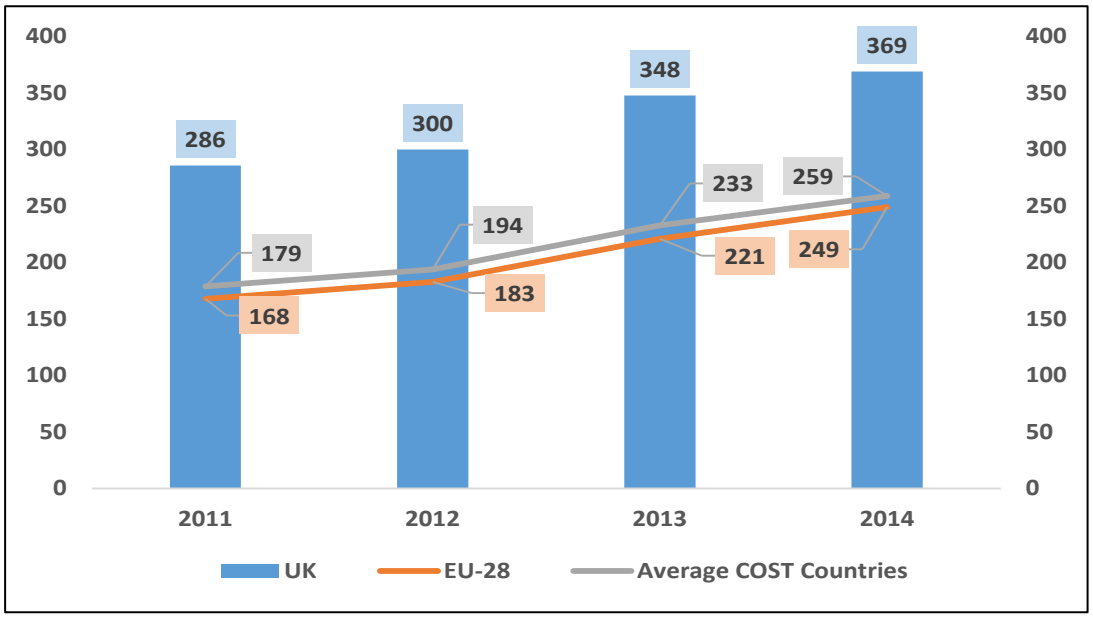
[6060] Data provided by the COST association did not allow disaggregation of UK participants. Therefore it is unclear to what extent UK participants in COST were the same or similar across time, and to what extent new participants benefitted from COST support.

[61] Data provided by the COST association does not allow disaggregation of success rates. With view of the aggregate statistics however it is likely to be very high and not comparable to success rates in FP7, as the COST programme takes a very inclusive approach to participation, and participation is organised around individual researchers rather than organisations.

[62] Analysis based on data provided by COST association

participants from EU-28 countries on average as well as the whole group of COST countries on average. It confirms that the UK's level of involvement was substantially above that of the average EU-28 and the overall average of all 36 COST member countries for the period in question.

Figure 3.29 Number of running COST Actions accessed by the UK, EU-28 and Cost Member Countries. 2011-14



Source: COST

Participation in COST Actions has also enabled UK researchers to access various COST Action networking activities, such as: meetings, workshops, Short-Term Scientific Missions (STSMs) and Training Schools. Over the period 2011-14, the UK participated in more than 9,000 COST Action networking activities. Although UK's participation increased by more than 130% over the whole period, the year-on-year change in participation was less pronounced in recent years (+9% between 2013 and 2014) than previously (+58% between 2011 and 2012; +34% between 2012 and 2013).

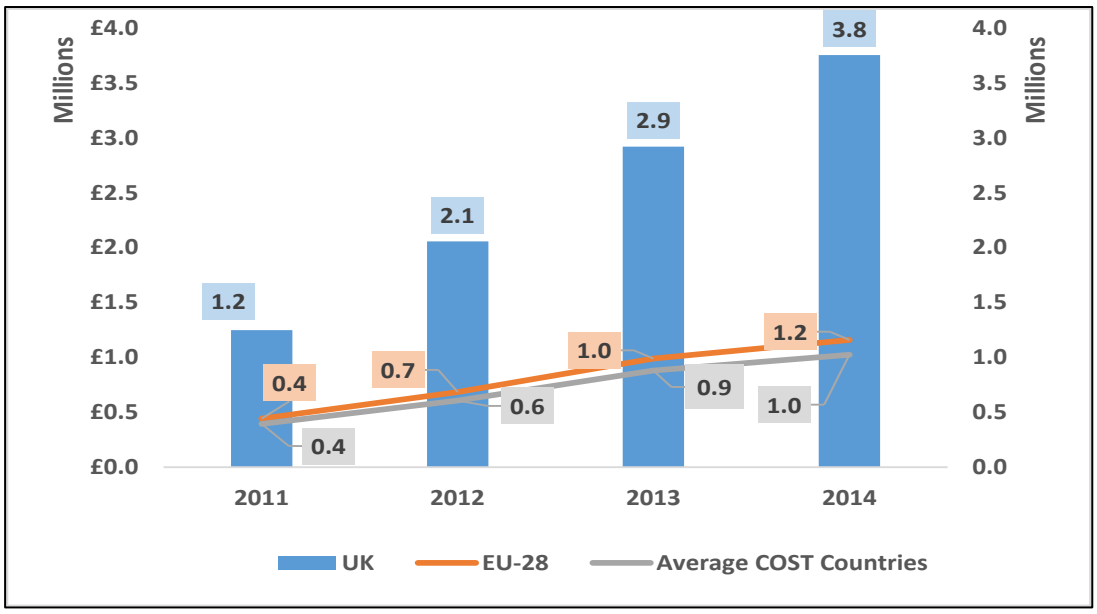
3.3.1.4 Recent trends

The amount of COST funding allocated to the UK rose substantially in recent years, from €1.2 million in 2011 to €3.8 million in 2014 (+200%).[63] A similar trend can be observed among the other COST Member Countries, where the average amount of COST funding has grown by almost 160% in the period 2011-14.

Funding allocations were however more significant (in value) in the UK than in the other COST Member Countries, averaging about €2.5 million over the four years while the average COST funding allocation in the other COST Member Countries was about €730,000 over the same period.[64]

[63] Data available from COST
[64] Data available from COST

Figure 3.30 COST funding allocations in the UK and average COST Member Countries



Source: COST

Overall, it is clear that UK researchers represent a dominant proportion of the COST programme, in terms of applicants and participating researchers. During the period investigated, they outperformed both overall averages for other COST countries and averages for EU countries. However a direct comparison to FP7 is not possible, given the distinctly different nature of COST implementation.

Furthermore, the UK has coordinated the highest number of all COST actions, from 2007-2013, of all countries, although this 'preference' for UK coordinators is less pronounced then in FP7.

3.3.2 UK's participation in EUREKA

3.3.2.1 Some principal differences

The EUREKA programme is fundamentally different to the activities funded under FP7. EUREKA predominantly facilitates close to market industrial development, and supports mainly private commercial organisations, with a specific focus on R&D performing SMEs in the EUREKA Eurostars programme. Therefore, this section will not attempt to compare UK participation in EUREKA like-for-like with that in FP7.

3.3.2.2 UK participation in EUREKA programmes

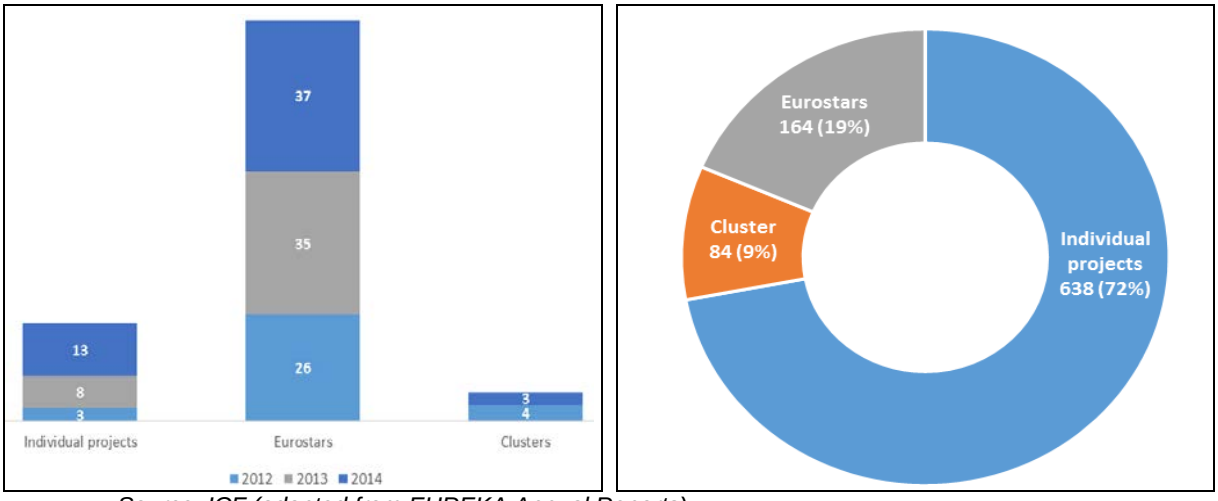
To date, the UK has been involved in a total of 886 EUREKA projects.[65] A majority of these projects (72%) were 'Individual projects' (projects where public funding (if any) comes entirely from the national funding agencies supporting the project) (Figure 3.32). However, the number of projects funded through Eurostars, which receives match-funding from the Horizon 2020 budget, has been more significant in recent years (Figure 3.31). As such, in 2014, 37 projects were funded through the Eurostars

[65] ICF calculation based on EUREKA Annual Reports (2013, 2014)

framework, representing nearly 70% of all EUREKA projects in which UK was involved in the same year. [66] EUREKA projects with UK participation, since the inception of EUREKA in 1987, were worth an estimated €937 million.[67]

Figure 3.31 UK's participation to EUREKA, 2012-14

Figure 3.32 Number of EUREKA projects with UK participation to date, broken down by project type (1985-2014)



Source: ICF (adapted from EUREKA Annual Reports)

3.3.2.3 UK participation in EUREKA Eurostars

Since its launch in 2008, the Eurostars programme has received 3,548 project applications over 10 cut-off deadlines. A budget of €468 million of public funding was mobilised for 783 projects that were approved during the six-year duration of the programme.

Eurostars-1, which ran from 2008 to 2013, had a total budget of €400 million, of which €400 million were provided by Eurostars Member Countries and €100 million from the FP7 budget. For the second wave of the programme (currently supported by Horizon 2020), Eurostars-2, the European Union, along with Participating States and partner countries, committed €1.14 billion for the funding and operations of the programme.

Table 3.7 presents the UK's participation in Eurostars-1. UK organisations participated 223 times, and received a total of €58.32 million in EUREKA match-funding, compared to €802 million of EU funding allocated to UK SMEs under FP7.

[66] EUREKA Annual Report 2014
[67] EUREKA Annual Report 2013

Table 3.7 EUREKA Eurostars-1 – Overview of UK participation and funding

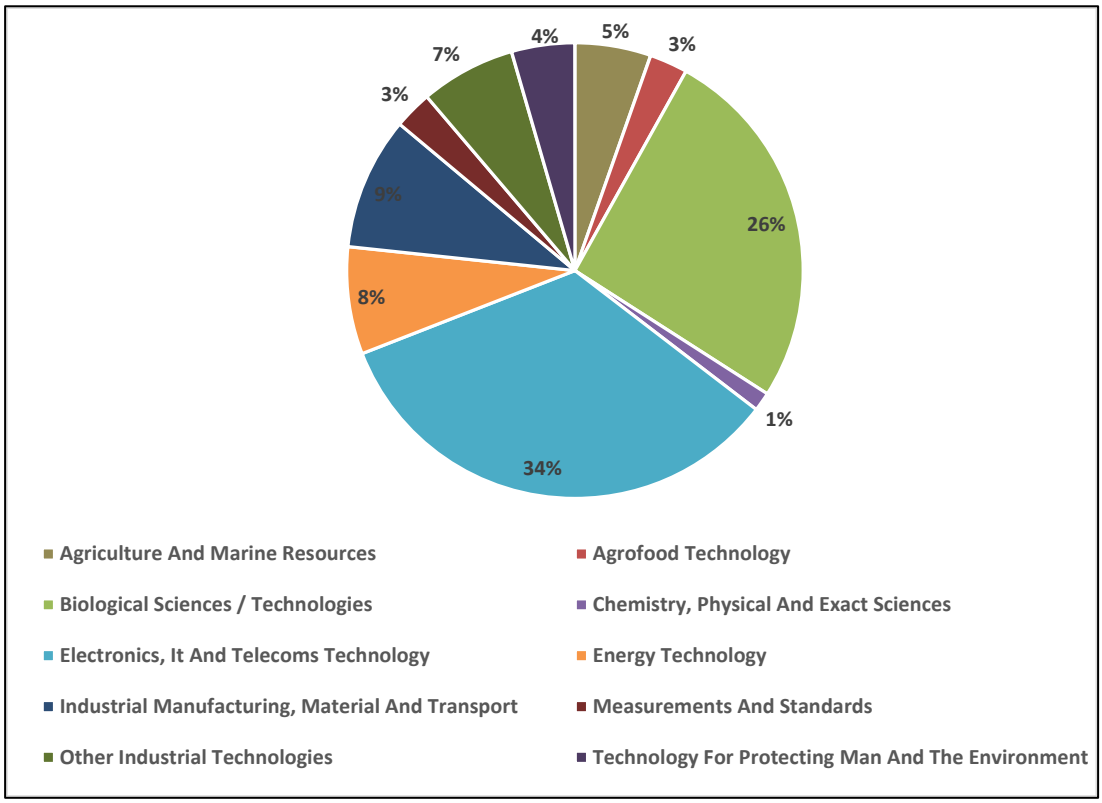
Project start year	Number of participations	Total project costs (million €)	EUREKA contribution (60% of total costs) (million €)
2008	1	€ 0.19	€ 0.11
2009	24	€ 9.59	€ 5.75
2010	40	€ 16.13	€ 9.68
2011	42	€ 19.40	€ 11.64
2012	58	€ 24.53	€ 14.72
2013	49	€ 23.47	€ 14.08
2014	9	€ 4.23	€ 2.54
Total	**223**	**€ 97.54**	**€ 58.52**

Source: EUREKA secretariat

3.3.2.4 Technology domains

Although the number of projects funded in the ICT and industrial sectors has grown rapidly in recent years, a majority of EUREKA projects in the UK have been in the biotech/medical sector. As depicted in Figure 3.33 below, 35% of all EUREKA projects with UK participation between 2010 and 2014 were in the biotech/medical sector, followed by the ICT and industrial sectors. A similar picture is presented when looking at UK participations in Eurostars-1 (Figure 3.33). ICT (34%) and Biotech (26%) were the dominant sectors represented. Energy (8%), Manufacturing/Materials/Transport (9%) and agriculture and marine resources (7%) follow.

Figure 3.33 UK Eurostars-1 participations by technology domain (2007-2013)



Source: EUREKA Secretariat

Compared with the study team's analysis of FP7 projects with UK involvement (section 3.1), this suggests that EUREKA covers a more limited number of thematic areas and industries – mostly these represent thematic areas with high commercial potential, and areas where UK SMEs are particularly competitive. The focus areas of activity also roughly correspond with product groups with the highest business R&D investment during the same period.

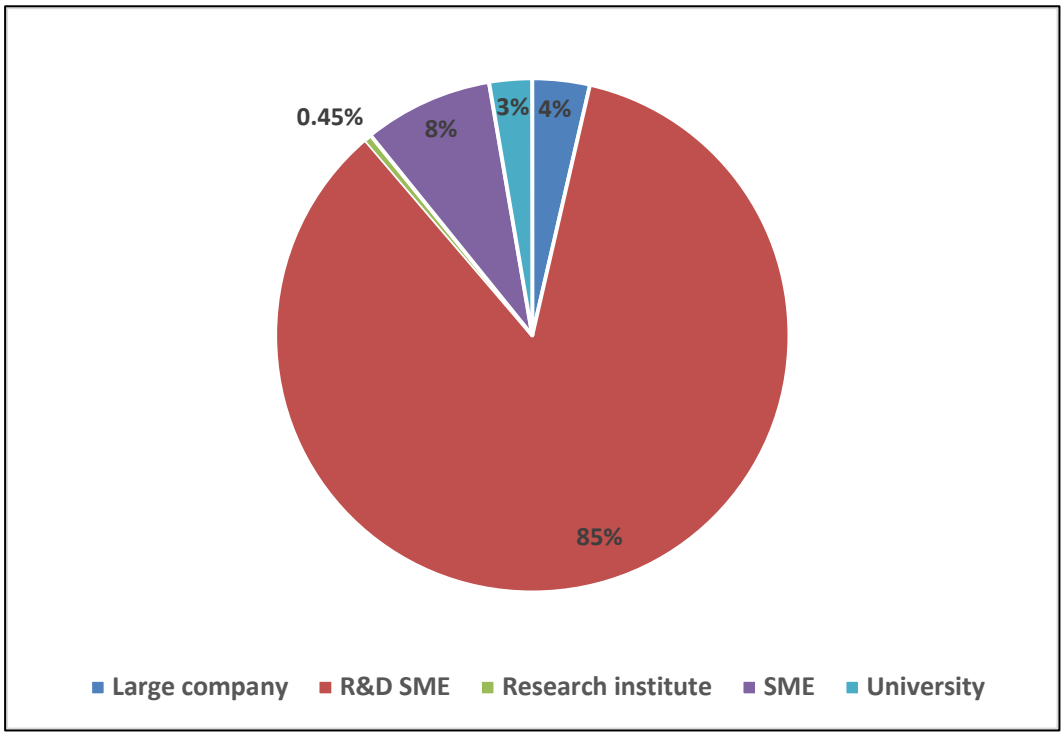
3.3.2.5 Types of UK participants

Over the period 2010-14, participating organisations in Eurostars have mostly been SMEs, large companies and universities/research institutes. 85% of participations represent R&D performing SMEs[68] and 8% other SMEs. The remaining 7% of UK participations represent larger companies, universities and larger companies. Figure 3.34 provides a breakdown of UK participations by organisation type.

This presents a largely different picture than FP7, where universities were the dominant participants (60% of all UK FP7 participations represented universities (versus 37% for all of FP7), universities received 71% of EU funding allocated to the UK respectively (versus 43% for all of FP7).

[68] With minimum of 10% of FTEs dedicated to R&D or minimum of 10% of turnover spent on R&D. https://www.eurostars-eureka.eu/sites/default/files/publications/eurostars-sme.pdf [accessed 12th March 2016].

Figure 3.34 UK participation in Eurostars-1 (2007-2013), by type of organisation



Source: EUREKA Secretariat

3.3.2.6 Success rates in Eurostar competitions

The average UK rate of successful applications across EUREKA Eurostars-1 was 22%, broadly comparable to the overall success rate achieved by the UK in FP7, and above the success rate of FP7 as a whole.

Assuming that almost all UK Eurostars applicants were private commercial undertakings, the average success rates of UK Eurostars applicants by participations and funding requested were largely comparable to those of private commercial applicants from the UK in FP7 (27% and 23% respectively). It has to be noted however that the CORDA data provided did not allow disaggregating for SME applicants based in the UK, and therefore a more detailed comparison of success rates between FP7 and Eurostars was not possible.

Table 3.8 presents an overview of UK applicants, proposals and success rates for Eurostars cut-off dates between 2008 and 2015.

Table 3.8 Eurostars – UK applicants, proposals and success rates 2008-2015

Call year	No. of applicants	No. of proposals	Matched funding (€m) =60% of total costs	No. of participants	No. of funded projects	Matched funding (€m) =60% of total costs	Success rate (participants)	Success rate (matched funding requested)
2008	6	5	€ 1.19	2	2	€ 0.29	33%	25%
2009	61	57	€ 15.88	20	17	€ 5.04	33%	32%
2010	103	89	€ 24.65	31	26	€ 7.38	30%	30%
2011	172	142	€ 42.31	31	22	€ 9.22	18%	22%
2012	141	122	€ 35.63	29	26	€ 7.07	21%	20%
2013	188	147	€ 47.24	40	34	€ 12.29	21%	26%
2014	141	127	€ 35.40	42	37	€ 10.53	30%	30%
2015	110	101	€ 27.40	15	13	€ 4.39	14%	16%
Total/ Average	***922***	***790***	***229.7***	***210***	***177***	***56.21***	***25%***	***25%***
Total/ Average 2008-2013	***671***	***562***	***166.9***	***153***	***127***	***41.29***	***26%***	***26%***

Source: EUREKA secretariat

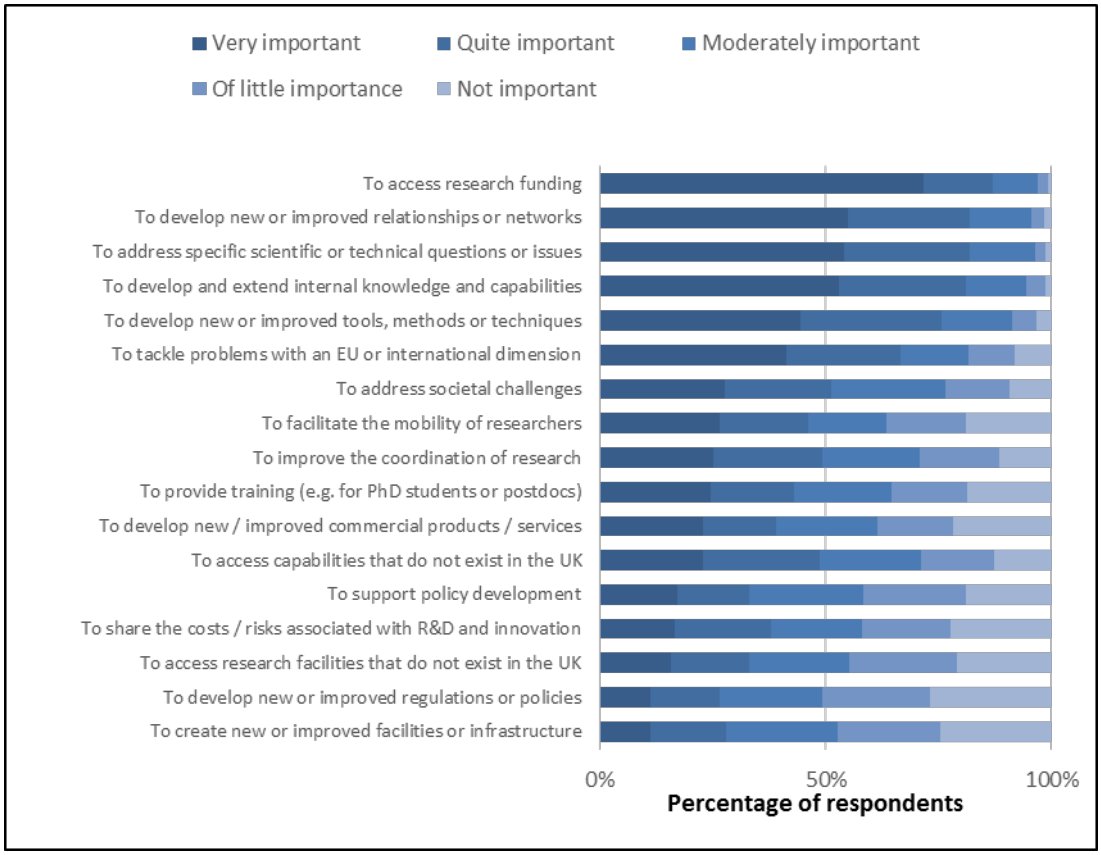
3.4 Factors influencing participation

3.4.1 Motives for participation

3.4.1.1 Participants

The reasons why UK organisations and research individuals have become involved in FP7 were many and various (Figure 3.35). The primary motive among participants was the opportunity to access research funding – 72% of respondents cited this as a very important motive. More than half of the participants also considered: the development of new or improved relationships or networks (55%); the desire to address specific scientific or technical questions or issues (54%), and to develop and extend internal knowledge and capabilities (53%) to be very important motives. A large minority also rated developing new or improved tools, methods or techniques (44%) and tackling problems with an EU or international dimension (41%) as quite or very important motives for their participation in FP7.

Figure 3.35 Importance of factors as motives for UK participation in FP7 projects (n=474)



Source: ICF survey of UK FP7 participants February 2016

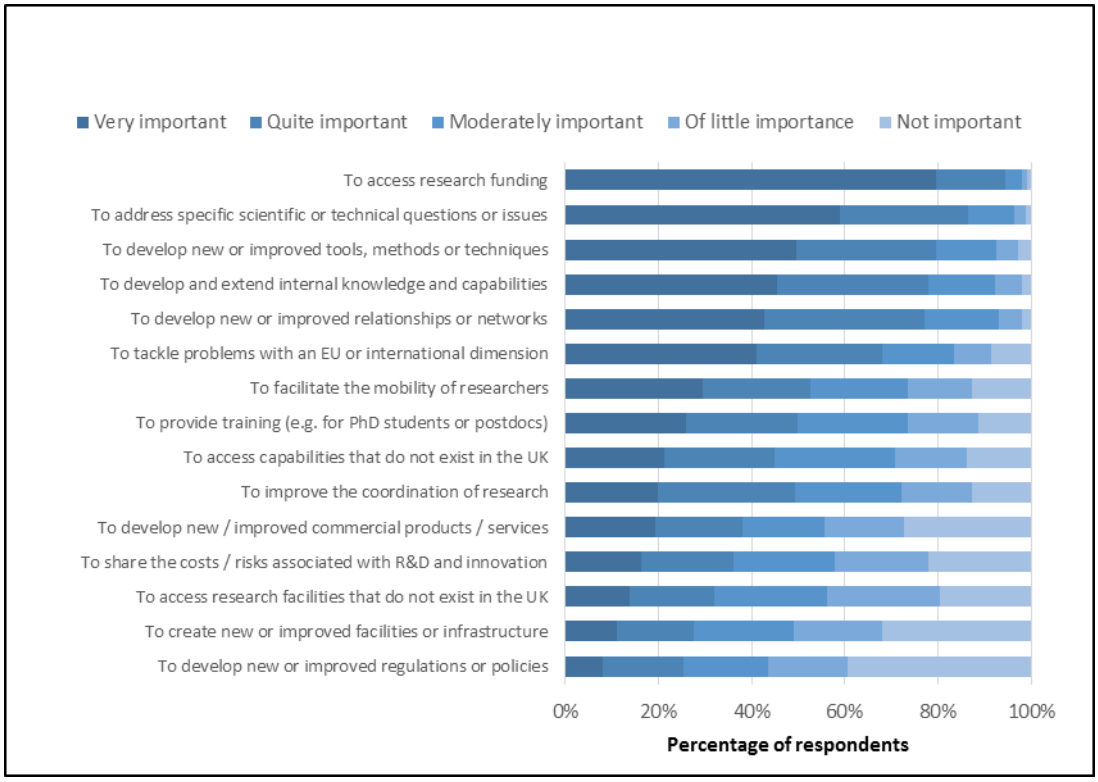
3.4.1.2 Unsuccessful applicants

The motives for participation did not differ markedly for unsuccessful applicants (Figure 3.36) when compared to successful applicants. To access research funding was again the most important motive for applying, and was in fact rated as very important by a higher proportion of unsuccessful applicants than successful. Notably, the development of new or improved relationships or networks was rated as very important by a lower proportion of unsuccessful applicants.

The profiles of respondents in the two groups (successful and unsuccessful applicants) were similar: in both cases, over 60% of respondents were representatives of academic institutions. SMEs representatives were the second most common type of respondents across the two groups, followed by public research institutes, large companies, private research institutes and public bodies. Therefore, the reasons for differences regarding motives for applications cannot be attributed to different respondent profiles across the two groups.

It is possible to hypothesise that the observable greater focus on simply accessing research funding rather than on collaboration and network building contributed to the lack of success within the competition, though this is beyond the scope of this research.

Figure 3.36 Importance of various factors as motives for applying to FP7 funding for unsuccessful applicants (n=643)



Source: ICF survey of UK unsuccessful FP7 applicants, February 2016

3.4.2 Relevance of FP7 research topics and instruments for FP7 participants[69]

The relevance of the research topics and instruments used within FP7 was a major factor influencing participants' ability and willingness to apply. UK participants were asked to rate the relevance of FP7 research topics, priority areas and calls for research in their own area, and also the relevance of the FP7 project instruments for the research they planned to conduct. Three-quarters (75%) of respondents (Figure 3.37) indicated that the relevance of both the topics and the instruments was high or very high for the research they wished to conduct, and most of the remainder indicated that they were of medium relevance.

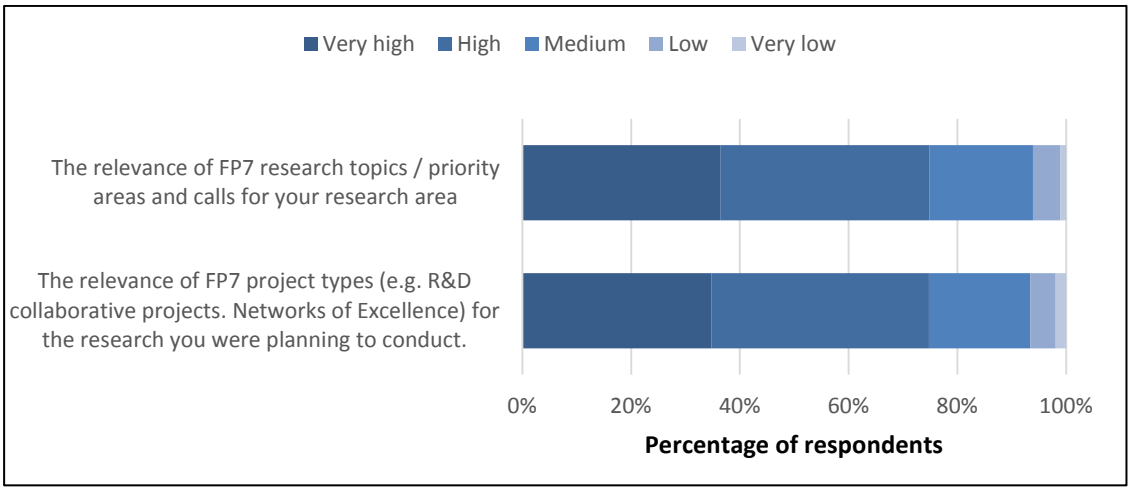
A small proportion of respondents (6%) rated FP7 research topics as of low or very low relevance. When asked to explain, most of these respondents indicated either that their area of research was not a priority for FP7 or that the research topics and calls were too narrowly prescribed 'top down' to be a good fit with the work they wished to carry out. Others described the topics as too politically influenced and not connected to real world needs or to efficient outcomes.

A small proportion of respondents (7%) also rated FP7 instruments as of low or very low relevance. Here participants highlighted that FP7 encouraged partnerships that were often too large, and made it harder for SMEs to participate. Others mentioned

[69] This section covers responses from successful FP7 participants.

that the political nature of the FPs mean that its collaborative instruments do not fit well with how science is conducted and reported outside of the FPs.

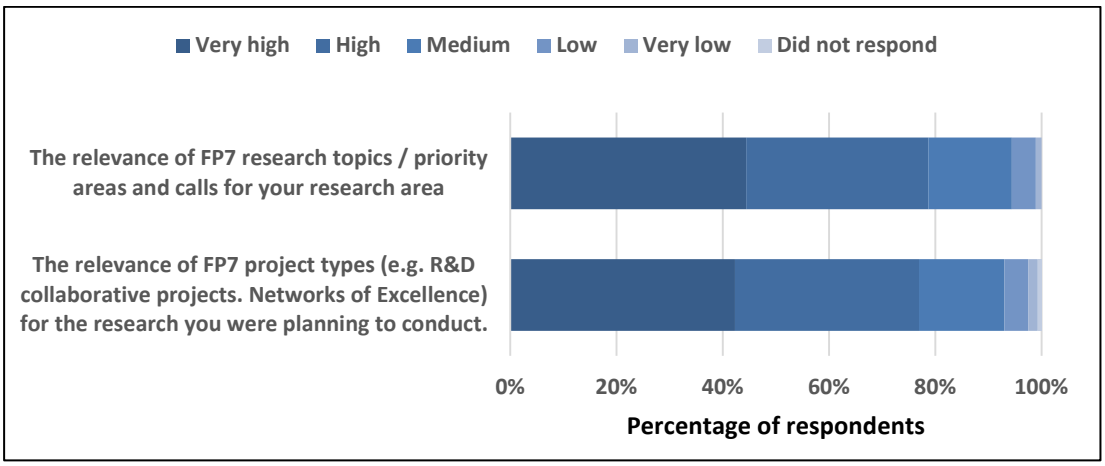
Figure 3.37 Relevance of FP7 research topics and instruments (n=473)



Source: ICF survey of UK FP7 participants February 2016

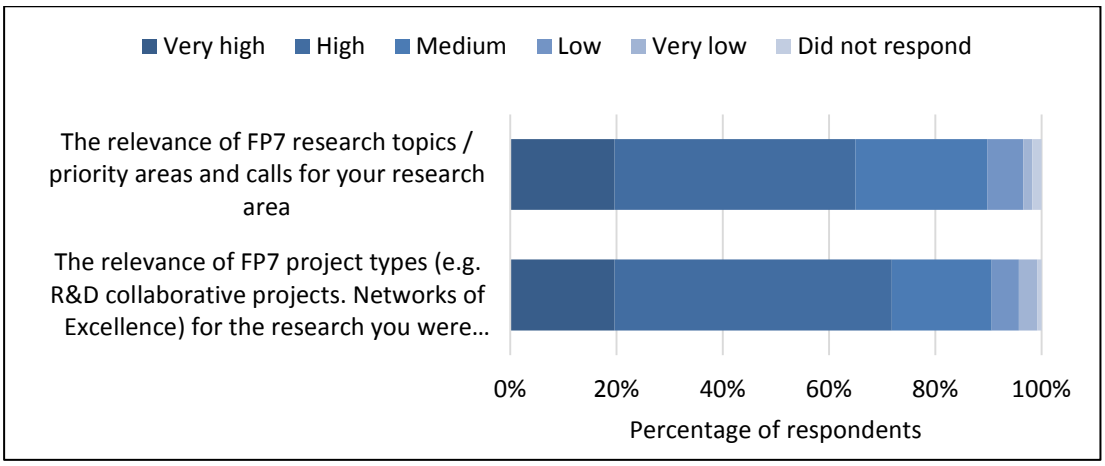
As shown in Figure 3.38 and Figure 3.39, relevance was scored the highest by universities: over 40% of university respondents believed that relevance of topic and instruments was 'very high', compared to 20% of companies.

Figure 3.38 Relevance of FP7 research topics and instruments: universities (n=286)



Source: ICF survey of UK FP7 participants February 2016

Figure 3.39 Relevance of FP7 research topics and instruments: companies (n=117)



Source: ICF survey of UK FP7 participants February 2016

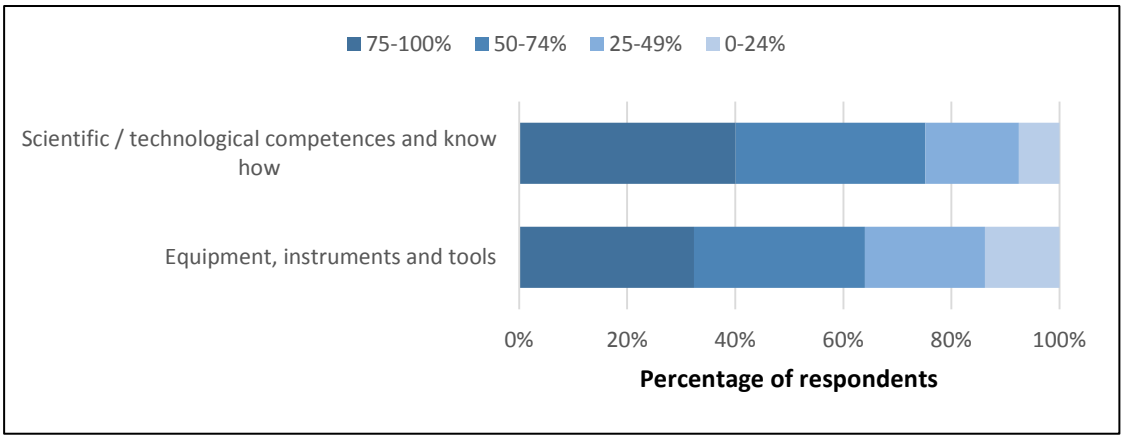
3.4.3 Quality of partners involved in FP7

Given the importance of new relationships and networks as a motive for participants, and the important role afforded to international collaboration within the FPs, the quality of partnerships is a key factor influencing levels of involvement.

UK participants were asked to estimate the proportion of their project partners who might be considered world class in relation to (i) their scientific / technological competences and know-how, and (ii) their equipment, instruments and tools. Most UK participants consider the majority of their partners to be world class on both counts (Figure 3.40). Three-quarters (75%) of respondents indicated that half or more of their partners were world class in terms of their scientific / technological competences and know how, while almost two-thirds (64%) indicated that half or more of their partners were world class in terms of their equipment, instruments and tools.

These results suggest that, in the eyes of the participants, the vast majority of FP7 projects are helping UK participants to cooperate with world class organisations, and thereby access some of their scientific and technological expertise, know-how and equipment.

Figure 3.40 Proportions of UK participants' FP7 partners considered to be world class (n=452)



Source: ICF survey of UK FP7 participants February 2016

Views on quality of partners

Case study AMAZE

The partnership formed mainly on the initiative of the former coordinator at the European Space Agency. Around 50% of the consortium had worked together previously, on a bilateral and multilateral basis, and the ability of the coordinator to assemble and manage international consortia was very helpful in this regard. A number of core partners had been involved in unsuccessful proposals to FP7 in the past, including an early version of AMAZE, which helped understand better how to balance the consortium for the AMAZE project between different application areas with different cost bases, and the complementarity of needed technology.

Case study FLUTCORE

The research topic required a critical mass of effort and resources which were not available in the UK. It was therefore of pivotal importance to go beyond the support and funding programmes available at the national level to

- *Access contract manufacturers to produce materials*
- *Access expertise in virus led particles and other scientific expertise not available within UK*
- *Combine data and resources*
- *Cover different regions of Europe to prepare and conduct a clinical trial*
- *Combine IQUR tandem platform with knowledge and IP on specific protein targets which can be used to produce vaccines.*

The European partnership provided critical input for the project.

Case study FORTISSIMO

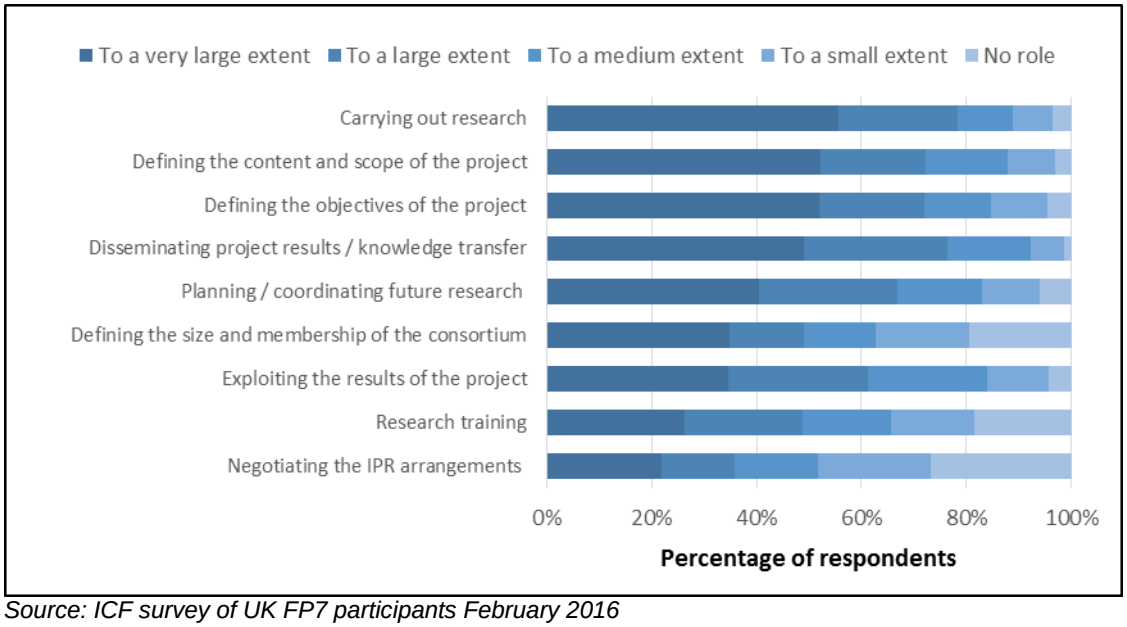
The decision to fund Fortissimo through FP7 funding was largely influenced by the project coordinator's extensive experience with EU research Framework Programmes. Another key motivating factor was the opportunity to work with leading researchers and industry players at European and/or international level.

3.4.4 Roles played by UK participants

In order to extract maximum value from their involvement it is often (although not always) favourable for participants to play a central role across the various stages of their projects (definition, implementation, exploitation). A third (30%) of UK participants answering the survey occupied the role of coordinator for their project, 54% described themselves as partners (i.e. regular participants) and 14% as the project developer (i.e. commercial firms assisting in the bidding process and taking on administrative management of the project, without taking on the formal coordination role).

UK participants played a very active role across almost all elements of their FP7 project's planning, implementation and exploitation (Figure 3.41). More than two-thirds of survey respondents were involved to a large or very large extent in defining the objectives, scope and content of the project, conducting the research, disseminating the results of the project, and planning future research. By comparison, the participants were less centrally involved in elements such as research training and negotiating intellectual property arrangements.

Figure 3.41 Extent to which UK organisations were involved in specific elements of their FP7 projects (n=474)



Source: ICF survey of UK FP7 participants February 2016

3.4.5 Open innovation

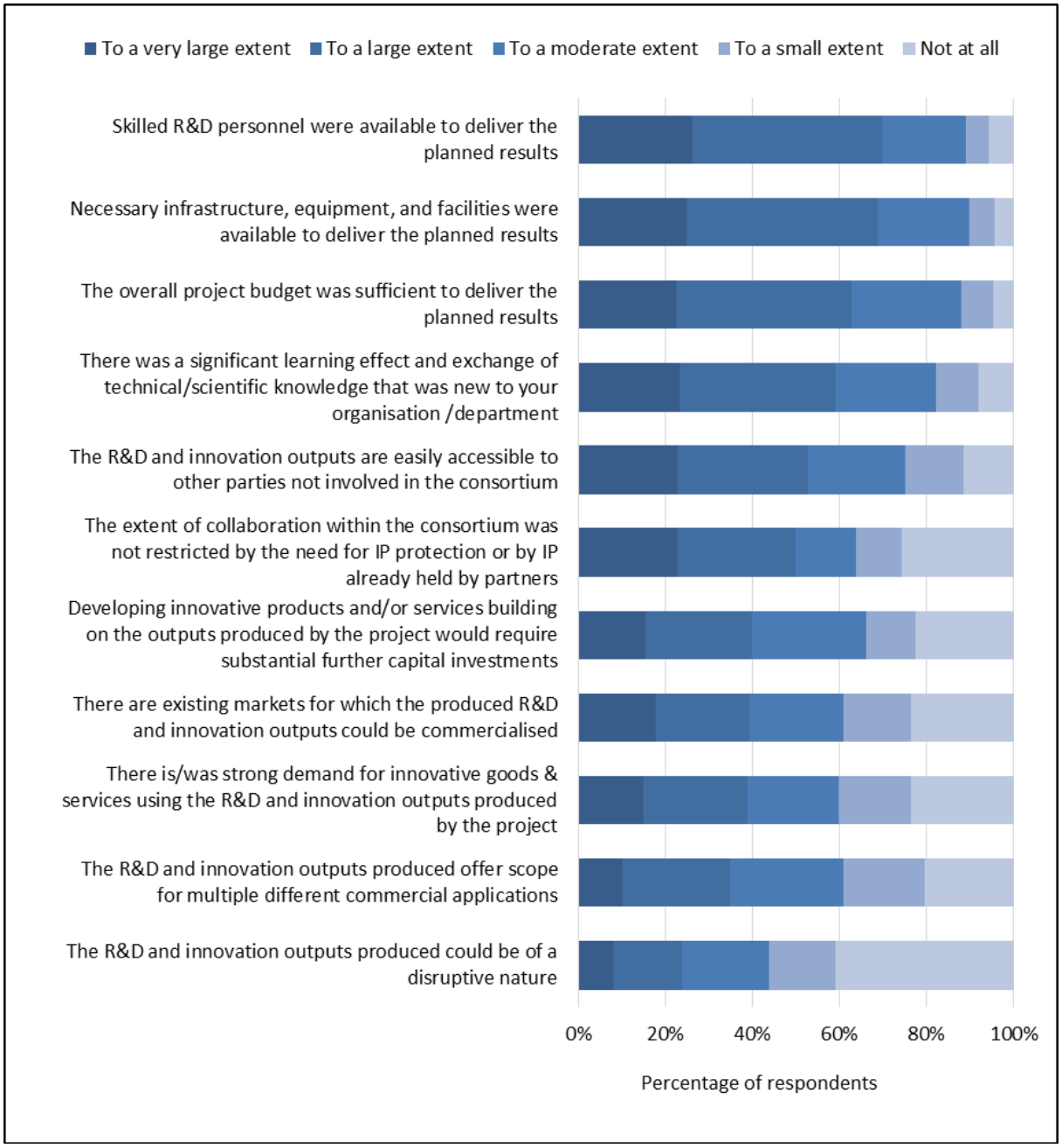
Open innovation systems are associated with stronger opportunities to access research resources, for knowledge sharing and associated knowledge spillovers supporting and adding value to the research undertaken. Open innovation also provides the opportunity to better understand the market potential and the potential for more disruptive innovation.[70]

[70] Disruptive innovations create new markets and value chains, and eventually replace existing markets and value chains.

The survey results (Figure 3.42) indicate that the main advantages of FP7 as an open innovation system was in the access to resources, with collaboration at EU level providing the potential for greater pooling of resources. Most participants also reported good levels of knowledge exchange, with limited intellectual property restrictions.

Around 40% of participants reported that conditions for commercialisation were fulfilled to a large or very large extent, in relation to demand for goods and services around project outputs, existing markets that could be exploited, and the scope for different commercial applications. Less than a quarter of participants, however, considered the outputs produced to be of a disruptive nature.

Figure 3.42 Extent to which projects were undertaken within an open innovation framework (n=460)



Source: ICF survey of UK FP7 participants February 2016

3.4.6 Use of support services - participants

3.4.6.1 Use of UK National Contact Point support services

National Contact Points (NCPs) provide free support service to applicants to EU research funding programmes. NCPs assist applicants with the selection of the most suitable funding schemes, administrative and contractual procedures, the application process and the building of consortia. They also liaise with the European Commission to clarify the scope of the call for proposal topics.

NCPs cover all the themes in the scope of the FP7 and Horizon 2020 programmes:

- NCPs hosted by Innovate UK provide support on legal issues across all sectors, and advice regarding specific sectors71 and SME-relevant areas of the programme.
- NCPs hosted by UKRO and the Research Councils provide advice on funding from the European Research Council and Marie Curie Actions. They also provide support in different thematic areas72.
- The Science and Technology Facilities Council NCP advises on research infrastructures.
- The Medical Research Council NCP supports applicants in the area of health, wellbeing and demographic change.
- The EU Energy Focus NCP provides support in the area of energy.
- While not part of the NCP network, the Enterprise Europe Network (EEN) cooperates with the NCP network in providing targeted support to SMEs.

UK participants were asked about the use of NCP support services when considering and applying to FP7. Of the 475 participants completing the survey, 21% had used NCP support services at the proposal stage, 67% had not, and the remainder were unsure or did not know whether they had.

The most widely used services of those provided by NCPs were in helping applicants understand FP7 administrative and financial eligibility criteria for applying and rules for conducting the project (80% of those that used NCP services). Many applicants also sought help with understanding the thematic, scientific and technical focus of the call for proposals and funding topics (72%), in order to identify suitable calls and topics for their own ideas. By comparison, applicants were much less likely to look to NCPs for help with their proposal or consortium, with only a minority taking up assistance around identifying project partners (33%), negotiating budgets or contracts (38-45%), or resolving IPR arrangements (33%).

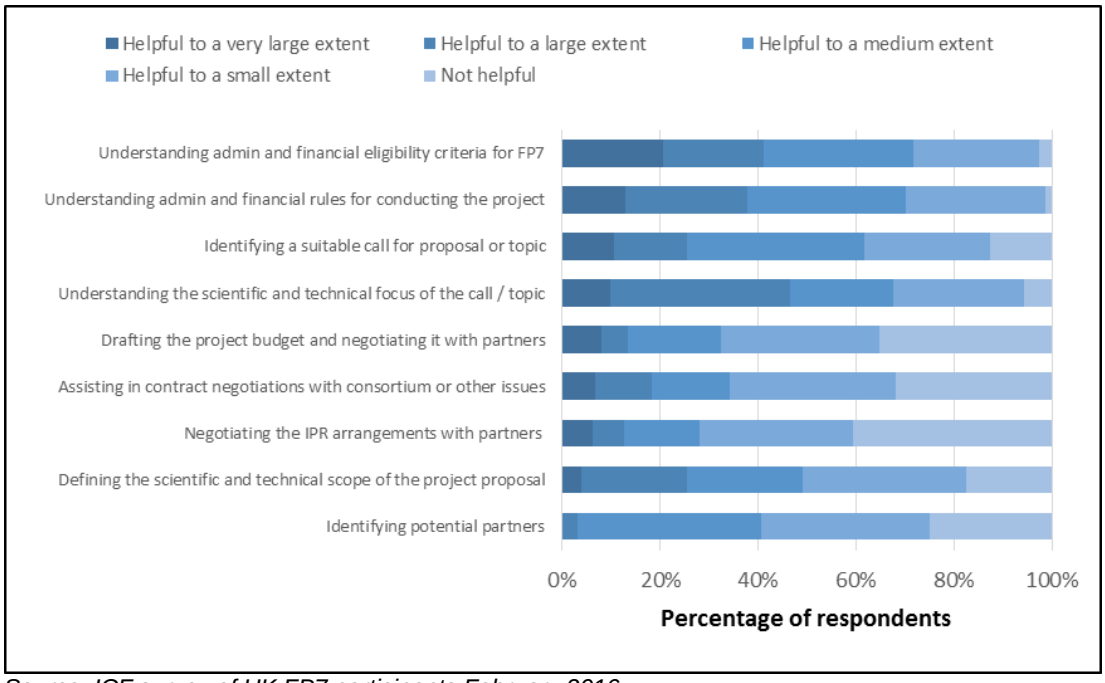
[71] Namely, advanced manufacturing and processing; climate action, environment, resource efficiency and raw materials; food security, sustainable agriculture and forestry, marine and inland water research, bioeconomy health, wellbeing and demographic change; ICT and future and emerging technologies; nanotechnologies and advanced materials; secure societies; space and transport.

[72] Science and society; social science and humanities; inclusive, innovative and reflective societies; widening participation among EU Member States; and inclusive, innovative and reflective societies.

3.4.6.2 Feedback on NCP support services

Those who stated that they had used NCP services were then asked to provide feedback on the utility of the support they had received. The results are presented in Figure 3.43 and reveal a fairly mixed set of feedback. Around two-thirds of respondents gave positive feedback (medium-very high ratings) for the helpfulness of the support they had received around understanding FP7 – whether on the eligibility criteria, rules for applying, calls for proposals or in identifying suitable topics. However, in cases where the support provided related to the internal project arrangements – agreeing budgets, negotiating IPR, defining the partnership and scope of the work – the NCP support was rated by most respondents as either not helpful or only helpful to a small extent.

Figure 3.43 Extent to which different elements of support provided by NCPs at proposal stage was helpful to participants (n=474)



Source: ICF survey of UK FP7 participants February 2016

Taken together these results suggest that prospective applicants to the FPs are most likely to need and appreciate help in understanding the programmes themselves, and are less likely to need or appreciate help with sorting out the project and consortium arrangements.

Qualitative feedback provided on the NCP support indicated that a small proportion of respondents felt that the support requested was not forthcoming or that the advice received was of little use. A much larger proportion attested to the invaluable advice and assistance provided by NCPs, in many cases making the difference between success and failure at the proposal stage. NCPs were applauded for providing key links to EC project officers, critical advice on EC legal and financial rules, awareness raising and advice on individual proposals. No qualitative feedback was provided on assistance with project and consortium arrangements, which interviewees and survey respondents were less likely to request.

Of those receiving support from NCPs at proposal stage, 25% indicated that their FP7 participation would **not** have been possible if the NCP support had been unavailable. This suggests that the support provided is critical in up to a quarter of cases, and helpful though not necessarily vital to success in the remaining cases.

Participants provided a range of suggestion on improvements that could be made to NCP support, primarily involving ensuring more resources are available to allow NCPs to widen and extend their current service provision, particularly around briefing seminars, warning of upcoming calls, advice on specific proposals, lobbying for UK projects to be funded, and outreach. Further feedback on how institutional and national support to applicants can be improved is presented in Section 3.4.6.4 below.

It should be noted that most of the feedback on national support services related to experiences with FP7, and that the NCP network resources have been increased for Horizon 2020.

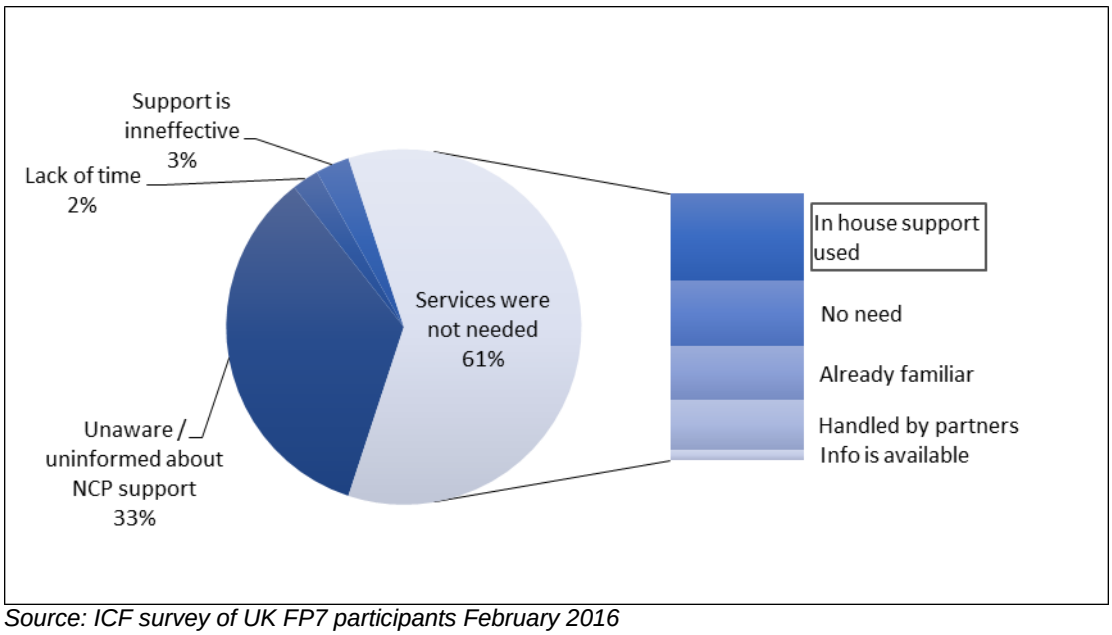
3.4.6.3 Feedback on why NCP support is not taken up

Participants who had chosen not to use the support offered by the NCPs were asked to explain why this was the case. The responses provided have been summarised in Figure 3.44 and show that in most cases (61%) the NCP support was considered unnecessary, either because effective in-house support was available or preferred, because the applicants were already familiar or experienced in FP7 rules and procedures, or because other partners took the lead in the proposal preparation phase.

While most UK participants felt they did not need the NCP support services on offer, one third (33%) of our respondents indicated that they were unaware of the NCP support system and didn't know what help was on offer or who to contact. This implies that there is still further work to be done to ensure that the availability of NCP services are more widely and actively notified to prospective participants.

The remaining respondents indicated that either a lack of time (2%) or a lack of confidence in NCP support provision (3%) were the reasons for not taking up the support. Overall, there were no noticeable differences between different organisation types.

Figure 3.44 Reasons why NCP support was not taken up (n=84)



Source: ICF survey of UK FP7 participants February 2016

3.4.6.4 Use of other (institutional or commercial) support services

Almost three quarters (71%) of UK participants indicated that, at the proposal stage, they had made use of support services offered by their organisation internally or from a commercial service provider. Of these, the vast majority (90%) had used internal support services, with only 10% employing private (commercial) support services. The remaining respondents either had not used any (internal or commercial) support (26%) or did not know (3%).

3.4.6.5 Additional support services needed

UK participants provided a range of suggestions as to how the support services available could be strengthened, as follows:

- **Awareness raising** - More information on what help is actually available at national level and through the NCP network is required (7%). A further 5% of respondents suggested that a greater number of awareness raising and training seminars and workshops would be helpful in alerting UK actors to opportunities.
- **Advanced warning of calls** - More and better information on calls for proposals would be useful, in particular targeted advance warning of calls of interest (10%). This would require the creation of a registry to enable national agencies and NCPs to match upcoming calls to interested UK actors.
- **Partner identification** - Improved support around partner searching and matching would be helpful, particularly in order to enhance industry / SME participation in the programmes (13%).
- **Help with proposal preparation** - More and better support with proposal preparation and bid writing, including provision of feedback on draft proposals and conformity checking services was the most popular suggestion (26% of respondents). A further 7% asked for more help and support around the application and selection processes in general.

- **Financial assistance** - Improved financial support to applicants and participants, either through financial support towards the costs of proposal preparation or in terms of contribution to the cost of projects not covered by the EU (12%).
- **Guidance on how to succeed** - Better advice and guidance based on actual successes, provided where possible by those with direct experience of programme participation and success (9%).

Smaller numbers of participants asked for more and better information on the financial and administrative rules of the FPs, an area of uncertainty for many prospective participants (5%); a need for improved coordination of the UK's positions, strategies and networks, in order to maximise the opportunities presented by the FPs (4%); more support to lobby for UK interests and topics, and greater political and practical support from the relevant UK government departments and agencies (3%). The remaining suggestions covered reduced administration, more credit to those who succeed in winning EU funding, improved access to European Commission officers, more general advice and tips, support for interviews and project management training.

3.4.7 Use of support services - unsuccessful applicants

3.4.7.1 Use of national NCP support services

Of the unsuccessful UK FP7 applicants responding to our survey, 37% had used NCP support services, 55% had not used them and 17% did not know. Based on this result, unsuccessful applicants were more likely than participants to have used NCP support. This may because the unsuccessful applicants were less experienced, and therefore both more likely to need support and also possibly more likely to be unsuccessful when applying.

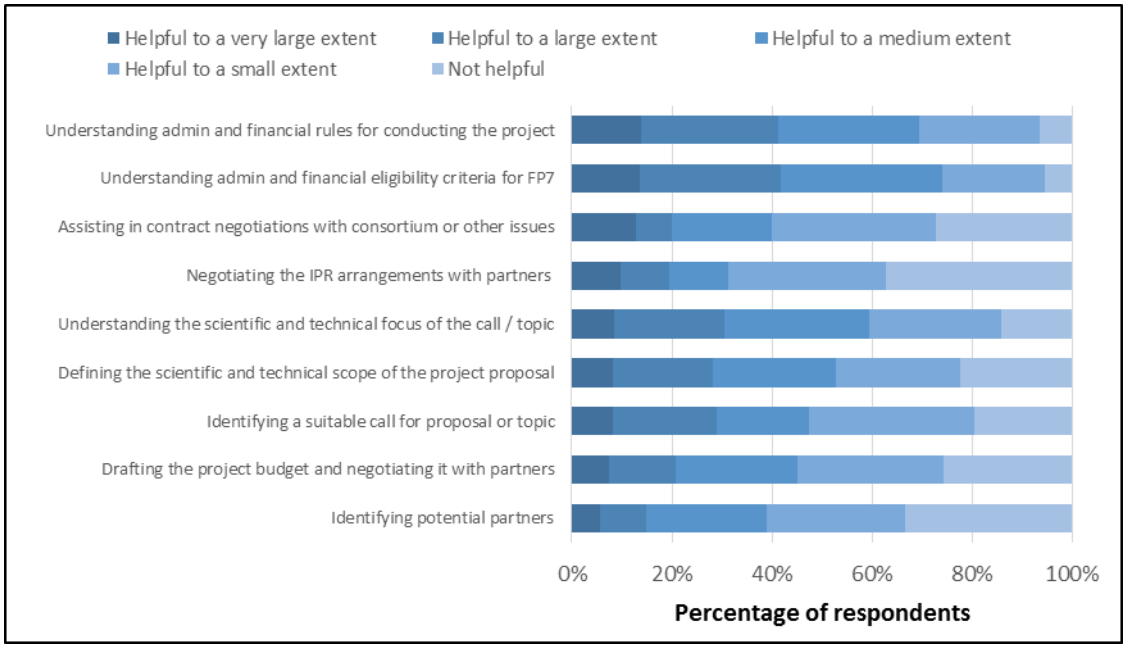
The services taken up most often by unsuccessful applicants were similar to those taken up by participants, focusing on understanding eligibility criteria, rules and procedures, and the content of the calls. Similarly, services around intellectual property arrangements and contract negotiations with partners were much less widely used.

3.4.7.2 Feedback on national NCP support services

Those who accessed support from NCPs rated the extent to which the NCPs' assistance had helped them in different aspects of their application to FP7 (Figure 3.45). The responses reveal that, overall, unsuccessful applicants provide more positive ratings to the NCP support received that do the successful applicants, even though they did not succeed with their bid.

Additionally, the results indicate that compared to participants, unsuccessful applicants rated support around identifying partners as more helpful, possibly because the new partners identified may be of future use or interest. Compared to participants, unsuccessful applicants rated the support around understanding the scientific / technical focus of the calls as less helpful, indicating perhaps that some proposals had been rejected due to a lack of understanding in this area.

Figure 3.45 Extent to which different elements of support provided by NCPs were helpful to unsuccessful applicants



Source: ICF survey of UK unsuccessful FP7 applicants, February 2016

Unsuccessful applicants who accessed NCP support were asked whether they believed that their FP7 application would have been possible without assistance from NCPs. Almost two thirds (65%) thought that they would have been able to apply without NCP assistance, while 13% would thought that they would have not been able to do so and 21% did not know. Compared to participants, unsuccessful applicants rated the support as slightly less vital to their ability to apply.

3.4.7.3 Use of other (institutional or commercial) support services

Unsuccessful applicants were asked whether they had made use of any application support services offered by their organisation internally or from a commercial service provider. Close to three quarters (74%) of unsuccessful applicants had used one of these services. Most of these (88%) had made use of internal support, and commercial providers had helped the remainder (12%). The responses provided by participants were largely similar to those provided by unsuccessful applicants.

3.4.8 Reasons for preferring EUREKA and COST over FP7

Apart from the online surveys conducted, the study team spoke to a number of businesses who had participated 1) both in FP7 and EUREKA programmes and 2) exclusively in EUREKA programmes.

Businesses interviewed generally considered FP7 to be more ‘difficult’ to apply for, and thought EUREKA programmes were better aligned to the requirements of industrial research.

The following main reasons for preferring alternative funding programmes were mentioned by interviewees:

- **Resources needed at FP7 pre-application stage**: it was felt that, to be successful, applicants need to invest significant resources at a pre-application stage in order to create contacts with European Commission staff and obtain a good understanding of the EU research agenda. The lack of resources to engage in this process was perceived as a barrier to SME participation.
- **Resources needed at FP7 application stage**: the application process was perceived as particularly burdensome. Complex application procedures combined with low success rates represented an important barrier, especially for SMEs. Many commercial interviewees outlined that they had used services and resources of experienced academic institutions to reduce their costs.
- **Resources needed for administration of FP7 projects**: interviewees reported that resources for project management, monitoring and reporting were too high and not always covered by the project budget, thus causing high internal project management overheads.
- **Low success rates, in particular for Horizon 2020**: non-applicants reported that low success rates, in combination with the issues outlined above, had considerably increased the risk of applying for the Framework Programme.

Overall, stakeholders interviewed perceived Eurostars to be more effective in delivering commercial impacts, however the choice of programmes under Horizon 2020 was considered to be more suited to business participants. Reasons for preferring FP7 over EUREKA mentioned by interviewees also related to scale and scope of projects, with FP7 perceived to fund mostly complex and large R&D projects.

Reasons for preferring COST over FP7 programmes have not been directly investigated through surveys or interviews. However, a previous impact assessment of COST[73] suggests a couple of possible factors. FP7 generally is perceived by UK participants to provide stronger benefits, outputs and impacts relating to the implementation of research, improving knowledge and skills as well as in accessing research infrastructure or equipment when compared to COST.

COST applicants noted that cross-border networking was their prime reasons for participation, as well as gaining access to research funding and to disseminate project results. COST does not fund direct research activities, and is therefore often seen as a precursor or preparatory action for European research projects.

3.5 Conclusions

UK participation and funding achieved from FP7 has been strong

In FP7, the UK's performance has been strong, both in terms of overall participation levels and EU funding won. In comparison with the other EU27 member states the

[73] Technopolis (2014), COST impact assessment.

UK scored very well in terms of the amount of EU funding secured, both in absolute terms and relative terms.

Taking into account the relatively low investments in R&D, the UK performed very strongly in FP7 in terms of its overall participation and funding won. The UK won a total of €7 billion in EU funding in FP7 (or 15.4% of overall EU funding awarded in FP7), the second highest of all participating countries behind Germany.

FP7 was a relatively important funding source in the UK compared to other EU member states. From 2007-2013, FP7 funding constituted 3.1% of the UK's overall R&D investment but made up less than 2% of total in France (1.7%) and Germany (1.4%). FP7 was particularly significant for the UK's higher education sector, where it represented 7.2% of total investments in HE R&D in the period 2007-2013.

The UK recorded a total of 17,695 FP7 participations within 10,372 projects, representing 13.1% of all participations in FP7. A total of 2,909 discrete organisations from the UK participated in FP7 (10% of all participating organisations).

UK participants performed particularly well in securing funding form the Ideas and People programmes (funded respectively by Support for Frontier Research and Marie Curie instruments). Indeed, the UK success in these two programmes was higher than in FP7 as a whole and higher than any of the comparator countries considered, both in terms of participation and EU funding allocated.

Taking into account its relative GDP, and government and business investment in research and development (GERD), and the number of FTE researchers:

- The UK was 11th out of the EU27 in terms of the amount of EU funding secured adjusting for the levels of GDP of member states. The UK's funding was 16% above what might have been expected based on GDP.
- The UK was 14th out of the EU27 in terms of amount of EU funding secured adjusting for GERD. The UK's funding was 34% above what might have been expected based on the level of UK GERD.
- The UK was 7th out of the EU27 in terms of the amount of EU funding adjusting for the number of FTE researchers. The UK's funding was 24% above what might have been expected based on the number of FTE researchers.

On all of the above metrics, the UK outperformed other large EU economies such as Germany and France.

UK success rates in competitions were above average

The average proposal success rate of UK applicants when applying to FP7 was 22.1% - more than 1.5 percentage points higher than the FP7 average proposal success rate for all participating countries (20.5%).

Project proposals with UK participation had a particularly high success rate in the Health theme (24% compared to an average success rate of 14%), Nanosciences, Nanotechnologies, New Materials and New Production Technologies (23% compared

to an average success rate of 12%), the Environment theme (22% compared to an average success rate of 12%) and the European Research Council (13% compared to an average success rate of 10%).

UK participants coordinated by far the largest number of FP7 projects

UK coordination rates have been above those of Germany and France across FP7 and during the early stages of Horizon 2020. The UK coordinated a total of 5,101 FP7 projects (49% of projects with UK participation), substantially more than either Germany (3,119, 35% of projects with German participation) or France (2,664, 37% of projects with French participation). In Horizon 2020, the UK held 1,785 coordinator roles out of 3,112 participations so far (57%), a much higher proportion that either France (794 out of 1,885, 42%) or Germany (984 out of 2,427, 41%).

Whilst the UK showed strong presence in the Ideas and People programmes, it coordinated relatively less of the more traditional R&D projects conducted under the Cooperation and Capacities programme.[74]

The UK continues to provide a significant share of project coordinators in Horizon 2020. UK coordinators are responsible for 21% of all projects funded so far (1,785 out of 8,599 projects).

UK universities received the majority of EU funding under FP7

Universities represented 60% of all UK participations and received 70% of all funding allocated to the UK, a much larger presence than in other EU member states, but reflecting the dominant presence of the higher education sector in the UK's research and innovation system, in contrast to other large countries such as Germany and France. The relative industry share of UK participations ranked 23th out of all EU27 member states during FP7 (26% compared to an average of 31%). Within FP7, UK had the second lowest relative proportion of EU funding allocated to industry (18% compared to an average of 25%).

As regards the UK's share of overall participations, the UK was in the top five countries in terms of total level of FP7 involvement. Notable here were UK universities, which represented the largest share of overall FP7 university participation (21%), leading before Germany in second place (12%). UK businesses represented 11% of overall business participation in FP7, with the UK coming 2nd out of all countries (behind Germany and on par with France). SMEs from the UK represented 12% of all SME participation in FP7, the 2nd highest proportion behind Germany.

FP7 was dominated by a relatively small group of key organisations – the top 100 UK participants in terms of the number of projects won (just 3% of UK participants) accounted for 76% of all EU funding awarded to the UK (or €5.3 billion) and 70% (or

[74] It is important to note that coordination roles have different meaning across FP7. A large number of UK coordinators have led projects in the Marie Curie and Europe Research Council programmes, which are largely dominated by singe beneficiary projects (75% of all UK coordinators), a larger proportion than in Germany (50%) and France (61%). However the UK came second in terms of coordination roles behind Germany in the Cooperation programme, which is dominated by multi-partner, collaborative projects.

12,397) of all UK participations in projects. This compared to a slightly less high concentration across FP7 as a whole - the top 3% of FP7 participants overall which represented 54% of all participations and 64% of all EU funding awarded. This group of 100 organisations comprised 67 individual universities, 14 companies, 16 research organisations and three government bodies.

UK participants played a very active role across almost all elements of their FP7 project's planning, implementation and exploitation. More than two-thirds of survey respondents were involved to a large or very large extent in defining the objectives, scope and content of the project, conducting the research, disseminating the results of the project, and planning future research.

Participants had a variety of reasons to participate in FP7, and the topics and funding instruments in FP7 were highly relevant

Key motives to participate in Framework Programme funding were access to research funding (72%) as well as the development of new or improved relationships or networks (55%); the desire to address specific scientific or technical questions or issues (54%), and to develop and extend internal knowledge and capabilities (53%) to be very important motives.

Three-quarters (75%) of respondents) indicated that the relevance of both the topics and the instruments of FP7 were high or very high for the research they wished to conduct.

Whilst the UK share of projects across EU Framework Programmes has decreased, it has increased its share of participations and funding – with a particularly strong performance in Marie Curie Actions and the European Research Council over time

A review of trends in the UK performance in the EU Research Framework Programmes indicates:

The share of proposals with UK participation was higher in FP6 than in later programmes, falling from 40% in FP6 to 33% in FP7 to 28% in Horizon 2020 (to date). This fall is not an indication of diminishing performance but of changes to the FP instruments (in particular smaller projects with fewer partners and countries involved in each), as well as demand from a growing number of countries.

The share of projects with UK involvement has decreased over time. While the UK was present in 45% of projects in FP6 and 41% in FP7, it is present in only 36% of projects funded under Horizon 2020 so far. This mainly reflects a reduction in the numbers of partners and countries in an average FP project, and an increase in the overall number of projects supported. Similar falls can be seen for comparator countries such as Germany and France.

The share of UK participations out of all participations has been growing over time, increasing from 11.8 in FP6 to 13.1% in FP7 and 13.4% during Horizon 2020 so far. To maintain and even increase its share of participations as more countries participate indicates a continued very strong performance of the UK within the Framework Programmes.

The UK has achieved a significant positive increase in participation rates and financial returns from FP7 as compared to FP6, and high levels of performance within FP7 appear to have been maintained within Horizon 2020 to date. UK performance over time also appears to be strong in comparison to the key comparator countries of Germany and France.

The UK has consistently had a higher than average share of its participations within the Marie Curie Actions, accounting for 18%, 23% and 30% of UK participations in FP6, FP7 and Horizon 2020 respectively. This strong performance by the UK is also reflected in the fact that the UK accounted for 19% of all Marie Curie Actions participations in FP6, 20% in FP7, and 24% in Horizon 2020. These data indicate that the UK's exceptionally strong performance in Marie Curie Actions is increasing across successive FPs, and confirm that the UK continues to be the top destination in Europe for researcher training and career development.[75]

The UK has also performed extremely well in relation to European Research Council grants. In both FP7 and Horizon 2020 European Research Council grants have made up 7% of UK participations as compared to just 4% and 5% respectively within the programmes as a whole. In FP7 the UK was awarded 23% of all European Research Council participations – an exceptionally high share. The equivalent figure for Horizon 2020 is slightly lower at 20%, but is still exceptionally high.

The UK participates less in the Cooperation programme. This represented only 56% of all UK participations (compared to 66% for all of FP7) and only 52% of the EU funding allocated to UK participants (compared to 63% of all FP7 participants). These shares were higher in all of the other six comparator countries considered in this analysis. A similar picture is presented when looking at UK participation in Horizon 2020.

Compared to the overall FP7 profile, the UK's participation rates in FP7 were highest in the Health, Socio-economic Sciences and Humanities, Environment (including Climate Change), Security and Space priority areas. In each case the share of participations held by the UK was higher than the share within FP7 as a whole. This was particularly so for Health, where the UK participation rate was 33% higher than the FP7 rate. The relative strengths in areas such as health, as well as food, agriculture & biotechnology in terms of EU funding won, to some extent, reflect the relatively importance of these areas to UK's economy – considering that throughout 2007-2014, pharmaceuticals was the product group which saw the highest amounts of business R&D investment (20% in 2014).

During the first years of Horizon 2020, the picture has changed slightly. Here, the UK so far achieved a relatively strong performance in the Societal Challenge Nanotechnologies, Advanced Materials, Advanced Manufacturing and Processing, and Biotechnology, but was relatively weaker in the Environment/Climate Change area. Performance in the Societal Challenge related to Socio-economic sciences and Humanities was also less strong when compared to FP7, however as above this

[75] Whilst Marie Curie Actions funded both researchers leaving and joining the UK, a crude analysis of the researcher recruitments and secondments in FP7 Marie Curie Actions suggest that the UK saw a net income of researchers through these programmes – with proportionately less researchers leaving the UK than in comparator countries.

needs to be considered in the context of Socio-economic sciences and Humanities being mainstreamed across Horizon 2020. Furthermore, in Horizon 2020 Space is no longer an area of comparative strength

UK's participation in COST Actions has grown steadily in absolute terms in recent years, from 286 running Actions in 2011 to 369 Actions in 2014 with UK participation (+30%). However, in real terms, UK's access to COST Actions remained stable, with UK researchers accessing 99.7% of all running COST Actions in each year and thereby representing a dominant proportion of the overall participations in COST Actions. Furthermore, the UK has coordinated the highest number of all COST actions in the period 2007-2013 of all countries although this 'preference' for UK coordinators is less pronounced than in FP7. Overall, UK researchers are a dominant group within the COST programme, in terms of applicants and participating researchers. They outperform both overall averages for other COST countries and averages for EU countries. However a direct comparison to FP7 is not possible, given the distinctly different nature of COST implementation.

In EUREKA, a majority of UK projects to date (72%) were 'Individual projects' (projects which are entirely funded by the national funding agencies supporting the project). With the introduction of the Eurostars programme, UK companies have taken a significant interest in this particular EUREKA funding scheme. From 2007-2013, UK companies participated 223 times in Eurostars, and received a total of €58.32 million in match-funding for this programme, compared to €890 million of EU funding allocated to UK SMEs under FP7. These projects covered a more limited number of thematic areas and industries – ICT (34%) and Biotech (26%) are the dominant sectors represented by UK participation. This corresponds roughly with areas that have seen significant R&D investment from UK businesses in the past (see section 1.2 for an overview of business R&D investment in the UK).

National support services are useful mostly for stakeholders without in-house support, however they are not known to a significant number of applicants

As regards the usefulness and relevance of the support offered by the NCPs, the following conclusions can be offered:

- National support services were not used by the majority of stakeholders interviewed and survey respondents – the majority of UK participants use effective in-house support or experienced partner organisations. Where national contact points have been used, their support has been useful in understanding FP7, and was deemed critical in around 25% of the applications supported. However more should be done to reach out to these potential applicants who could potentially make better use of NCP services.
- First-time applicants and applicants without strong in-house support are most likely to need and appreciate help in understanding the programmes themselves, and are likely to need or appreciate help with sorting out the project and consortium arrangements. Qualitative feedback provided on the NCP support indicated that most respondents considered the advice provided by NCPs as valuable. However a small proportion of respondents felt that the support requested was not forthcoming or that the advice received was of little use, and more focus should be put on actively helping applicants to identify suitable project partners.

4 UK outputs, outcomes and impacts from participation in EU research programmes

This section summarises the main outputs and outcomes resulting from FP7 funded projects, reported by researchers. Outputs are understood to be the direct results of funded projects, whilst outcomes are understood to be expected mid-term results of projects likely to occur after projects have ended. Outputs, outcomes and impacts presented here should be understood in context – considering the nature of FP7 as a programme focussing on research at lower TRL, and the demographics of UK participants in FP7 which consisted of a large group of universities (60% of all UK participants), and to a lesser extent of private companies (26% of all UK participants), as well as other organisations (14%). Perceived outcomes and impacts of COST and EUREKA are also reported in this section.

4.1 FP7 Outputs, outcomes and impacts

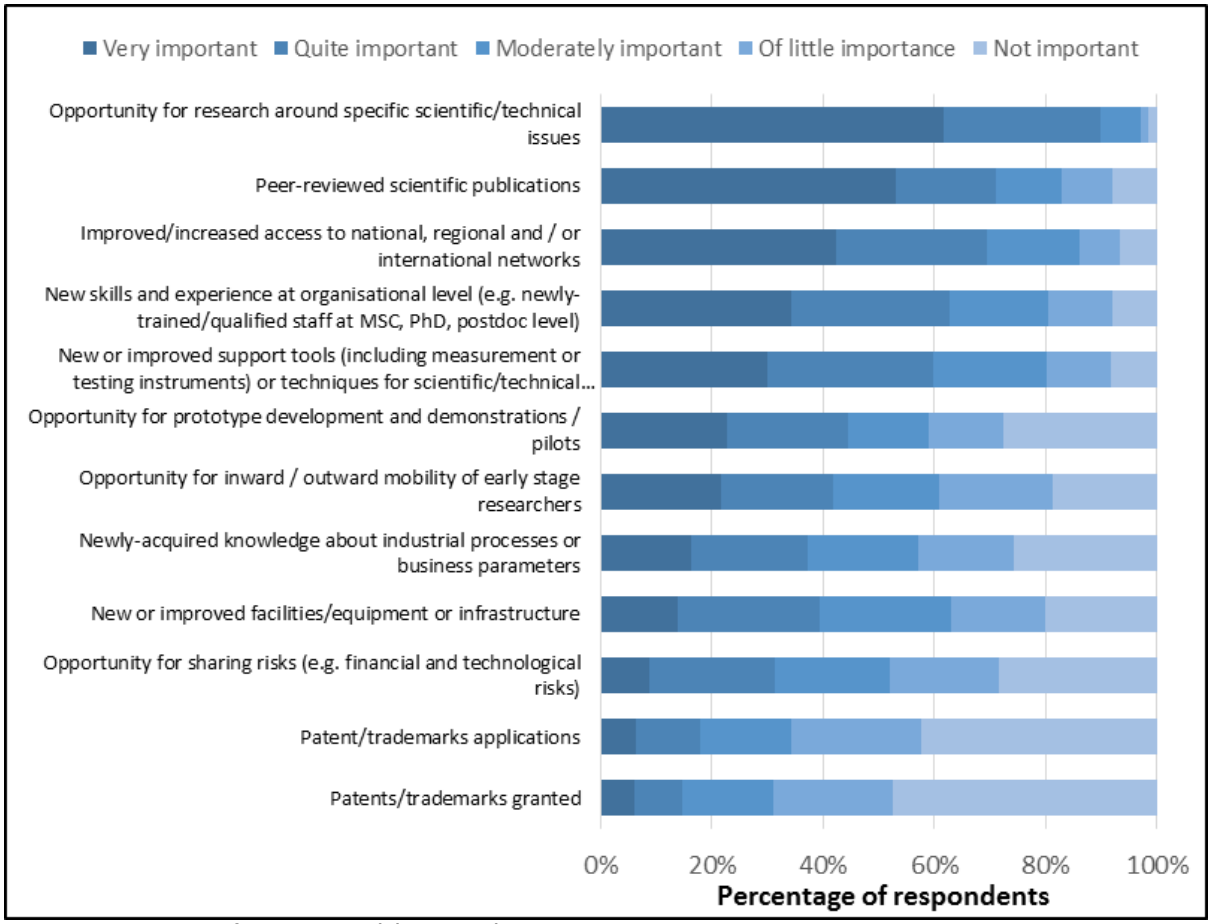
4.1.1 Research outputs of FP7

The survey sought to establish the views of the participants on what they considered to be the most important types of output, estimate the outputs that were generated from projects, and the extent to which these outputs met expectations.

4.1.1.1 Importance of research outputs

UK participants were asked to indicate the importance they attach to various types of research output. The opportunity to conduct research on specific issues of interest to the researcher and the scope to produce peer-reviewed publications were very important to a majority of respondents (Figure 4.1).

Figure 4.1 Importance of various types of outputs to UK FP7 participants (n=472)



Source: ICF survey of UK FP7 participants February 2016

Accessing research networks, acquiring new skills and developing new tools and techniques were also quite or very important to more than half of those providing feedback. Conversely, more commercially orientated outputs such as generating patents, risk sharing and investing in new facilities were of little or no importance for the majority of participants. This is unsurprising as only a minority of FP7 projects focussed on close-to-market R&D activities.

The relative importance of different outputs varies between different organisations. University researchers rate (i) the opportunity to carry out research and (ii) improved access to networks as key outputs. In comparison, private companies did not rate peer-reviewed publications or new skills acquisition as of high importance but instead rated (i) opportunities for prototype development and demonstrations / pilots, and (ii) newly-acquired knowledge about industrial processes or business parameters as among the most important outputs.

4.1.1.2 Quantification of research outputs

Participants were asked to quantify, where applicable, the number of a range of different types of output produced by their FP7 project. Peer-reviewed journal articles are the most widely generated output (76% of respondents) and most numerous (14.7 per project on average), most likely a result of universities representing the majority of survey respondents and UK participants in FP7.

Other large-scale outputs related to the recruitment and training of specialist researchers (68% of participants, with an average of five FTEs per project) and scientific exchanges and networking (67% of participants sending their own personnel on visits overseas and 57% hosting personnel from other institutions abroad).

Commercially oriented outputs were far fewer in number: less than one in five (14%) of the respondents' projects made one or more new patent applications, and just 3% applied for one or more form of intellectual property right. Again, this is likely a result of universities representing the majority of survey respondents and UK participants in FP7. Table 4.1 provides an overview of outputs reported by all respondents.

Industry respondents were more likely to report new patent applications (26% of all industry respondents) compared with respondents from universities (11%) and applications for intellectual property rights (8%) compared with respondents from universities (2%). University respondents were more likely to report articles published/accepted for publication in peer-reviewed journals than industry respondents (84% compared with 58%, respectively). University respondents were also much more likely to report the recruitment of researchers specifically for the project compared to respondents from industry (79% compared with 48%, respectively).

Table 4.1 Quantification of outputs by survey respondents (n=475) (all survey respondents)

	No. of respondents reporting at least one output	Proportion of respondents reporting at least one output	Total no. of outputs reported	Mean no. of outputs per project	Largest no. of outputs from a single project
Articles published/accepted for publication in peer-reviewed journals	361	76%	6,085	14.7	160
Employees recruited specifically for the project? (in Full Time Equivalent)	323	68%	2,110	5.2	192
Researchers from your organisation that have undertaken or are undertaking research/scientific visits at other UK organisations or overseas as part of the project?	320	67%	1,158	2.7	100
Researchers from other UK organisations or from overseas that have undertaken or are undertaking research/scientific visits at your organisation as part of the project?	269	57%	2,190	5.3	350
New patent applications ('priority filings') made	68	14%	165	0.4	12
Trademark	14	3%	21	0.1	3
Registered Design	9	2%	11	0.0	3
Other IPR	13	3%	25	0.1	5

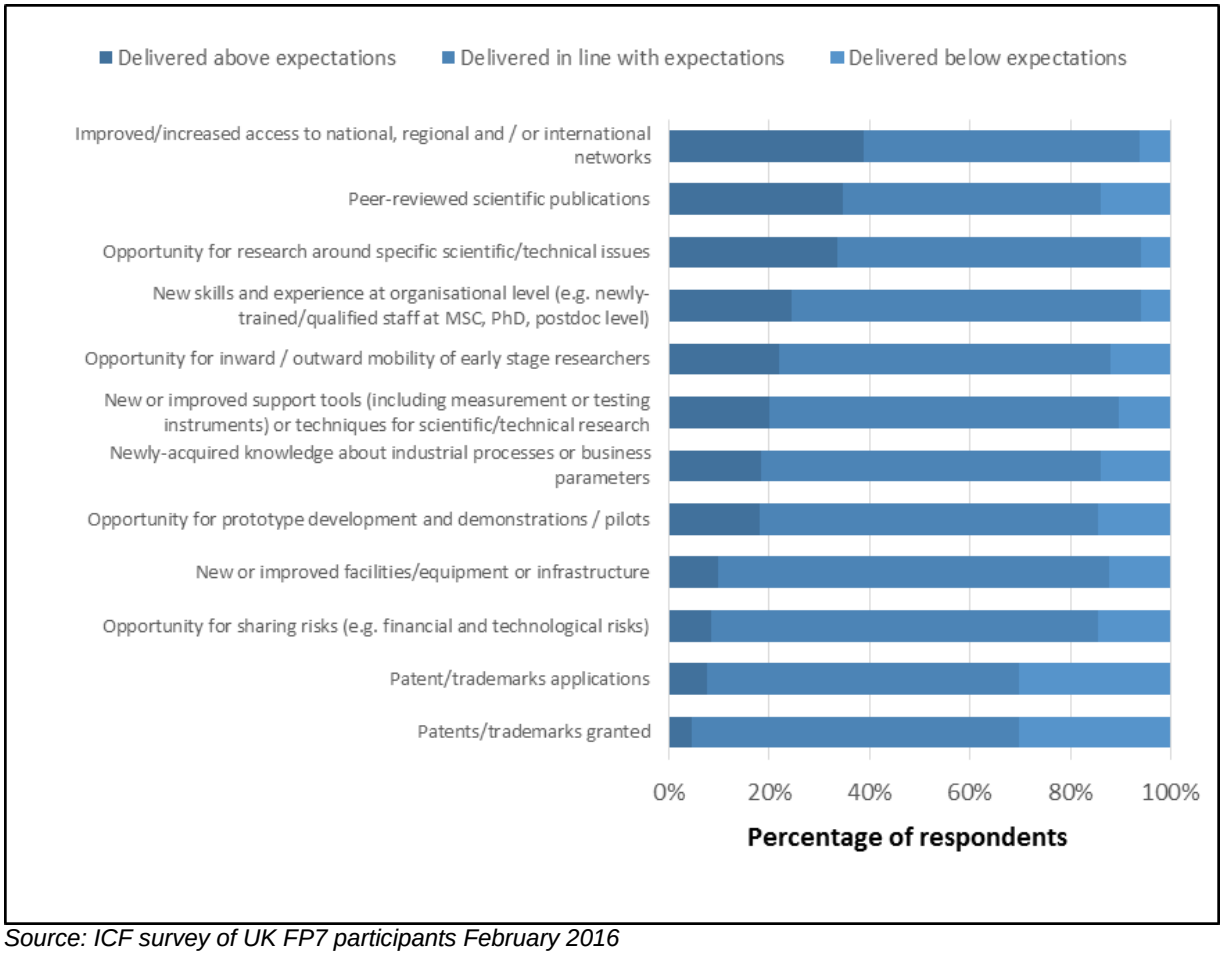
Source: ICF survey of UK FP7 participants February 2016

4.1.1.3 Extent to which outputs met participants' expectations

FP7 participants were asked about the extent to which their FP7 project had successfully delivered outputs to their satisfaction.

In almost all cases outputs were delivered in line with or above expectations (Figure 4.2), especially the most important outputs sought by participants – improved networks, opportunities for research and peer reviewed publications. Almost all of the listed outputs were delivered in line with or above expectations in more than 80% of cases.

Figure 4.2 Extent to which FP7 projects delivered outputs to participants' satisfaction (n=468)



Source: ICF survey of UK FP7 participants February 2016

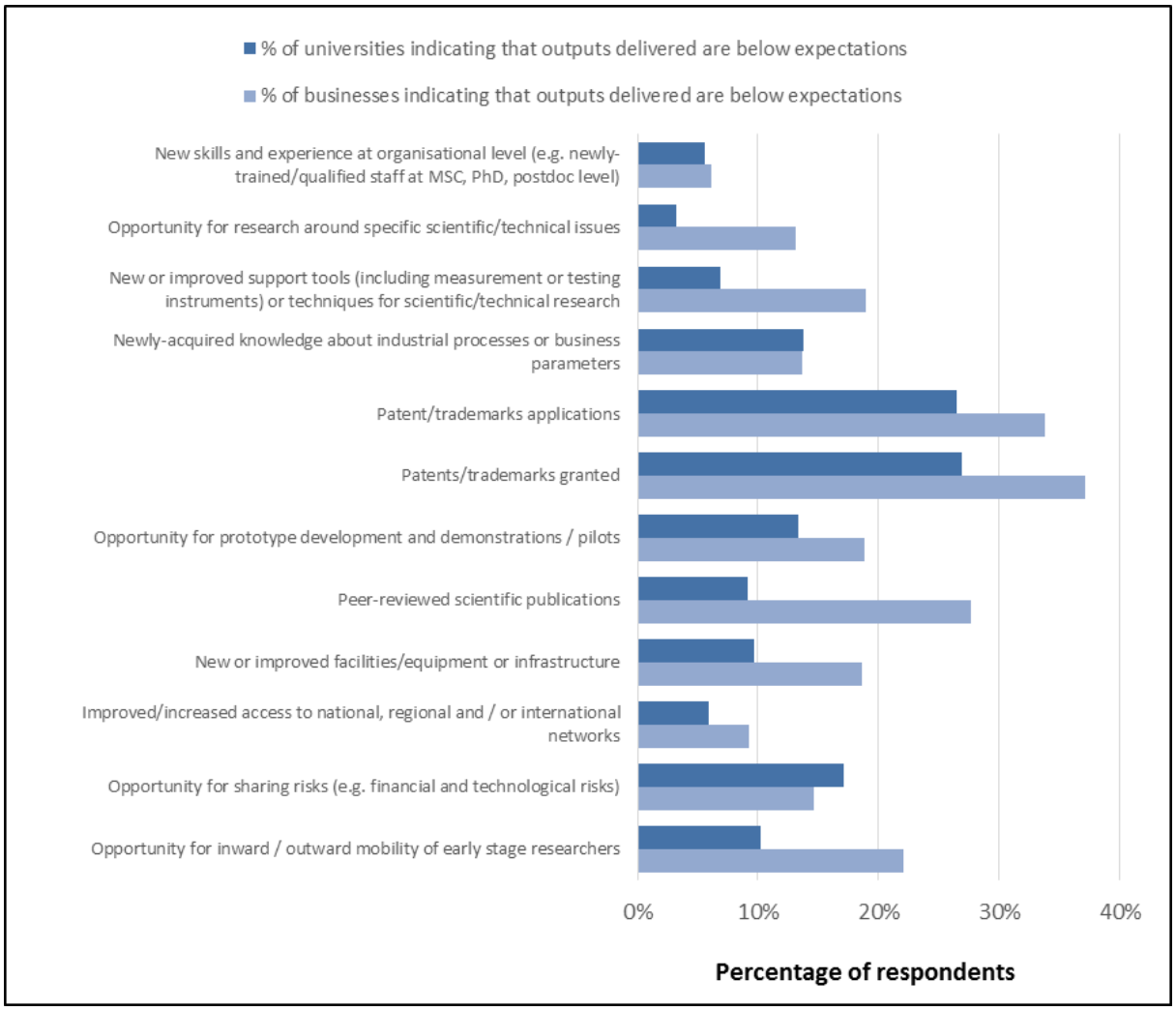
Only with respect to the more commercial outputs, such as patent and trademark applications, did a sizeable share of respondents (30%) report delivery below expectations. This should be understood in context of the demographics of UK participants in FP7 which consisted of a large group of universities, and to a lesser extent of private companies.

When comparing how far the FP7 experience differed between university and business participants, businesses generally reported outputs below expectations more frequently. When comparing responses from businesses to those from universities, it can be seen that businesses reported a significantly larger proportion of projects delivering below expectation (difference of 10% or more) in the following areas:

- new or improved support tools (including measurement or testing instruments) or techniques for scientific/technical research;
- patents/trademarks granted;
- peer-reviewed scientific publications; and
- opportunity for inward / outward mobility of early stage researchers.

Figure 4.3 below provides an overview of respondents from universities and businesses who indicated that their project delivered below outputs below expectations in certain areas.[76]

Figure 4.3 How far did FP7 projects deliver outputs below participant expectations (universities and businesses)



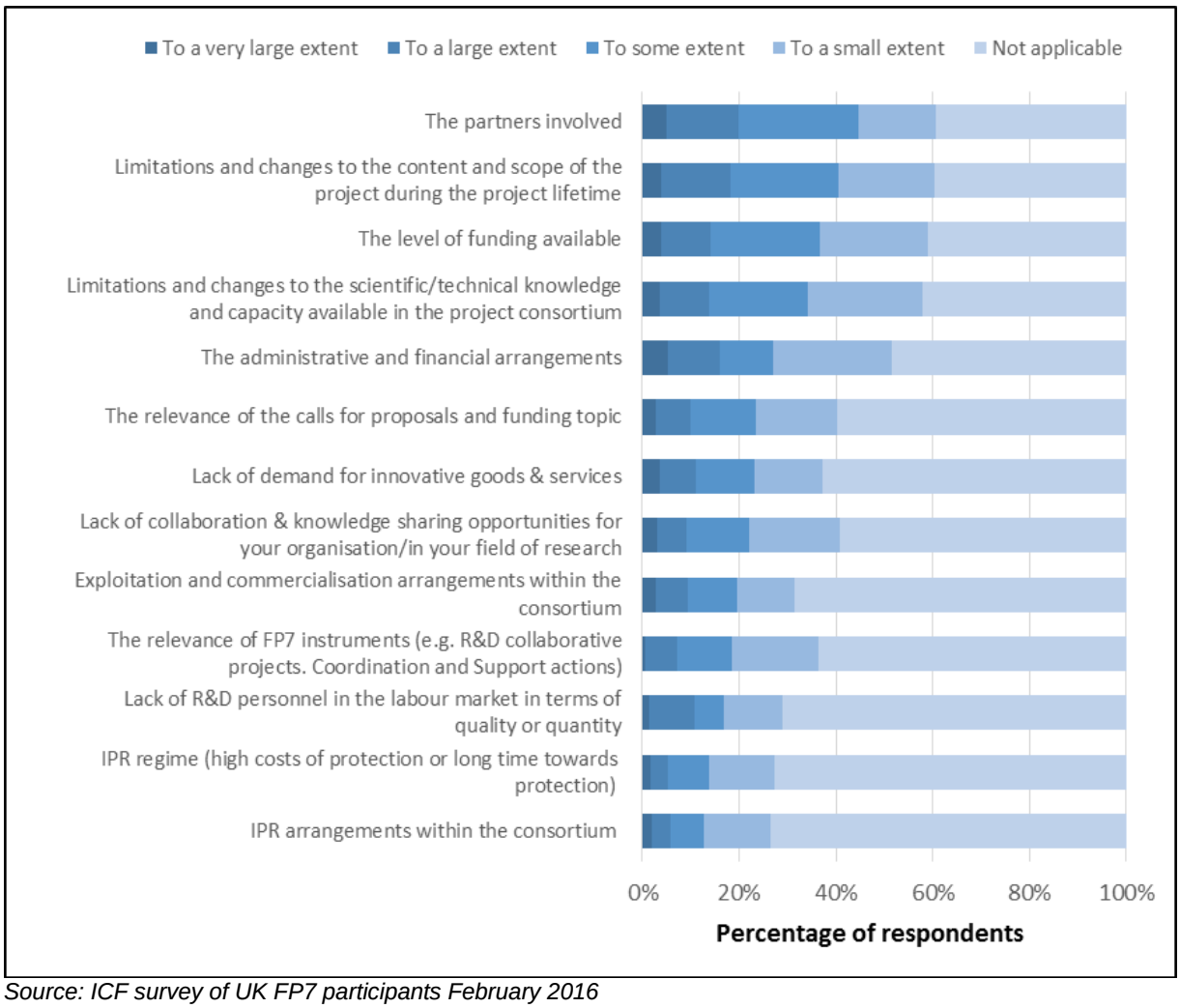
Source: ICF survey of UK FP7 participants February 2016

4.1.1.4 Reasons for outputs not meeting participants' expectations

Where FP7 projects had delivered outputs below expectations, participants indicated that the reasons for this were most commonly attributed (Figure 4.4) to the quality of project partnerships, limitations or changes to the scope or content of the project, the level of funding available, or limitations in the knowledge or capacity of the consortium. These reasons revolve around the project partners and their productivity rather than external factors such as levels of demand or lack of availability of skilled personnel. There is of course also always the possibility of research failure, i.e. projects failing to find the breakthrough or solution that was envisaged at project start.

[76] Note: Respondents indicating that a certain type of output was not relevant for their project and non-respondents are excluded from this analysis.

Figure 4.4 Reasons why outputs were delivered below participants' expectations (n=240)



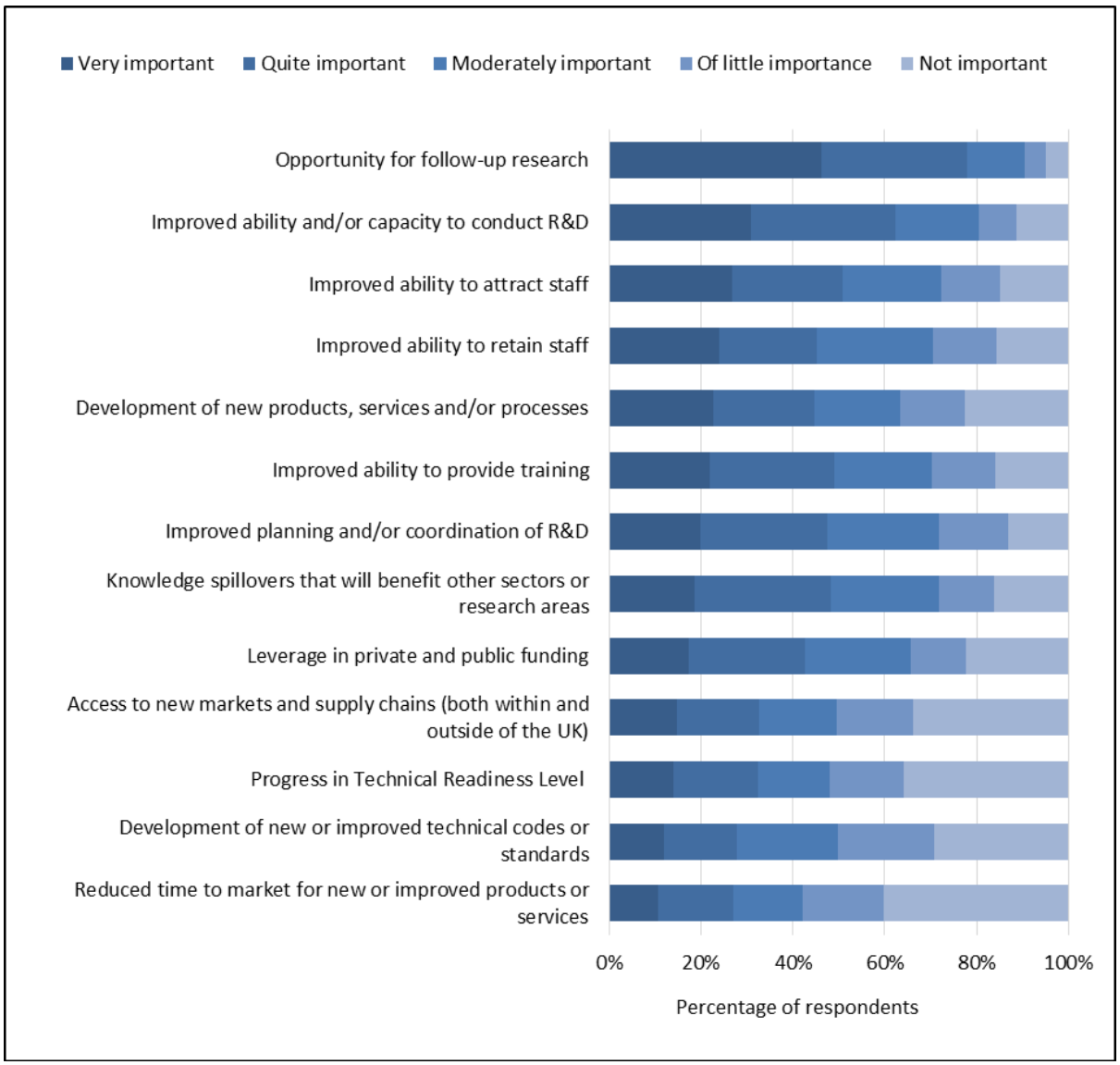
Source: ICF survey of UK FP7 participants February 2016

4.1.2 Research outcomes of FP7

4.1.2.1 Importance of outcomes

The most important outcomes resulting from the research activity and the outputs achieved were the opportunity and ability to follow-up research and the improved ability to attract and retain staff (Figure 4.5). Commercial outcomes compared with these outcomes were relatively less important, reflecting the weight of university respondents compared with businesses in the overall response. While all groups considered the opportunity for follow-up research to be an important outcome, companies rated (i) development of new products, services and/or processes, (ii) access to new markets and supply chains (both within and outside of the UK), and (iii) reduced time to market for new or improved products or services as among their most important outcomes. However, these were rated as relatively unimportant as outcomes to universities and research institutes, which instead prioritised improvements in internal capabilities, training and research performance.

Figure 4.5 Importance of various outcomes to UK participants (n=472)



Source: ICF survey of UK FP7 participants February 2016

4.1.2.2 Extent to which outcomes met participants' expectations

The achievement of outcomes met or exceeded expectations for the vast majority of projects. More than a third of projects (34%) delivered above participants' expectations with regard to providing opportunities for follow-up research, and almost a quarter (23%) delivered above expectations with regards to knowledge spillovers to other sectors or research areas. More than 90% of projects delivered at or above expectations in terms of improved ability to conduct R&D, the training provided and the ability to attract staff.

In terms of achievement of outcomes, industry respondents were more likely than university respondent to have achieved (i) newly-acquired knowledge about industrial processes or business parameters, (ii) opportunity for sharing risks (e.g. financial and technological risks), and (iii) leverage in private and public funding, at or above expectations.

Commercially oriented outcomes were more likely to be delivered below expectations, with one in five or more of the projects achieving less than expected in terms of development of new products and services, development of new codes and standards, access to new markets, and reduced time to market.

Respondents indicated that outcomes were relevant to a varying degree. More than half of university respondents indicated that the following outcomes were not relevant for their project: access to new markets and supply chains (both within and outside of the UK); reduced time to market for new or improved products or services; and progress in Technical Readiness Level. On the other hand, improved ability to provide training and development of new or improved technical codes or standards were highlighted by 43% and 39% of industry respondents respectively as not relevant.

University respondents most frequently indicated the following outcomes to be delivered above expectations: opportunity for follow-up research (39% of university respondents); improved ability and/or capacity to conduct R&D (22%) and improved ability to attract staff (19%).

Industry respondents most frequently indicated the following outcomes to be delivered above expectations: development of new products, services and/or processes (20% of all industry respondents), knowledge spillovers that will benefit other sectors or research areas (17%), access to new markets and supply chains (both within and outside of the UK) (15%) and opportunity for follow-up research (15%).

Impacts reported in case studies

Case study AMAZE

The main impact is seen in building pilot scale factories across Europe, which will help to demonstrate how individual components can be produced and how their production could be scaled up to a commercial level. These will be the first pilot scale facilities for the production of large scale components allowing the industrial partners to fully explore the cost benefit of additive manufacturing. The project has investigated in detail the production of 15 different components covering a wide range of materials, scales and manufacturing processes to develop the knowledge required for manufacturing by additive manufacturing.

Case study FLUTCORE

The project has enabled IQUR to leverage funding to use the tandem core technology™ for other vaccines and safeguard up to five research staff. For instance, a collaboration with the Edward Jenner Institute for Vaccine Research to develop a new malaria vaccine was currently being funded through the Innovate UK Biocatalyst programme.

If the phase I clinical trial is successful, the consortium will enter into a partnership with a large pharmaceutical company to carry out late stage clinical trials or sell the generated Intellectual Property.

Source: Case studies, details in Annex 3

When comparing how far the FP7 experience differed between university and business participants, businesses generally reported outcomes below expectations

more frequently. When comparing responses from businesses to those from universities, it can be seen that businesses reported a significantly larger proportion of projects delivering outcomes below expectation (difference of 10% or more) in the following areas:

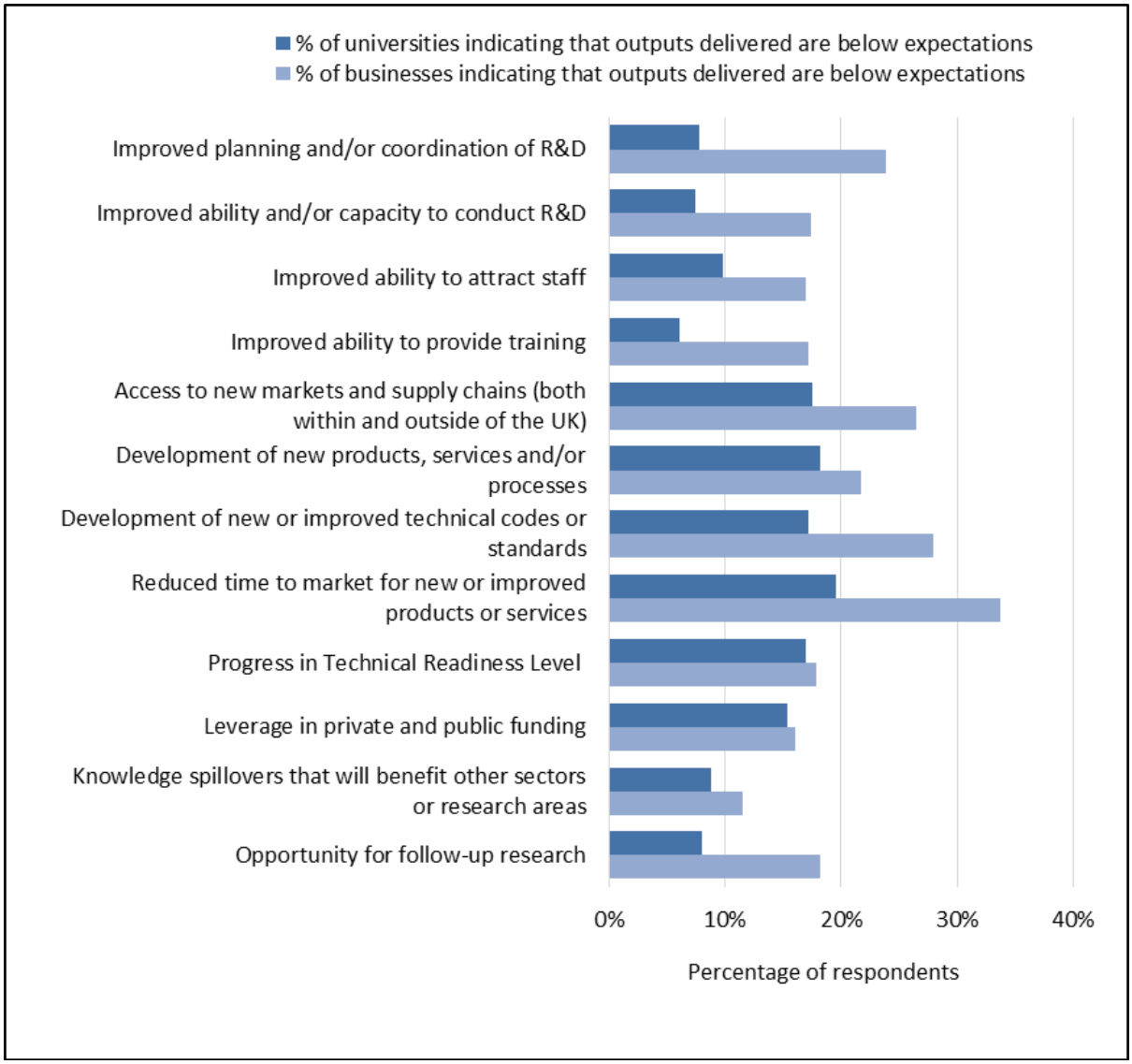
- improved planning and/or coordination of R&D;
- improved ability to provide training;
- development of new or improved technical codes or standards;
- reduced time to market for new or improved products or services; and
- opportunity for follow-up research.

The higher frequency of failure to achieve improved planning and/or coordination of R&D might just be the result of limited overall research capacity of the participating businesses. However the higher frequency of failure to reduce time-to-market and offer follow-up opportunities for business-relevant research points to the general features of FP7 catering more strongly to research at lower TRLs. A further review of how far Horizon 2020 has succeeded in mitigating these issues should be undertaken once a substantial subset of Horizon 2020 projects has been completed.

Figure 4.6 below provides an overview of respondents from universities and businesses who indicated that their project delivered outcomes below expectations in certain areas.[77]

[77] Note: Respondents indicating that a certain type of outcomes was not relevant for their project and non-respondents are excluded from this analysis.

Figure 4.6 Extent to which FP7 projects delivered outcomes below expectations, by type of respondent



Source: ICF survey of UK FP7 participants February 2016

4.1.3 Impacts of FP7 participation

This section outlines the main impacts resulting from the research outputs and outcomes summarised in the previous section. These impacts relate to the wider consequences of the research activity for the funded organisations and the possible longer-term impacts on the economy.

4.1.3.1 Impacts on funded organisations

4.1.3.1.1 Overview of the impacts for funded organisations from FP7 participation

The large majority (>75%) of participants report medium to high impacts on their organisations in terms of (Figure 4.7):

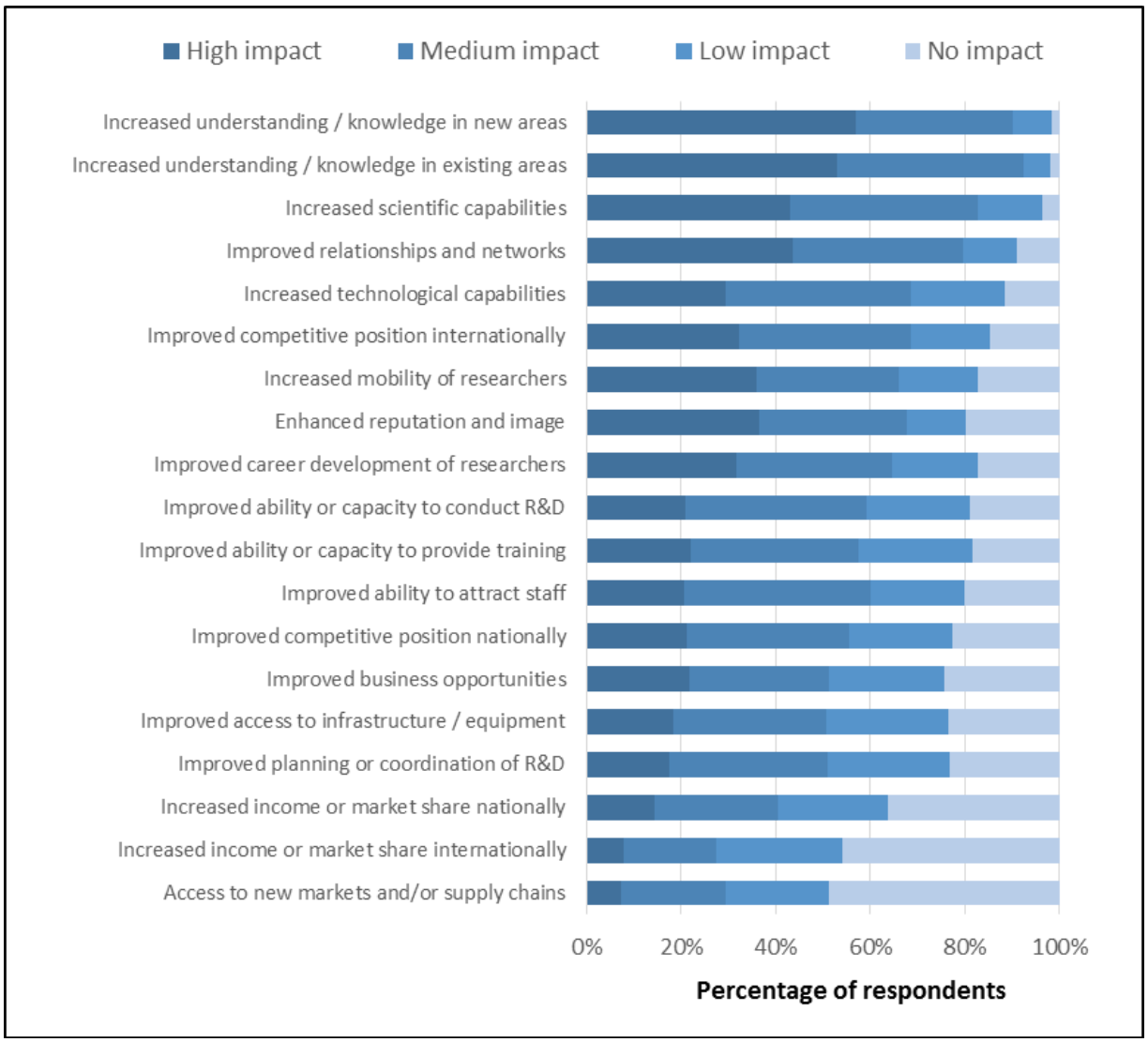
- increased understanding and knowledge, in both new and existing areas (91% of all respondents indicated medium or high impacts in existing areas, 93 in new areas);
- increased scientific capabilities (83% of all respondents indicated medium or high impacts); and
- improved relationships and networks 80% of all respondents indicated medium or high impacts).

The majority (> 60%) of participants report medium to high impacts on their organisations in terms of (Figure 4.7):

- increased technological capabilities (69% of all respondents);
- increased mobility and improved career development for researchers (66% and 65% respectively);
- an improved competitive position internationally (69%); and
- enhanced organisational reputation (68%).

Differences were again noted in the responses provided by industry from those provided by university respondents. Industry respondents were more likely than university respondent to assign medium-to-high ratings for (i) improved business opportunities, (ii) increased income or market share internationally, (iii) access to new markets and/or supply chains, at or above expectations. Industry respondents were, however, less likely to have assigned medium-to-high ratings for (i) improved ability or capacity to provide training, (ii) improved ability to attract staff, and (iii) improved career development of researchers.

Figure 4.7 Positive impacts of FP7 projects on participating organisations (n=470)



Source: ICF survey of UK FP7 participants February 2016

4.1.3.1.2 Employment effects on participating organisations

Impacts on employment beyond the duration of the project were difficult for participants to identify. In two-thirds of cases (67%) respondents indicated that it was not possible to provide an answer. In 17% of cases respondents reported an increase in employment and in 16% of cases they reported a safeguarding of employment. Just two respondents (<1%) reported a decrease in employment as a result of their project. Of those respondents who were able to answer this question:

- 64% of universities reported an increase in employment;
- 57% of RIs reported an increase in employment; and
- 31% of industry reported an increase in employment.

Respondents report a total of almost 1,000 full-time equivalent jobs being generated (377 jobs) or safeguarded (596 jobs) representing approximately 10 jobs per organisation across the 96 organisations reporting an impact. Industry respondents were slightly more likely than university respondents to be able to answer this question (70% versus 62% responding and providing an indication of the impact on

employment). However, university respondents were much more likely than industry respondents to report an increase in employment (19% versus 12%), suggesting that FP7 impacts on employment may be greater in the university (research) sector than within industry.

4.1.3.1.3 Impact on investment by participating organisations

Almost a quarter of respondents (109, 23%) reported that some investment had been or would be made as a result of the research project, of which 38 were able to provide some quantification. These organisations indicated a level of investment of some €30.6 million, an average of just over €780,000 per organisation. The remaining respondents indicated either that their project had not resulted in any additional investment (57%) or that they did not know (20%). Industry respondents were more likely than university respondents to answer this question (84% versus 78%) and were also more likely to report that their project had resulted in investment in new devices or equipment, or is expected to in the future (32% versus 23%).

4.1.3.1.4 Commercial benefits for participating organisations

As noted above in section 3.1, universities were the predominant beneficiary of FP7 funding in the UK, and this feature has to be considered when discussing commercial impacts attributed to FP7.

UK participants were asked whether their FP7 project had produced (or was expected to produce) commercial benefits for their organisation. Just over half of respondents (53%) stated that the project would not result in any commercial benefit (other than the FP7 funding for their participation in the project). A further quarter (25%) were unable to say whether any commercial benefits had been realised. In the remaining 22% of cases participants reported that some commercial benefit had been achieved. In most of these cases (63%) the commercial returns came from the direct use of the project results within the participating organisation, but a significant proportion (37%) came from sale or licensing of products or intellectual property developed through the project.

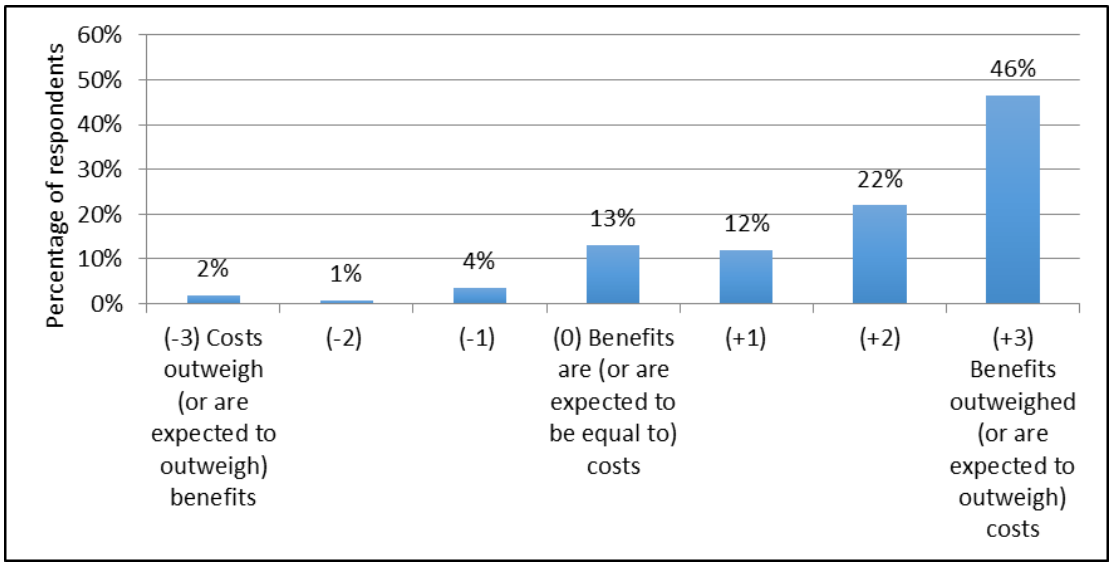
Around 38% of respondents who reported commercial benefits (9% of all respondents) were able to quantify these benefits. Based on this information, an average additional income of €937,000 was reported. These figures result in an average net gain of €815,000, and an estimated total net gain of around €35 million, across the 9% of respondents who detailed commercial benefits.

Industry respondents reported commercial impacts much more frequently across all impacts queried. With 39% reporting commercial impacts from the direct use of project results, 18% reported them from sale or licensing of product and 11% of industry respondents from sale or licensing of intellectual property. Among university respondents, 9% reported commercial impacts from the direct use of project results, 2% experienced commercial impacts from the sale or licensing of product and 2% from the sale or licensing of intellectual property. The remaining university respondents (61%) reported that the project resulted in no commercial impact other than reimbursement of project costs, or that they didn't know whether the project resulted in commercial impacts (27%). Among industry respondents, 31% reported that the project resulted in no commercial impact other than reimbursement of project costs, while 16% said that they didn't know whether commercial impacts had resulted.

4.1.3.1.5 Overall costs and benefits of participation

Figure 4.8 indicates that the large majority of participants (80%) report that the benefits of participation outweighed the costs (with 46% indicating that the benefit to cost ratio was very high). A further 13% of participants (roughly one in eight) stated that benefits obtained were equal to the costs involved, and just 6% indicated that the costs of participation had outweighed the benefits. The balance of costs and benefits was most positive for universities / colleges and research organisations, with just 3% and 6% respectively reporting that the costs had outweighed the benefits. By comparison, private companies and public bodies were more likely to report that the costs had outweighed the benefits (14% and 18% respectively).

Figure 4.8 Costs and benefits of FP7 participation (n=469)



Source: ICF survey of UK FP7 participants February 2016

Where the costs of participation outweighed the benefits most respondents explained that this had reflected their requirement to pay part of the costs (25-50%) and carry the high costs of administration and reporting. In a small number of cases problems with partners failing to deliver on their part of the work had reduced the benefits obtained by the UK partner. In one case, a lack of flexibility had limited the value of the results and led to missed commercial opportunities, while in another, elements of the project managed by the UK partner had to be cancelled.

4.1.3.2 Wider impacts from FP7 funded research activity

4.1.3.2.1 Policy impacts

FP7 participants were asked whether their project had, or was expected to have, an impact on policy development. Whilst a large number of respondents considered there was no impact (35%) or did not know (26%), 39% stated that their project had exerted an impact on policy, in most cases at European level (24% of projects) but also at international / global level (11%). Only 4% of participants reported that their FP7 project had impacted on policy development at national level.

Examples of policy impact

"I was invited to take part in the UK-Japan mission of the BIS Technology Strategy Board (TSB). The team of five academics and industrialists visited Japanese universities and companies to promote UK robotics and scout Japan for collaboration opportunities. The visit resulted in an advisory document presented to the TSB in November 2011. The recommendations informed a key speech by the Chancellor of the Exchequer, to the Royal Society, which informed the £35 million investment in robotics by the Department for BIS, as part of its investment in the UK's "eight great technologies".

"Influenced EU guidelines for Directives on CO2 storage and Emissions Trading scheme. Fed into practice of operators and National implementation of EU directives"

"Provided evidence to UK policy makers on wheat population performance and potential ways that regulations could be modified that resulted in the council decision 2014/150/EU." [decision on the organisation of a temporary experiment providing for certain derogations for the marketing of populations of the plant species wheat, barley, oats and maize pursuant]

Case study ESS-DACE

"To a large extent, ESS has achieved its objectives. The goal was to allow people to access important social data for free as well as to help policy-makers access important data to shape policy and tackle societal challenges. To date, 80,000 people have registered to our service. About 3,000 publications cite ESS data and have used it in their work. Moreover, many countries have used the data to shape national policy, for instance: Bulgaria has used ESS data on immigration."

Case study FLUTCORE

As a result of the FLUTCORE work and that of other EU projects focussing on new influenza vaccines the European Medicines Agency (EMA) received further incentive to change the legislation required for influenza vaccine licensing since it was no longer fit for purpose.[78]

Source: ICF survey of FP7 participants, February 2016, Case Studies, details in Annex 3

4.1.3.2.2 Impacts on UK networks and relationships

FP7 projects are being used as a mechanism for fostering both existing and new relationships. Respondents indicated that for the sample of projects covered[79], the average number of partners per project was 13, and respondents had previously worked with a third of them (on average 4.6 per project). Approximately two-thirds (65%) of the partners were 'new' in the sense that the UK partner(s) had not previously worked with those organisations, (an average of 8.4 new partners per project). Participants also reported that they expected to work again in the future with just under half (46%) of their FP7 project partners (an average of 6.0 'future' partners per project). These collaborations contribute to an enhanced set of relationships for UK organisations, based on the addition of newer and more useful partnerships and the cessation of less productive ones.

[78] In particular, the use of hemagglutinin inhibition assay as a release criterion for influenza vaccines has been discontinued since none of the new products either require it or would meet these standards.

[79] Projects involving only a single organisation or bilateral partnership, such as ERC projects and many Marie Curie projects, are excluded from this analysis.

There were close to 70,000 non-UK participations in UK led projects. Using these figures to scale up from the estimates provided through the surveys, we could estimate that:

- Some 45,500 **new** partnerships were created between UK and non-UK FP7 participants (65% of all UK partnerships were new, with 35%, or 24,500, with pre-existing collaborators).
- UK partners expect to work with an estimated 32,200 (46%) of their non-UK FP7 partners again in future.
- An estimated minimum of 7,700 (24%) of these future collaborations will be with overseas partners that the UK partner first collaborated with during FP7.

There were approximately 7,323 UK participations in projects with at least one other UK partner. If the above proportions of new and future partners are used, this gives the following estimates as regards partnerships with other UK organisations:

- 4,760 new partnerships between UK organisations; and
- 3,369 new UK partners with which UK organisations expect to work with again after the FP7 project.

These estimates are assuming that UK participants overall saw similar proportions of new partnerships and intend to continue collaboration with partners at a similar frequency as those UK participants who responded to the online survey.

4.1.3.3 Difficulties associated with FP7 projects

The survey of FP7 participants investigated difficulties associated with participating in FP7. Only 60 participants out of 470 (or 13%) reported one or more difficulties. The following issues were the most frequently described:

Administrative burdens: problems arising from complex project administration were reported by 21 out of 60 respondents (35%). Onerous administrative tasks sometimes meant that fewer resources were available for research tasks.

"[Impacts arise from] management time diverted on administration overhead that could have been much better utilised in other areas of the business for productive and added value purposes."

Source: ICF survey of FP7 participants, February 2016

Project management and coordination: When asked about the specific issues encountered, 14 participants (23% of all respondents reporting negative impacts) reported issues arising from project management and coordination with partners (see box below for some examples). This had consequences for participants' willingness to engage with the same partners for further research. As for administrative burdens, in some cases the resources needed for project management and coordination detracted from resources for scientific tasks.

"A lot of work [was] required […] as partners required extensive training."

"Ensuring that we had the right research resource available at the right time whilst balancing commercial obligations outside of FP7, proved to be challenging. This was primarily down to having unclear objectives and dependencies on other partners."

"The coordinator did not fully communicate all reports etc. to the partners that were submitted to the EU and she did not offer the partners any chance to edit the reports before they were submitted".

Source: ICF survey of FP7 participants, February 2016

Insufficient funding: seven respondents (12% of all respondents reporting negative impacts) commented that funding was not sufficient to cover all project costs. In some cases, economic risks prevented participants from applying to further projects.

"The funding mechanism didn't cover 100% of full economic costs, so the return for the University was low, in financial terms - we had to argue that the non-monetary reputational benefit was sufficient to make it a worthwhile investment, for the institution as a whole."

"[I] become nervous about trying to apply again […] because money [was not enough] to cover costs".

Source: ICF survey of FP7 participants, February 2016

Other unwanted impacts were created by the limited flexibility regarding project structure and delivery and barriers to the commercial exploitation of results. Details are provided in Table 4.2.

Table 4.2 Difficulties associated with participation in FP7 (n=60 respondents who described unwanted impacts)

Theme	Summary of impacts reported by survey respondents	Quotes from survey responses	Number of respondents reporting unwanted impacts	% of all respondents reporting unwanted impacts
Administrative burdens	■ Administrative burdens affected some participants, in particular SMEs.	*"[Impacts were] largely associated with the administrative burden required to support the project. [Our organisation] was already set up to accommodate the administration required, but the systems did place burdens on some of the smaller companies involved. However, we were very pleased with the level of support from the Project Officer and the pragmatic approach to delivering this action taken by the Commission."* *"Consortium science always carries a large administrative overhead. This dilutes the funding for the science."*	21	35%
Project management and coordination	■ Participants faced problems regarding the relationships with some partners and difficulties with managing inputs and resources.	*"Some relationships between partners did not develop in a positive way, these partners may not seek future collaboration."*	14	23%
Funding	■ Participants were not able to recover all project costs, and in some cases they faced economic impacts from participation.	*"[…] some of the work packages required more person hours than were originally budgeted for. This was not necessarily a negative thing, in that the extra time was invested in order to increase the number of publications resulting from the project."*	7	12%
Flexibility	■ Negative impacts included those arising from the limited flexibility	*"Very heavy bureaucratic administrative load. Inflexibility of the project in a very fast-moving field of technical advance."*	5	8%

Theme	Summary of impacts reported by survey respondents	Quotes from survey responses	Number of respondents reporting unwanted impacts	% of all respondents reporting unwanted impacts
Commercial exploitation of results	■ Participants were affected by barriers to the full commercial exploitation of results.	*"[The negative impact was my] frustration about commercial exploitation of results. I believe the EC has high expectations without providing the infrastructure for realising them. We are academics, not merchants. […] Advisory offices [should be created] in the EC [to] help us commercialise our products."* *"The project deliverables to the commission can distract from the core research aims of the project, creating unusable results that are only there to fill in demands of a plan which was decided on many years ago, based on requirements that are no longer relevant or cannot be usefully delivered. The strong demand for large reports to be written and the worry that those reports don't exactly match the original plan causes difficulties in our business to push research directions into fruitful or commercial directions. The reality, is you try something and if it isn't going to work well, or be deliverable in the available time, it is better to not waste time on it, but that doesn't fit the FP7 approach. If something useful pops up, you want to chase that. In a commercial environment, that is based on confidential discussions (potential customers present a problem they all face for which a technology might be commercially viable)."*	4	7%
Delays	■ Some respondents reported delays to the project.	*"Poor administration by DG Research: delayed payment and start but no time allowance for this at the end of the program".*	3	5%
Other	■ Other responses included a variety of issues, such as unclear project objectives and difficulties regarding IP arrangements.	*"The importance and scale of some deliverables changed; access to software that we had hoped to modify changed."* *"The IP arrangements required by the EU makes industry participation difficult."*	8	13%
Total			**60**	

Source: ICF survey of UK FP7 participants, February 2016; Note: each respondent could describe more than one impact

4.2 Outcomes/impacts of participation in EUREKA Eurostars

In the online survey of FP7 participants, nine respondents out of 488 indicated that they had received funding for a EUREKA project. The low number of respondents to this subsection of the survey could suggest that there is no significant overlap of participants between FP7 and EUREKA programmes – it could also suggest that the typical EUREKA participants (R&D performing SMEs) are less likely to participate in a survey on FP7 benefits and impacts.

Seven of these responded to questions on the relative advantages of FP7 and EUREKA, all of which indicated that they have participated in a EUREKA Eurostars project. In this non-representative sample, FP7 benefits in accessing research funding and research facilities, sharing costs/risks associated with R&D and innovation projects, developing new or improved commercial products or services and accessing complementary expertise that does not exist in the UK are all considered to outweigh the corresponding benefits of EUREKA Eurostars.

Regarding the realised impacts, respondents to the online survey were asked whether they believed FP7 was more effective in delivering certain impacts than EUREKA projects, or vice versa. Again, the non-representativeness of the respondents has to be underlined as only a small number of responses was collected to this specific part of the questionnaire (n=7). The majority of respondents believed that EUREKA was equally effective or more effective to a ‘small’ or ‘large’ extent than FP7 in improving business opportunities, improving the competitive position nationally, increasing income or market share nationally and accessing new markets or supply chains. These responses to the online survey broadly confirm the views and opinions of the semi-structured interviews conducted with UK businesses.

4.2.1 Impacts reported by UK participants in EUREKA Eurostars

The EUREKA Secretariat collects information on the project outputs, results and impacts of Eurostars projects beyond the project duration. It made available project final reports (FiR) and market impact reports (MiR) related to UK participations in the Eurostars-1 programme. Whilst a like-for-like comparison is not possible due to substantial difference in how data is collected, units of measurements and time frames during which data is collected, some general trends can be identified and are discussed below. In total, 96 project final reports for UK participants (out of 223 total UK participations in Eurostars-1) and 20 market-impact reports were made available.

4.2.2 Progress in Technology Readiness Level

EUREKA Eurostars final reports ask participants to rate the technological achievements of the funded project. 68 (or 71%) of UK respondents rated the achievement as excellent or good, 6 (or 6%) rated them as average, and one respondent rated the achievements as poor. 21 respondents (or 22%) did not reply to this part of the final reports.

4.2.3 Development of new/improved products, processes or services

Of 96 project final reports analysed, 55 respondents (57%) indicated that their Eurostars project has resulted in the development of new or improved products, processes or services. 20 respondents (21%) explained that the project has not resulted in any progress towards new or improved products, processes or services. 21 respondents did not answer this question.

Eurostars participants were also asked whether the commercial project results (product/ process/service) were successfully achieved. Of 96 respondents, 63 answered yes, 11 answered no and 22 did not respond.

To put feedback from Eurostars participants into context, it is useful to review survey responses to similar questions in the FP7 participant survey conducted by the study team. In the survey respondents were asked whether projects delivered outputs above, in line with or below expectations as regards the development of new products, services and/or processes. 16% indicated that the projects had delivered above expectations, 66% indicated outputs in line with expectations, and 19% indicated outputs below expectations.

FP7 participants were asked as well how they would rate the outcomes of their FP7 project as regards reduced time to market. 25% noted that the FP7 project had delivered below expectations, whilst 67% noted that the project had delivered outcomes in line with expectations.

4.2.4 Impact on employment

To put feedback from Eurostars participants into context, it is useful to review survey responses to similar questions in the FP7 participant survey. FP7 participants were asked whether their project had had an impact on employment beyond the duration of the project. In most cases (67%) respondents indicated that it was not possible to provide an answer. In 17% of cases respondents reported an increase in employment and in 16% of cases they reported a safeguarding of employment. Just two respondents (<1%) reported a decrease in employment as a result of their project.

Among these responses, a total of 377 jobs had been created (3.9 FTEs on average within 96 organisations) and 595 had been safeguarded (5.6 FTEs on average within 107 organisations). By comparison, just seven jobs had been lost (1.2 on average across six organisations).

When considering the EUREKA Eurostars market impact reports in turn, it first has to be noted that the sample of respondents is much smaller (only 13 individual UK businesses submitted market impact reports to the EUREKA secretariat for Eurostars-1, covering a total of 20 spinoff products, processes or services – representing 6% of all UK participations in EUREKA Eurostars). It is likely that out of the 223 UK participations in total, this selection is not representative but rather presents a subset of UK businesses which did actually achieve market impacts.

The market impact reports suggest that among those businesses submitting a market impact report, an average of 5.1 FTEs had been created or were expected to be created as a result of Eurostars projects.

4.2.5 Commercial benefits

Based on market impact reports for EUREKA Eurostars projects, on average, the 13 businesses reported additional turnover of €320,960 and expected this to increase to an average of €4.8 million within three years.

By way of context, FP7 participants were asked whether their project had produced (or was expected to produce) commercial benefits for their organisation. Just more than half of respondents (53%) stated that the project would not result in any commercial benefit (other than the FP7 funding for their participation in the project). A further quarter (25%) were unable to say whether any commercial benefits had been realised. In the remaining 22% of cases participants reported that some commercial benefit had been achieved. In most of these cases (63%) the commercial returns came from the direct use of the project results within the organisation, but a significant proportion (37%) came from sale or licensing of products or intellectual property developed through the project.

4.3 Outcomes/impacts of participation in COST

As stated in section 3.4.8, COST is seen by stakeholders very much as a complementary programme to activities funded under FP7 or currently Horizon 2020. Furthermore, the COST office does not collect comprehensive impact and outcome data on each COST action, which means there is no reliable secondary data that would allow a like for like comparison of outcomes and impacts produced by participation in COST.

A recent impact assessment of COST suggests that the main areas of impact were:[80]

- Impact on networking - COST delivers benefits to Action participants by providing the means to extend the scope of their networks, improve their national and international profiles and their embeddedness in European networks. There is a clear increase in the cross-border co-publication activities of both the Early Stage Researchers as a group and researchers from the New Comer countries after their participation in the COST Actions. It also increases their ability to secure other funding.
- Impacts on capacity building / career perspectives - a large emphasis put on the engagement and development of Early Stage Researchers and researchers from New Comer countries in the COST Actions. Out of 1,500 Early Stage Researchers responding to an online survey, almost all (96%) indicated some form of improvement to career opportunities or some form of career development (97%) as a result of their participation in COST actions.

[80] Technopolis (2014) COST Impact Study and Customer Satisfaction Survey 2014.

In the online survey of FP7 participants, 50 respondents out of 488 indicated that they had received funding through COST. 32 of these responded to questions on the relative advantages of FP7 and COST. The picture here is clearer than when comparing EUREKA with FP7, which is partially due to the higher number of responses collected.

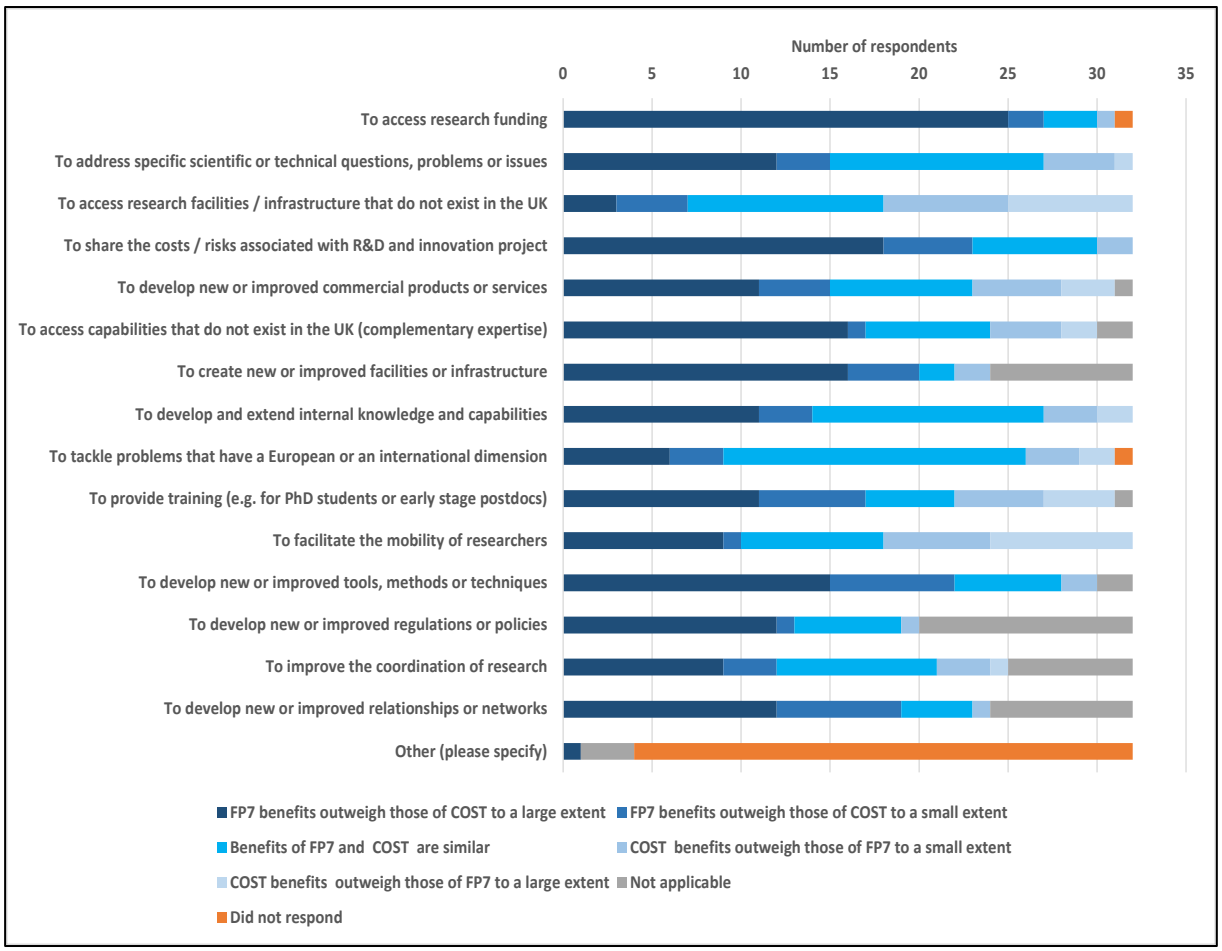
Figure 4.9 presents an overview of responses as regards the relative benefits of participating in FP7 or COST. More than half (or 15) of respondents were of the view that the benefits of FP7 outweighed those of COST to a large or small extent as regards accessing research funding, to share the costs/risks associated with a R&D and innovation project, to access capabilities that do not exist in the UK and to develop new or improved methods.

The benefits of participating in COST outweigh those of FP7 most frequently as regards:

- access to research infrastructure / facilities that do not exist in the UK (14 respondents feel that COST benefits outweigh those of FP7 to a large or small extent); and
- facilitating researcher mobility (14 respondents respectively).

These results are roughly in line with the evidence presented by previous COST impact assessment studies.

Figure 4.9 Online survey – comparison of benefits of FP7 / COST participation (n=32)



Source: ICF survey of UK FP7 participants February 2016

The box below presents some of the relative advantages of COST actions over FP7, according to some survey respondents.

Views on relative benefits of COST over FP7

"COST involves much less bureaucracy in the running of projects, and (in my experience) involves much larger numbers of researchers/institutions, and hence is much better at fostering the formation of networks."

"COST Actions provide opportunities for sharing and generating new knowledge across disciplines. These networks can include scholars of different ages, and including early career scholars. There are significant opportunities for networking and relationship building, especially in discrete or emerging subject areas."

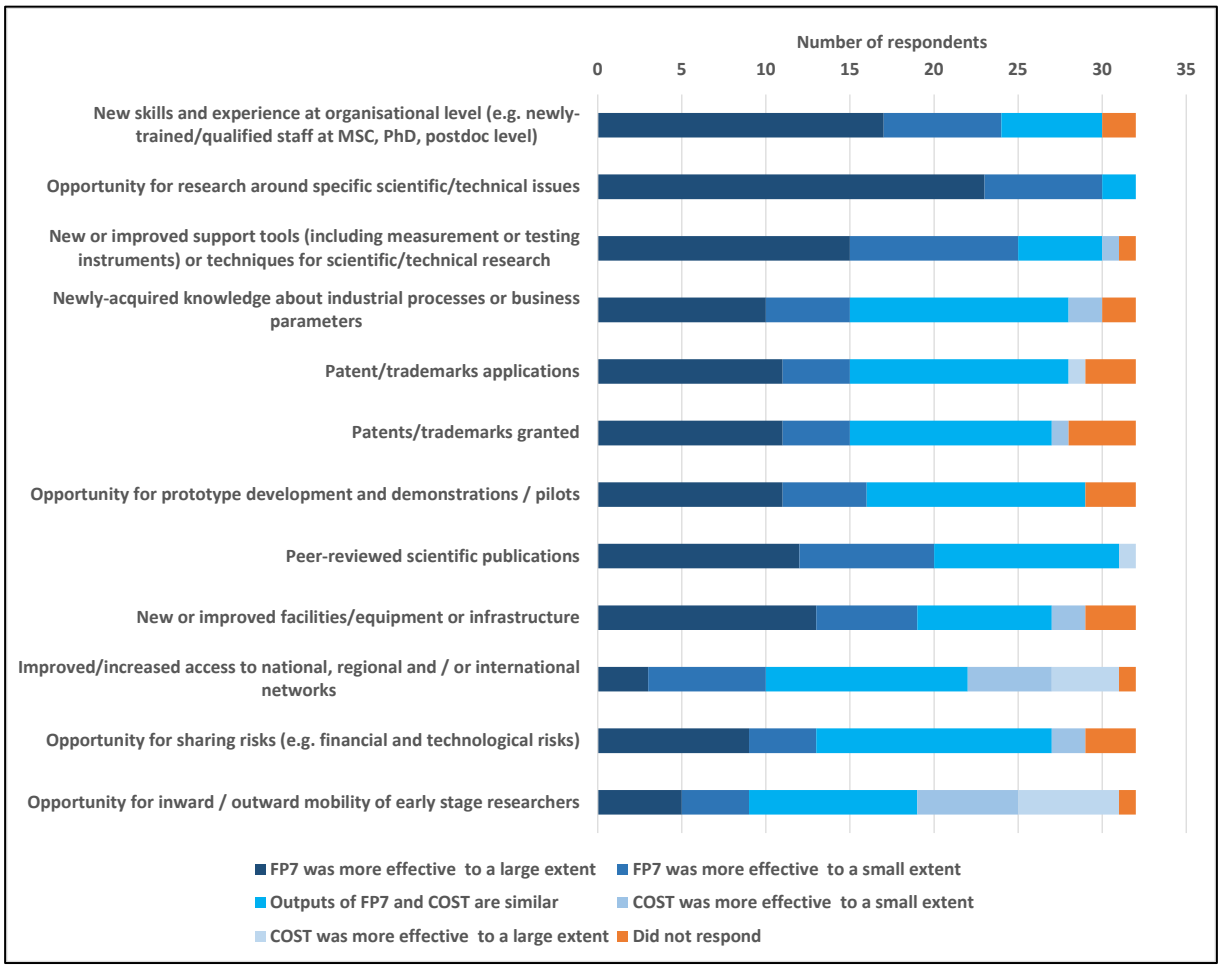
"COST is not 'better' than FP7. They serve different objectives. [COST] is a good way of getting networking funds that could then result in projects with the funding to do research"

Source: ICF survey of UK FP7 participants February 2016

When asked to compare the realised outputs of COST and FP7 projects, more than half (or more than 15) respondents were of the view that FP7 was more effective in

producing 1) new skills and experience at organisational level, 2) opportunities for research around specific scientific/technical issues and 3) new or improved support tools or techniques for scientific research, 4) peer reviewed publications, and 5) new or improved facilities/equipment or infrastructure. FP7 was seen to be less effective than COST in providing opportunities for inward/outward mobility of early stage researchers (22 out of 32 responses). Figure 4.10 presents an overview of responses with regard to the effectiveness of outputs.

Figure 4.10 Online survey – Effectiveness of producing certain outputs in FP7/COST (n=32)



Source: ICF survey of UK FP7 participants February 2016

The box below provides some further insight into whether COST is considered more effective in delivering outputs on mobility and networking, according to some survey respondents.

Views on effectiveness of outputs (COST and FP7)

"COST is a much more flexible approach to research. FP7 projects are tied to a research project that cannot change as the research itself evolves"

"[COST] is best used to develop a long term FP7 project by capacity/network building"

"COST has a wider network and more opportunities for mobility and training, but does not fund research."

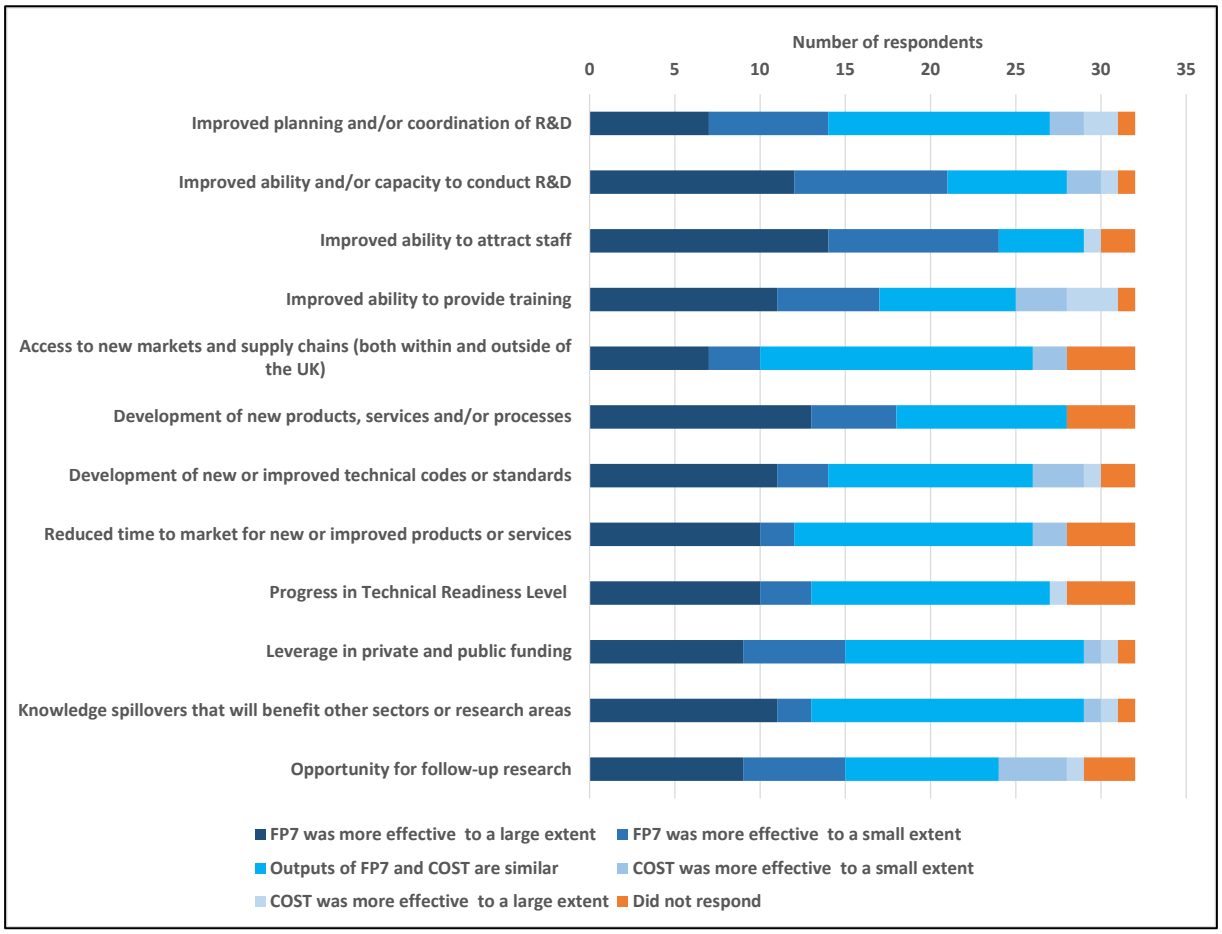
Source: ICF survey of UK FP7 participants February 2016

Figure 4.11 presents survey responses as regards the relative effectiveness of FP7 and COST to provide certain outcomes.

FP7 was considered more effective than COST in delivering mid-term outcomes, specifically:

- an improved ability and/or capacity to conduct R&D;
- an improved ability to attract staff; and
- the development of new products, services and/or processes.

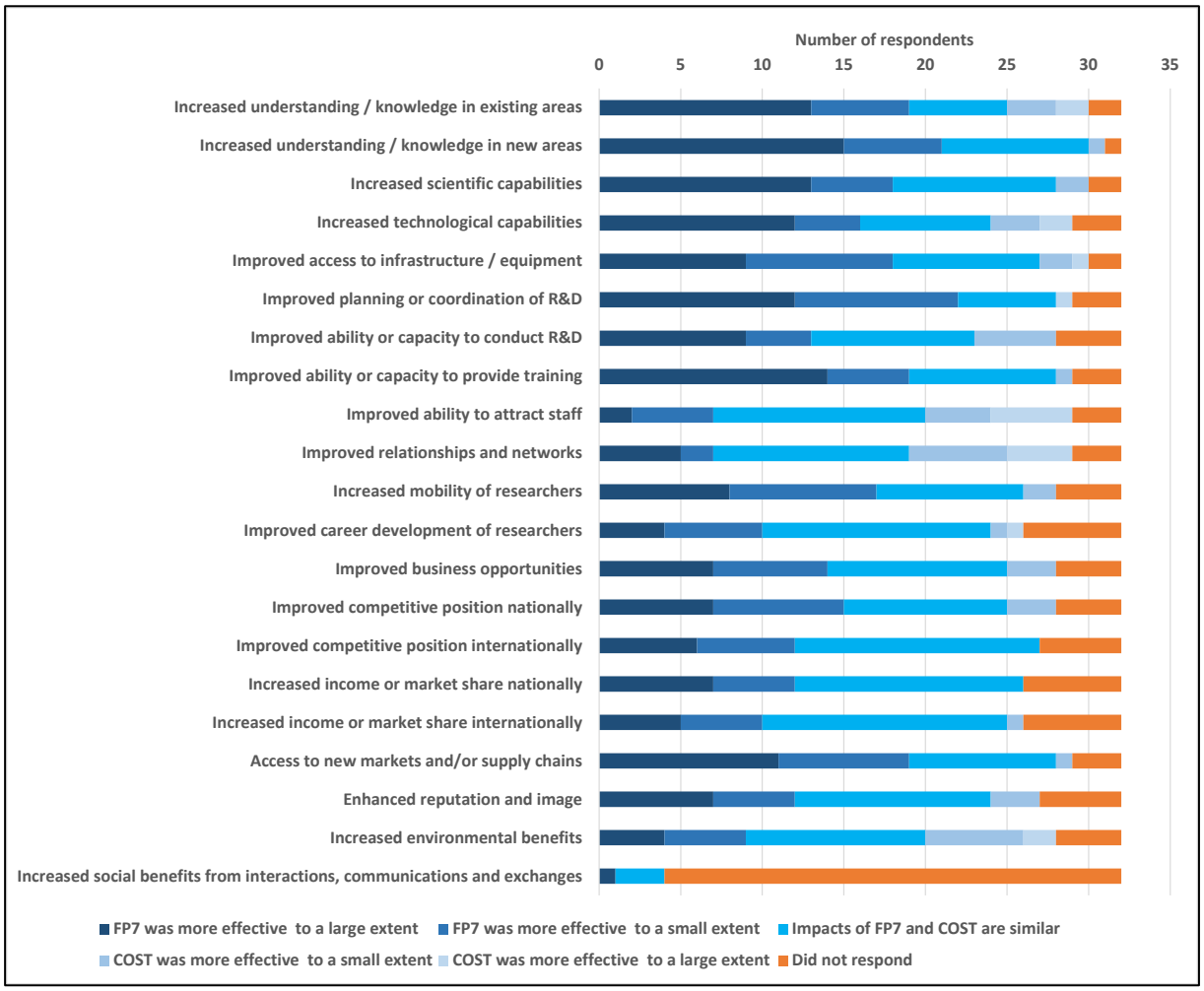
Figure 4.11 Online survey – comparison of realised outcomes in FP7/COST (n=32)



Source: ICF survey of UK FP7 participants February 2016

The impacts that respondents felt FP7 delivered more effectively were: improved planning and coordination of R&D, increased understanding and knowledge in new and existing areas, increased technological and scientific capabilities, improved access to infrastructure and equipment and access to new markets or supply chains. Respondents considered COST to be equally effective or more effective than FP7 in improving the ability to attract staff and in improving relationships or networks. Figure 4.12 presents an overview of survey responses as regards the relative effectiveness of FP7 and COST to deliver certain long term impacts. Apart from the results highlighted above, it can also be seen that there is a considerable proportion of indifference (FP7 and COST are considered to be equally effective) for some of the impacts suggested. This could be interpreted as a consequence of the differences in programme objectives and activities above.

Figure 4.12 Online survey – comparison of realised impacts in FP7/COST (n=32)



Source: ICF survey of UK FP7 participants February 2016

4.4 Conclusions

Overall, FP7 met the expectations of participants from both universities and businesses with widely varying needs, delivering results across a large portfolio of outputs, outcomes and impacts. In the minority of cases where the programme failed to deliver, there was some evidence that the programme delivered results for businesses to a slightly lesser extent. This is probably not surprising as FP7 as a whole did not score strongly on commercially orientated results – a consequence of the programme's focus on research activities 'further away from market' throughout most of its lifetime, without significant attention to higher TRL.

FP7 was successful in producing a variety of outputs, with a relatively lesser focus on commercial results

By large, FP7 was successful in producing a wide range of outputs, with a particular focus on peer-reviewed journal articles, but with a relatively lesser focus on producing more commercially oriented outputs.

The results show that peer-reviewed journal articles are the most widely generated output (87% of projects) and most numerous (14.7 per project on average). A large proportion of FP7 projects recruited personnel specifically for the project (79%), with an average of just more than five full time equivalents (FTEs) per project. Scientific exchanges were also highly prevalent outputs, with 76% of participants sending their own personnel on visits overseas and 65% hosting personnel from other institutions abroad.

For more commercially oriented outputs, less than one in five (18%) of the respondents' projects generated one or more new patent applications, and just 7% applied for trademarks or registered designs as a result of an FP7 project; 26% of industry respondents generated a patent applicant and 8% of industry respondents applied for a registered trademark / design. Industry respondents were more likely to be able to quantify new patent applications or other intellectual property right, whilst universities and research institutes were more likely than other respondents to quantify the number of peer-reviewed articles.

Some differences were noted between the different types of participating organisation as regards the relative importance of specific outputs. While all organisation types rated (i) the opportunity to carry out research and (96% of responses) and (ii) an improved access to networks (87%) as key outputs; private companies did not rate peer-reviewed publications or new skills acquisition as of high importance. Instead (i) opportunities for prototype development and demonstrations / pilots (84% of responses), and (ii) newly-acquired knowledge about industrial processes or business parameters (81% of responses) were rated as among the most important outputs for UK companies participating in FP7.

Businesses reported more frequently that outputs had been delivered below expectations. When compared to university respondents, businesses reported the largest additional dissatisfaction with outputs in the following areas:

- new or improved support tools (including measurement or testing instruments) or techniques for scientific/technical research;
- patents/trademarks granted;
- peer-reviewed scientific publications; and
- opportunity for inward / outward mobility of early stage researchers.

FP7 produced a range of impacts and outcomes, often delivering above participant expectations. More commercially oriented outcomes and impacts were more likely to be delivered below expectations.

Participants were asked whether their project had no impacts, low impacts, medium or high impacts in certain areas. 40% or more of FP7 participants report high level outcomes in terms of increased understanding and knowledge, in both new and existing areas, increased scientific capabilities, and improved relationships and networks. Increased technological capabilities, improved competitive position, improved career development for researchers and enhanced reputation also feature as areas where a large number (30% or more) of participants reported a high level of impact. Increased researcher mobility, improved ability & capacity to conduct research, improved business opportunities and improved ability to attract staff were also widely cited areas where projects delivered high impacts (20% or more of reported high impacts here).

More than a third of projects (34%) delivered above participants' expectations with regard to providing opportunities for follow-up research, and almost a quarter (23%) delivered above expectations with regards to knowledge spillovers to other sectors or research areas. More than 90% of projects delivered at or above expectations in terms of improved ability to conduct R&D, provide training and attract staff.

More commercially oriented outcomes were more likely to be delivered below expectations, with more than one in five of the projects survey respondents reported on achieving less than expected in terms of development of new products and services, development of new codes and standards, access to new markets, and reduced time to market. Nonetheless, the vast majority of participants and projects did achieve these outputs in line with expectations.

Overall, businesses reported more frequently that outcomes had been delivered below expectations. When compared to university respondents, businesses reported the largest additional dissatisfaction with outcomes in the following areas;

- improved planning and/or coordination of R&D;
- improved ability to provide training;
- development of new or improved technical codes or standards;
- reduced time to market for new or improved products or services;
- opportunity for follow-up research; and
- opportunity for inward / outward mobility of early stage researchers.

Around 17% of survey respondents reported an increase in employment

Survey respondents (n=475) were asked whether their project had had (or was likely to have) an impact on employment beyond the duration of the project. In most cases (67%) respondents indicated that it was not possible to provide an answer.

Around 17% of cases respondents reported an increase in employment and in 16% of cases they reported a safeguarding of employment. Just two respondents (<1%) reported a decrease in employment as a result of their project. Of those respondents

- 64% of universities reported an increase in employment;
- 57% of RIs reported an increase in employment; and
- 31% of industry reported an increase in employment.

Of respondents that reported an increase in employment, a total of 377 jobs had been created (3.9 FTEs on average within 96 organisations), 595 safeguarded (5.6 FTEs on average within 107 organisations). By comparison just seven jobs had been lost (1.2 on average across six organisations).

Around 22% of survey respondents reported some commercial Impacts

UK participants were asked whether their FP7 project had produced (or was expected to produce) commercial benefits for their organisation. Just over half of respondents (53%) stated that the project would not result in any commercial benefit (other than the FP7 funding for their participation in the project), unsurprisingly so as the programme largely focussed on research activities which were not considered close-to-market.

A further quarter (25%) were unable to say whether any commercial benefits had been realised. In the remaining 22% of cases participants reported that some commercial benefit had been achieved. In most of these cases (63%) the commercial returns came from the direct use of the project results within the participating organisation, but a significant proportion (37%) came from sale or licensing of products or intellectual property developed through the project.

Industry respondents reported commercial impacts much more frequently across all impacts queried. 39% of industry respondents reported commercial impacts from the direct use of project results, 18% said there were commercial impacts from sale or licensing of product, 11% described commercial impacts from sale or licensing of intellectual property. Among university respondents, 9% reported commercial impacts from the direct use of project results, 2% described commercial impacts from sale or licensing of product and 2% experienced commercial impacts from sale or licensing of intellectual property.

38% of respondents who reported commercial benefits (9% of all respondents) were able to quantify these benefits. On average, €937,368 per project was reported. These figures result in an average net gain of €815,000, and a total net gain of around €35 million, across the 9% of all respondents who detailed commercial benefits.

FP7 formed an estimate of 45,500 new partnerships between UK and non-UK participants

High quality research collaboration is commonly accepted to influence the productivity of individual scientists and organisations, as well as the impact of their work. FP7 has had a significant impact on the ability of UK research base to conduct collaborative research with non-UK partners who were often reported to be world leading in terms of their scientific competences and technology know how.

The average number of partners in FP7 projects with UK involvement was 13.0, and respondents had worked with on average 4.6 of these organisations before (or 35%). This suggests that 65% (on average 8.4 partners per project) were 'new' in the sense that the UK partner(s) had not previously worked with those organisations.

The collaboration within FP7 contributed to the continuing evolution in relationships between UK researchers and other non-UK researchers:

- An estimate of 45,500 **new** partnerships were formed between UK and non-UK FP7 participants (65% of all UK partnerships were new so 24,500 of the partnerships were with pre-existing collaborators (35%)).
- UK partners expect to work with approximately 32,200 (46%) of their FP7 partners again in future.
- An estimated minimum of 7,700 (24%) of these future collaborations will be with overseas partners that the UK partner first collaborated with during FP7.

Around 23% of survey respondents reported additional investments as a result of their project

Almost a quarter (23%) of survey respondents reported that some investment had been made, of which 35% (38 respondents) were able to provide some quantification. The remaining respondents indicated either that their project had not resulted in any additional investment (57%) or that they did not know (20%).

The 38 respondents who were able to quantify the investments indicated a level of investment of some €30.6 million, an average of just over €780,000 per organisation.

Industry respondents were more likely than university respondents to answer this question (84% versus 78%) and were also more likely to report that their project had resulted in investment, or is expected to in the future (32% versus 23%, respectively).

Impacts on policy development were indicated by 39% of survey respondents

A third of survey respondents (35%) said that their project had not had an impact on policy and a further quarter (26%) did not know. The remaining respondents (39%) stated that their project had exerted an impact on policy, in most cases at European level (24%) but also at international / global level (11%). Only 4% of participants reported that their FP7 project had impacted on policy development at national level.

These results correspond with the largely cross-national, European character of many FP7 projects.

COST and EUREKA Eurostars focussed largely on different types of outputs and outcomes, not allowing a direct comparison with FP7

The analysis of COST and EUREKA Eurostars data confirmed that both programmes serve different objectives than FP7 – illustrated by the outputs and outcomes reported for these two programmes.

Respondents did not consider results of COST projects to be comparable with FP7. When asked to compare the effectiveness of FP7 with COST in producing certain outcomes, more than half (or 15) of respondents were of the view that the benefits of FP7 outweighed those of COST to a large or small extent in terms of accessing research funding, to share the costs/risks associated with R&D and innovation projects, to access capabilities that do not exist in the UK and to develop new or improved methods. COST was most frequently seen as having an impact on networking and impacts on career building or career perspectives.

Perhaps not surprisingly, participants in the EUREKA Eurostars programme reported commercial outputs and outcomes more frequently than from FP7, with 57% of projects with UK involvement describing the development of new or improved products, processes or services and 65% of EUREKA Eurostar UK participants reporting that commercial project results were successfully achieved.

5 Additionality of the research Framework Programme and complementarity with other initiatives

5.1 Additional research activity due to FP7 funding

This section discusses the additionality of project activity funded by FP7, according to survey respondents. The section also includes a review of the complementarity of FP7 with EUREKA and COST

5.1.1 Additionality of project activity

Almost all (91%) of the UK participants stated that their projects would not have gone ahead without FP7 support.[81]

A separate analysis was undertaken of the views of UK's FP7 project coordinators[82] (who might be expected to have clearer view on additionality). A similar share (89%) of coordinators considered that their projects would not have gone ahead in the absence of FP7 funding.

Views on additionality of FP7

Case study FLUTCORE

The project was considered too "difficult" for most UK grant awarding bodies, and was best addressed at the European level. Similar activities were being funded by the US Biomedical Advanced Research and Development Authority, which started a large-scale programme in 2011. Interviewees considered FLUTCORE and its sister projects funded under FP7 to help Europe in staying ahead of global competition […].

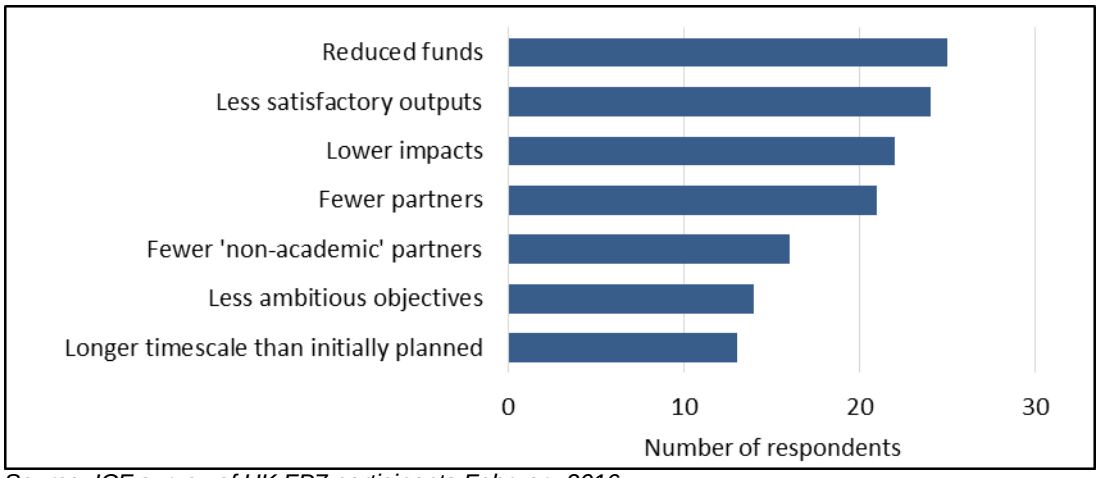
Respondents who stated that their project would have gone ahead without FP7 funding were asked to indicate the impact (if any) on the project due to the lack of EU funding. In the majority of cases (40 out of 42 responses) an impact was reported: most projects would have proceeded with reduced funds (25 out of 42 respondents, 60% of respondents), would have generated less satisfactory outputs (24 respondents out of 42, 57%) and would have had lower impacts (22 respondents out of 42, 52%). The number of partners involved would have been reduced in around half of the cases and one third would have proceeded with less ambitious objectives over a longer timescale.

[81] It has to be noted that there is a possible response bias when considering only survey responses from organisations that were funded by FP7, and by organisations which applied for FP7 funding (unsuccessful applicants) – therefore additionality of FP7 should be considered in its entirety as presented in section 5.

[82] Of the 475 respondents to the survey of participants, 141 (30%) were project coordinators.

The separate analysis of Project Coordinators who considered that their project would have gone ahead without FP7 funding provided similar views to other respondents.[83]

Figure 5.1 Impact on projects had FP7 funding not been available – only for projects that would still have gone ahead in some form (n=42)



Source: ICF survey of UK FP7 participants February 2016

Respondents considered a small number of projects (22 out of 452, 5%) to have been able to proceed and achieve similar levels of outputs and impacts in the absence of FP7 funding. These amounted to €37.8 million or 7.4% of the total EU funding secured by survey respondents. This represents a minimum estimate for the deadweight effect of the programme.

When comparing university with industry respondents, both groups indicated with similar frequency that their project would not have gone ahead without FP7 funding (91% and 89% respectively). Industry respondents were more likely to go ahead with fewer partners (75% compared with 43% of university respondents) and with a longer timescale than initially planned (58% compared with 38% of university respondents).

University respondents reported that 14 projects (out of 273) worth €20.6 million, or 6.8% of the total EU funding secured by university respondents, would have been able to go ahead with similar levels of outputs and impacts in the absence of FP7 funding. Industry respondents reported that four projects (out of 111) worth €3.9 million, or 2.8% of the total EU funding secured by industry respondents, would have been able to go ahead with similar levels of outputs and impacts in the absence of FP7 funding. This indicates that for the share of FP7 projects reported on, the minimum deadweight was slightly higher for university respondents than their industry counterparts.

[83] Only 14 coordinators responded that their project would have gone ahead without FP7 funding. The small size of this subset of respondents affects the possibility to provide a solid comparison with the broader group of all respondents.

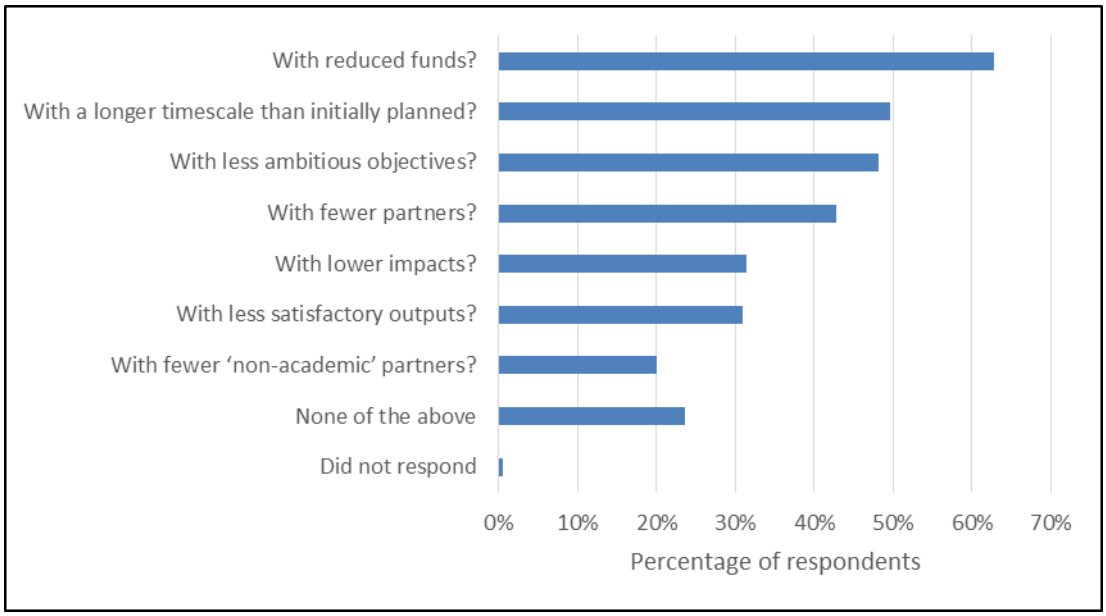
5.1.2 Project activity of unsuccessful applicants

Some 62,000 UK applications to FP7 (78%) were unsuccessful in securing FP7 funding throughout the programme. Unsuccessful applicants for whom contact details were available[84] were asked if they had gone ahead with the project (or similar research activities). About two thirds of respondents (65%) said they were unable to undertake the project while around a third (34%) indicated that they undertook similar research activities with other funding, but not necessarily at the same scale or with the same outputs as planned under FP7.

The ability to continue with similar research activity varied between different types of applicant. More than a third (37%) of unsuccessful academic participants continued with some form of research activity, whilst only 21% of unsuccessful industry applicants did so. Of the 220 respondents who were able to undertake similar research activity, about two thirds (63%) undertook projects with reduced funds and 50% had to set longer project timescales (Figure 5.2). Close to a half (48%) took forward projects with less ambitious objectives and 43% involved fewer partners.

Only 24% of unsuccessful applicants who undertook similar research activity did not experience any effects to the nature of their project, representing 8% of all unsuccessful applicants who responded to the survey.

Figure 5.2 Effects of unsuccessful application to FP7 on subsequent progression of a project
(n=220 respondents who were able to take their projects forward)



Source: ICF survey of UK unsuccessful FP7 applicants, February 2016

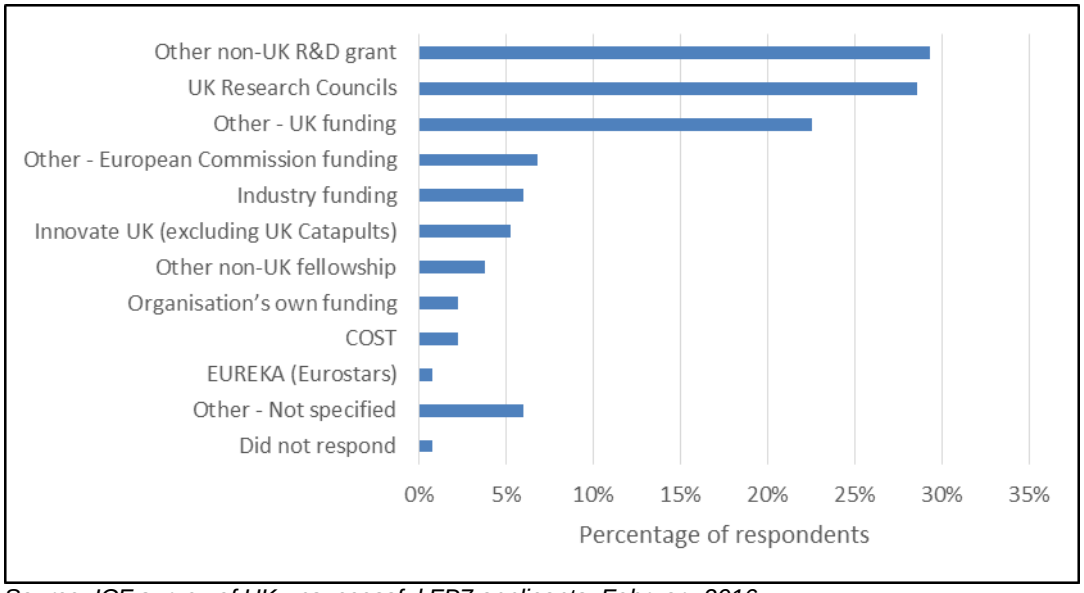
Note: multiple options could be selected by respondents

[84] A total of 33,199 unique contacts representing a total of 52,383 applications/were identified using a Levenshtein fuzzy matching algorithm. As CORDA data for applicants is of varying quality, these numbers only provide a rough estimate of the overall population of unsuccessful UK applicants. The survey was sent to 24,323 email addresses, from which 643 valid responses were collected.

The majority of those who undertook similar research activity obtained funding from another agency or programme (133 out of 220, or 60%), while a third (33%) did not obtain funding from other agencies/programmes but relied instead on funding from their own institution or organisation.[85]

The 133 respondents who obtained other agency or programme funding relied largely on non-UK R&D grants[86] (29%), and funding from UK Research Councils (also 29%), as shown in Figure 5.3.

Figure 5.3 Funding sources used in absence of FP7 support
(n=133 respondents who obtained other agency or programme funding)



Source: ICF survey of UK unsuccessful FP7 applicants, February 2016

Notes: multiple options could be selected by respondents. None of the respondents selected EUREKA network projects, ERUEKA cluster projects or UK Catapults as alternative sources of funding.

Unsuccessful FP7 applicants who went ahead with their projects and relied on funding from other agencies or programmes were also asked about the types of organisations involved in the funded projects and the adequacy of the funding obtained to establish and complete their projects.

Close to 50% of respondents (67 out of 133) respondents indicated partner organisations from outside the UK were involved, however the remaining 50% (66 respondents) indicated that no partner from outside the UK was involved in their funded project, or they did not know the answer to this question. Regarding organisation types, a majority of respondents (91 of 133, or 68%) involved partners from academia, while partnerships with industry were less frequently reported (44 of 133, or 33%). The remaining respondents stated that neither academia nor industry

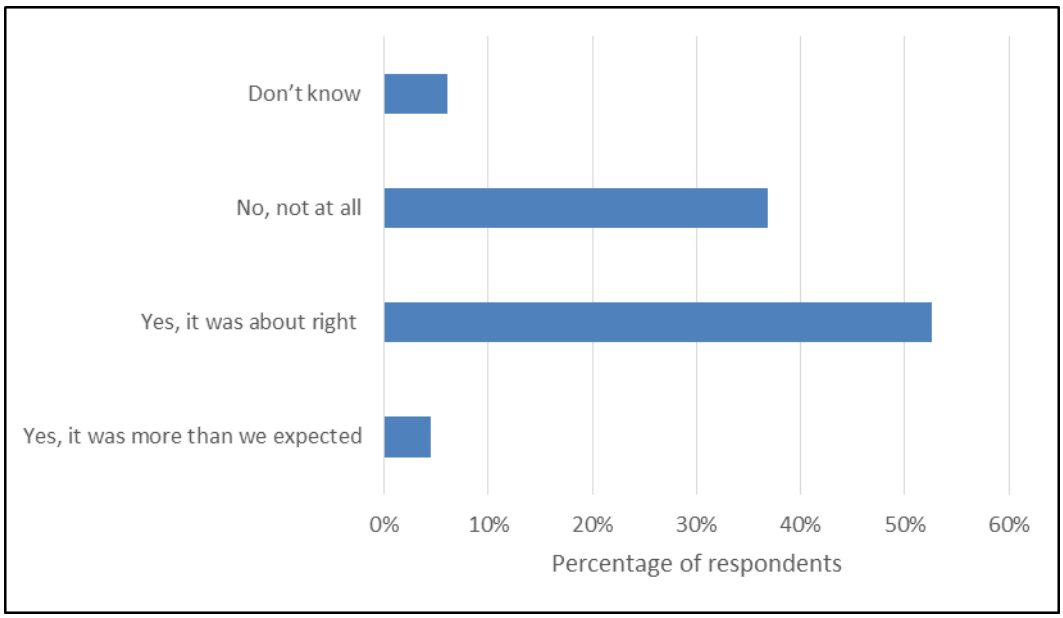
[85] The remaining 7% did not respond to the question. Funding from their own organisation included a university's own grant funding or a company's own R&D budget.

[86] Mostly researcher mobility and collaborative grant funding from other European programmes and national sources in other countries. E.g. the German Academic Exchange Service (DAAD) or funding from various national research councils in partner countries.

were involved in their projects (26 respondents, or 20% of the total) or did not know what organisation types were involved (3 respondents, 2%).

More than a third of respondents (37%) indicated that the funding received was not adequate at all, considering the original project objectives, while 70 respondents (53%) indicated that the funding received was about right, and 6 respondents (5%) said it was more than expected (Figure 5.4).

Figure 5.4 Adequacy of alternative funding for project completion in the absence of FP7 support
(n=133 respondents who obtained other agency or programme funding)



Source: ICF survey of UK unsuccessful FP7 applicants, February 2016

5.2 Complementarity with EUREKA and COST

Section 5.1 outlined the extent to which FP7 funded activities would have been conducted without FP7 funding. The vast majority of projects would not have been possible according to survey respondents, underlining the strong added value of FP7.

A review of COST programme objectives and activities suggests that FP7 and COST are, to a large extent, complementary programmes. COST Actions are often seen as a precursor and provide support to prepare collaborative research which is then often funded under the Framework Programme. There is however some overlap in benefits, outputs and impacts between COST and the Marie Curie actions (now Marie Skłodowska-Curie Actions under Horizon 2020) – particular with the Initial / Innovative Training Networks (ITNs). This pattern is also visible when analysing the results of the online survey. FP7 generally is perceived by UK participants to provide stronger benefits, outputs and impacts relating to the implementation of research, improving knowledge and skills as well as in accessing research infrastructure or equipment. The picture is less clear as regards the mobility of researchers, support to career development and the creation of new networks and partnerships – areas

where COST is seen as equally effective or more effective in delivering outputs and impacts.

The programme objectives and structure of EUREKA, in particular the EUREKA Eurostars programme, could be interpreted as more comparable to FP7 collaborative projects than COST. They fund collaborative R&D. However, they have a much clearer focus on industrial application than the majorities of FP7 specific programmes and cater to mainly industrial participants. EUREKA Eurostars funds mainly R&D performing SMEs, a group which was less prominent in FP7.

When reviewing the expected and realised benefits and impacts of FP7 and EUREKA Eurostars, these differences in programme objectives and target groups are confirmed in principle. Eurostars is perceived to be more effective in delivering commercial impacts, and a crude comparison of responses to the FP7 participant online survey and Eurostars project reports confirms this.

For the particular sample of EUREKA Eurostars projects with UK participation and at least one submitted market impact report (n=20), the average impact on employment and average realised impact on turnover is higher than for FP7. However, the data does not allow a like for like comparison as reporting times are different, and FP7 data includes a high number of collaborative projects funded by work programmes specifically focussing on basic/fundamental research.

5.3 Comparative advantages of EU Framework Programme and other initiatives

5.3.1 Strength and weaknesses compared to other European initiatives (COST, EUREKA)

As discussed above COST, EUREKA and FP7 were largely not comparable as the programmes set out to meet very different objectives.

Furthermore, perception of comparative advantages of European programmes largely depend on the type of beneficiary interviewed and the intended type of project activities. This is exemplified by views on EUREKA. Business interviewees were of the view that EUREKA programmes in principle are more focussed on applied research than FP7. This was noted as an advantage for business in particular, however the new orientation of Horizon 2020 on commercial impacts and innovation made this advantage less pronounced when interviewees were asked about the new EU Framework Programme.

5.3.2 Strength and weaknesses compared to national programmes

UK stakeholders agreed that FP7 programmes and national programmes are complementary. Business interviewees confirmed the opinion of interviewees from UK government and programme management, in that a conscious effort was made to align national R&D support to European programmes, and in particular to FP7.

As regards the complementarity of EU and national funding, interviewees suggested that:

- EU RTD Framework Programmes largely complemented national activities in the UK. Researchers and businesses in the UK could take national research to the EU level and collaborate with EU researchers.
- Furthermore, the EU RTD Framework Programme was perceived to create research at critical scale in some areas which might be too large for individual national programmes to tackle, such as in the area of diseases, energy technologies or fusion research.

Weaknesses of the EU RTD Framework Programmes in comparison to UK programmes, in particular in comparison to InnovateUK programmes, relate to the perceived administrative burden. Although there is no comprehensive research available which compares time and effort for UK programmes with the EU RTD framework, individual participants estimated that it takes between £40,000 and £100,000 to prepare a winning EU RTD framework proposal (collaborative research projects). Interviewees conceded however that this reflects the more complex project design, with multiple partners across different countries, and the larger amount of funding available.

Some examples of feedback on the relative advantages of national and FP7 funding are provided in the box below.

Views on relative advantages of InnovateUK and FP7 funding

"Application for UK programmes is much less extensive than EU, but the scope of projects is different. FP7 is very attractive – large projects, opportunity making very important contacts for the future. "

"You get the opportunity to create a good EU network. This is probably not the same for UK projects, which are smaller and more local. "

"Strengths of FP7 depend on the product stage you focus on. FP7 allows to do basic/fundamental research and, at the same time, to have a focus on commercial outputs. It allows to better investigate problems that new products are meant to address. Innovate UK projects have to be closer to the market."

"[T]he level of funding provided with FP7 is a big advantage. EU funding does not require to provide match funding. Investment in products is part of the project costs. While Innovate UK requires match funding, and this may be a disadvantage. With low margin products, it is difficult to find investment in early stages. "

"[O]ne of the big weaknesses [of FP7] is bureaucracy and lack of flexibility. It is very difficult to obtain an amendment"

"[W]ith FP7 it is very difficult to obtain technical changes and changes regarding how costs are recognised. The process is very slow."

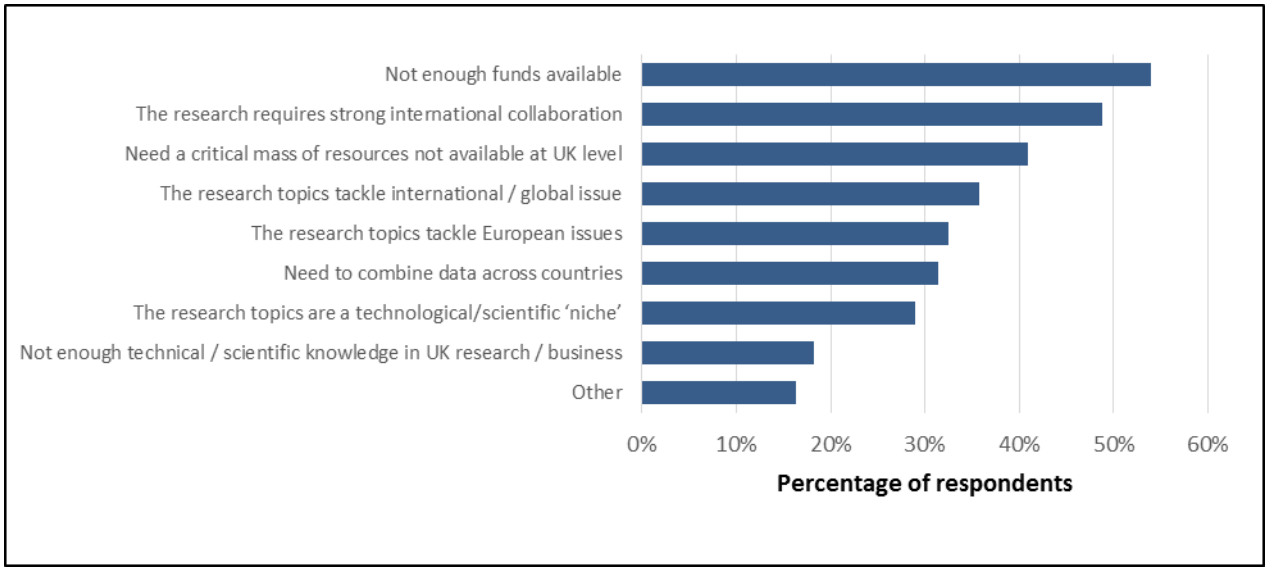
"There is probably more momentum in the EU than in the UK when looking at leveraging additional funds. InnovateUK/TSB tends to change a lot – different people and different systems, always changing. In the EU there is a stronger, large and globally recognised network which helps raise additional funding."

Source: ICF survey of UK FP7 participants February 2016

The FP7 participant survey confirmed most of this feedback collected in semi-structured interviews. Respondents who said that FP7 had provided support for research topics / issues that had not been addressed by the UK's national funding programmes were asked why they thought this was the case.

The results are presented in Figure 5.5 and indicate that lack of available funds (54%), a requirement for international collaboration (49%), and the need for a critical mass of resources (41%) were the most frequently cited reasons. Roughly one third of the respondents also indicated that the research topics tackled related to European or global issues, or required the combination of data across countries. As such there is a need for international cooperative effort rather than support through an exclusively national programme.

Figure 5.5 Reasons why UK national programmes have not addressed certain FP7 research topics / issues (n=252)



Source: ICF survey of UK FP7 participants February 2016

5.4 Conclusions

FP7 provides substantial added value to other national and European programmes

FP7 provided substantial added value to existing national and European programmes, according to UK participants. Almost all (91%) of the UK participants stated that their projects would not have gone ahead without FP7 support, suggesting that EU funding is critical for FP7 projects with UK involvement.

Around 5% of projects covered in the online survey of UK participants were reported to have been able to proceed, achieving similar levels of outputs and impacts, in the absence of FP7 funding. These projects amounted to €37.8 million or 7.4% of the total EU funding secured by survey respondents. This represents a minimum estimate for the deadweight effect of the programme.

Only 8% of unsuccessful applicants were able to go ahead with their project in absence of FP7 funding without major changes or limitations to project activities.

FP7 was largely complementary to other programmes such as COST and EUREKA Eurostars

The analysis of FP7, EUREKA and COST suggests that whilst there are some overlaps in terms of the programme objectives, the activities funded and their results and outcomes are largely considered to be complementary, aiming to address different objectives.

FP7 was generally perceived to provide strong benefits, outputs and impacts relating to the implementation of research, improving knowledge and skills as well as in accessing research infrastructure or equipment. The benefits of FP7 are less clear cut in terms of encouraging the mobility of researchers, support to career development and the creation of new networks and partnerships – areas where COST is seen as equally effective or more so in delivering outputs and impacts.

EUREKA Eurostars tends to fund activities more relevant to industrial application, and cater to mainly industrial beneficiaries. Eurostars-1, which ran from 2007-2013, was perceived to be more effective in delivering commercial impacts, and a crude comparison of responses to the FP7 participant online survey and Eurostars project reports confirms this. However this could not be confirmed robustly with the data at hand.

FP7 addressed issues of critical scale and scope that could not be tacked at the national level, but is perceived to have a larger administrative overhead than national programmes

When comparing the scope for added value of FP7 compared to national initiatives, differences in project size and extent of networking opportunities were most often noted. FP7 was largely seen to address issues of critical scale and scope that could not be tackled with UK resources and partners alone. In turn, national programmes

are seen to be more easily accessible and projects funded through national schemes are considered to have a lower administrative overhead.

Stakeholders and survey respondents were largely of the view that FP7 was complementary to R&D programmes at the national level. More than half (53%) of survey respondents stated that FP7 had supported topics not addressed by national programmes. Survey respondents indicated that a lack of available funds (54%), a requirement for international collaboration (49%), and the need for a critical mass of resources (41%) were the most common reasons they saw for work being supported at European level rather than at national level. Around 92% of respondents said that their project would not have been possible without FP7 support.

6 Feedback on administration and proposals for improvement

This section provides direct feedback from respondents on the administrative issues and suggested improvements for future calls / programmes under FP7 – it combines feedback on FP7 administration and reporting procedures from FP7 participants with feedback on the application and evaluation procedure from unsuccessful applicants.

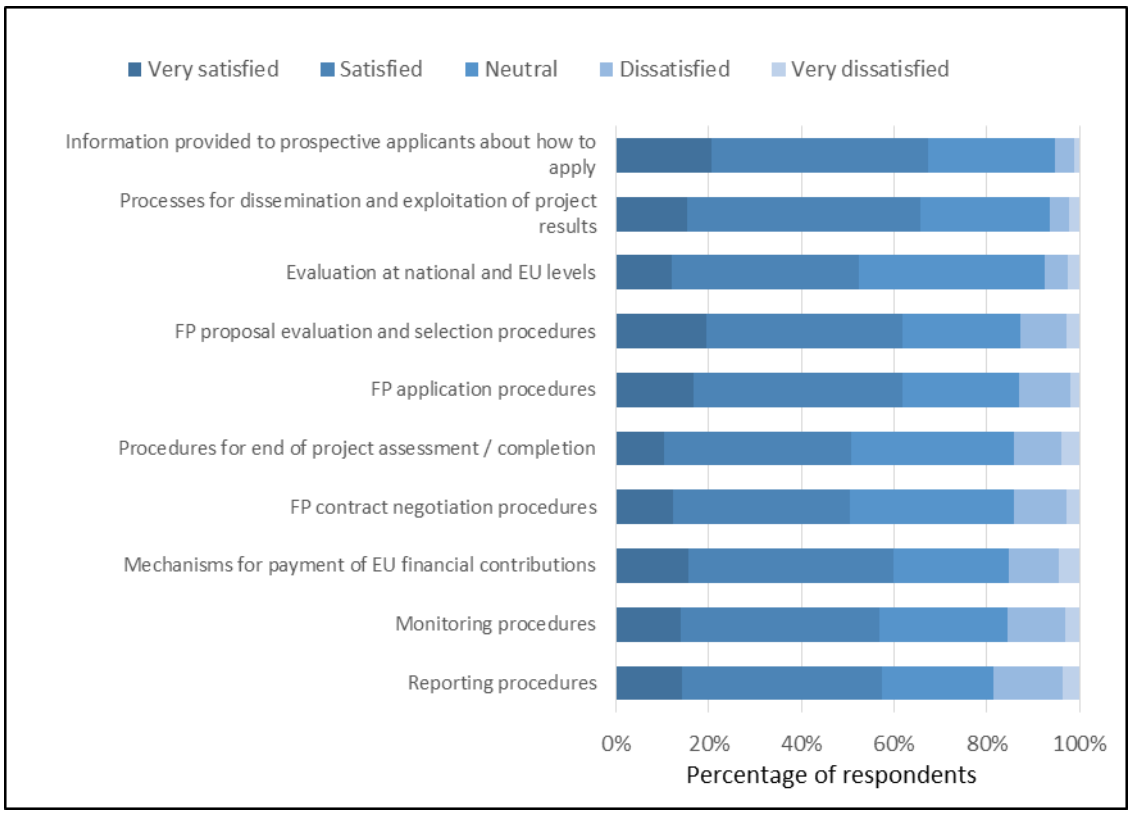
The section summarises advice from FP7 participants to future participants in EU Framework Programmes on how to maximise benefits from future FP projects.

6.1 Feedback on FP7 administration and reporting from participants

Participants reported generally high levels of satisfaction with various aspects of the administrative mechanisms and reporting procedures of FP7 (Figure 6.1). The areas of most satisfaction and least dissatisfaction concern (i) the information provided to applicants about how to apply, (ii) processes for dissemination and exploitation of results, and (iii) evaluation at national and EU level.

The greatest levels of dissatisfaction were with monitoring and reporting procedures, contract negotiation procedures, and mechanisms for payment of the EU's financial contribution to the projects. In these cases 15-20% of participants stated that they were dissatisfied or very dissatisfied. This compares to 50-60% of participants who stated that they were satisfied or very satisfied with these same elements. As such, the feedback suggests a good level of satisfaction with FP administrative and reporting procedures.

Figure 6.1 Satisfaction with FP7 administration and reporting (n=468)



Source ICF survey of UK FP7 participants February 2016

6.2 Feedback on FP7 application and evaluation procedures from unsuccessful applicants

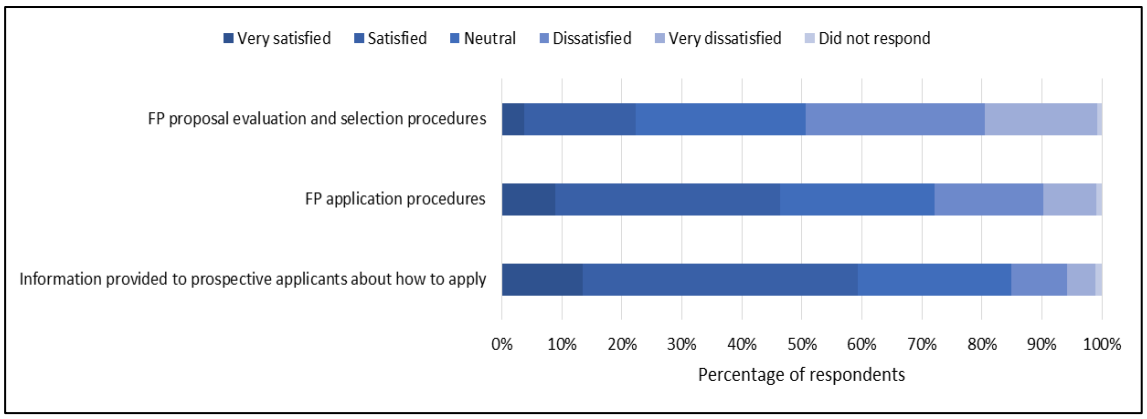
Unsuccessful applicants[87] were asked to report on their level of satisfaction with the following aspects of the FP7 programme:

- information provided to prospective applicants about how to apply;
- FP application procedures; and
- FP proposal evaluation and selection procedures.

Responses suggest that applicants were mainly dissatisfied with FP7 proposal evaluation and selection procedures (Figure 6.2). These responses are likely to be conditioned by their experience as unsuccessful applicants.

[87] Based on a survey of unsuccessful applicants to FP7, comprising individual researchers affiliated to a UK organisation at the time of application who had never succeeded in winning FP7 funding. In total, 643 unsuccessful applicants submitted a survey response. Annex 8 provides a breakdown of survey respondents.

Figure 6.2 Level of satisfaction of unsuccessful applicants with aspects of the FP7 programme (n=643)



Source: ICF survey of UK unsuccessful FP7 applicants, February 2016

Unsuccessful applicants were asked to comment on the administrative procedure to apply to FP7. A minority of those who commented (59 of 382, or 14%) provided positive feedback, indicating that procedures were generally efficient and clear. Most respondents (85%) gave negative feedback and emphasised that procedures were too complex and time consuming. Respondents also referred to the lack of transparency and insufficient guidance and feedback by evaluation panels regarding the selection of successful proposal. Some felt that the selection process was biased and not entirely based on merit.

6.3 Advice from participants to future participants on how to maximise benefits from EU Framework Programmes

Advice provided by FP7 participants to other potential UK participants on how to maximise benefits from EU Framework Programmes relates most frequently to the choice of partners, the design of the consortium and use of networks.

The most frequent recommendations were:

- **Maximise benefits from networking**: (from 16% of those who provided advice) - take advantage of the new networks and collaborations created through participation in EU Framework Programmes. Examples of the comments provided were as follows:

  "Ensure that [project participants] take full advantage of the opportunities to collaborate. We have developed an excellent network which will continue long after the project ceases."

  "In my area of research …, the benefits of the programme can be maximized by having a long-term programme of cooperation through international networking"

- **Ensure careful budgeting and planning**: (13%) - consider all factors that might affect delivery and cost recovery. for example:

"Avoid dependencies on large scale infrastructure targets with simultaneous delivery schedules."

"Budget adequately for face-to-face project meetings and translation."

- **Create a balanced consortium**: (12%) - involving a mix of organisation types and expertise, for example:

  "Make sure that the consortium is well balanced and that you can see a route to commercial involvement for your organisation."

  "Join the right consortium or build your own. Success is critically dependent on the consortium. Different partners have different agenda about why they are participating. Particularly commercial organisation whose main role seems to be making money from EU projects."

- **Make sure that project partners are known and trusted**: (11%) - choose partners carefully. In many cases they recommended consortia with partners that were previously known by the applicant:

  "It takes a year to build a consortium… putting together a submission rather quickly (say within months) is unrealistic unless partners are building on years of collaboration already."

  "Work with partners you know you can trust, including when they bring in new partners they know they can trust. Working together can be almost impossible if none of the partners have worked together before."

Further details of advice and examples of good practice are provided in Table 6.1.

Table 6.1 Views and opinions from participants to potential participants on how to maximise benefits from EU research Framework Programmes

(n=285 respondents who provided advice)

Category of advice	Recommendations	Quotes from survey responses	Number (and%) of respondents
Partners and Networks			
Know your partners	■ Work with partners that are previously known and trusted.	*"Make sure your partners are honest, look carefully at their EU-funded track record and make sure the team actually work on the project. Overall...avoid if you aren't 100% certain of the pedigree of your partners."* *"Work with people you like […] Our group was fantastic and productive because we all got on."*	32 (11%)
Reach a clear agreement with partners on expected project results	■ Set clear agreements for each project partner's role and on expected project outputs.	*"Be very clear beforehand about what you are trying to achieve, and consider carefully whether the benefits from working collaboratively are outweighed by the rigidities and managerial costs of using EU funding."* *"Be very clear about the overall objectives of the project, your role in delivering it and with budgetary arrangements."*	10 (4%)
Create a balanced consortium	■ Reach the right mix of expertise, nationalities and/or organisation types. ■ Optimise the number and mix of partners in order to maximise efficiencies and project benefits.	*"Take great care when selecting consortium partners that they have all the right knowledge required."* *"Be involved in good consortia that provide a mix of academic, innovation, and industrial partners."* *"Think about and manage expectations of the commercial and academic partners upfront (e.g. that academic partners want to carry out research and write papers)."*	33 (12%)

Category of advice	Recommendations	Quotes from survey responses	Number (and%) of respondents
Use opportunities for networking and cooperation	■ Take advantage of networking opportunities with other organisations, such as supply chain actors, other researchers and policy makers.	*"Use the programme to build strong partnerships."* *"Look for additional networking and distribution benefits (new collaborations, markets, sectors, etc.)."* *"Concentrate on networking for greater understanding rather than short-term routes to financial targets."*	47 (16%)
Project Management			
Ensure careful budgeting and planning	■ Ensure that resourcing is realistic. ■ Anticipate administrative burdens and high overheads.	*"Be more thoughtful about the number and timing deliverables across work packages when planning the project."*	38 (13%)
Ensure alignment with organisation's priorities and resources	■ Ensure that project objectives are relevant to partner organisation's goals and resources.	*"Ensure planned benefits fit well with the participant's strategic goals."* *"Ensure project is core to Company strategy."*	31 (11%)
Ensure adequate resources for coordination and for administrative tasks	■ Ensure adequate support for managing administrative burden ■ Involve an administrator with expertise of dealing with EU funding programmes	*"To have good/efficient (and low cost if possible) administration to handle the admin overheads."* *"Hope that your home institution has a good infrastructure in place to help you comply with all EU rules and [regulations] for project development/reporting - this can be a major production (and from my understanding, always has been for European funding) - but if that burden can be lessened, the funding is certainly worth the effort."*	15 (6%)

Category of advice	Recommendations	Quotes from survey responses	Number (and%) of respondents
Ensure good project management capacity	■ Ensure that the project is managed by a competent person. ■ Hire a project management company or a full time expert for project management ■ Involve a manager with expertise of dealing with EU funding programmes	*"If the project involves more 7-8 partners, engage a project management company as a full partner to support the administration, including proposal development and dissemination activities."* *"Have a strong well-governed management board. Require quarterly updates if the official update cycle is bi-annual."* *"Insist that the overall project is managed by a competent person or organisation."* *"If you are going to co-ordinate a multi-million euro project make sure you have a good project manager with experience of working with the Commission."*	13 (5%)
Be flexible on project delivery	■ Anticipate the need to change project delivery arrangements.	*"Be clear what you want to achieve going into a collaboration - but be very flexible and expect changes as the project is delivered."*	4 (1%)
Keep focussed on deliverables	■ Keep focussed on deliverables initially agreed. ■ Keep some flexibility in delivery.	*"Focus on what it is you want to deliver, do not get too broad in scope."* *"These projects are complex and distributed, so focus and concentrate your involvement if possible, to reduce your risks. Join with the intent to work to deliver on the project itself, not against your own agenda. Join with an open mind, and be prepared both to listen and to argue!"*	7 (2%)
Use external support services (e.g., NCPs and UK Research Office)	■ Get support from NCPs and other services	*"Get advice from all possible sources, i.e. UK and other EU national contact points."* *"Talk to National Contact Points and to Programme Officers about calls."* *"Work with the national contact point early and often -- they are your best help and highly knowledgeable."*	4 (1%)

Category of advice	Recommendations	Quotes from survey responses	Number (and%) of respondents
Dissemination and Exploitation			
Ensure dissemination of results	■ Dissemination of results throughout the project is important to maximise the value of participation in EU Framework Programmes	*"Make software modular and standards compliant, and open source, to promote reuse. Ensure that software is available for download throughout the project."* *"By properly resourcing our dissemination activities and a dedicated champion for this work was crucial to promoting the project and increasing the profile of our work. Also networking with our colleague and using their contacts to promote the work of the project has been important to raising awareness. Also a good working relations with your project officer is important."*	14 (5%)
Ensure exploitation of results	■ Ensure that there is a clear industry need for the new product/process developed and to have a clearly established ownership of intellectual property rights.	*"Have a clear idea of commercial value of expected project outcomes and clear agreement on ownership of project results."* *"It depends on the type of project, but for a project with a strong industrial partner bases, technologies should have a clear industry need and with a clear route for [technology readiness level] growth and exploitation. Ideally, partner proposals should be vetted by a steering committee during the application stage to ensure they are aligned with industry need."* *"[Undertake an] open discussions on IPR in the early stages of the project. Include a member of the consortium whose only role is the dissemination and promotion of the outputs (i.e. not a scientific contributor)."*	10 (4%)
Total			**285 (100%)**

Source: ICF survey of UK FP7 participants, February 2016

Note: each respondent could provide more than one piece of advice

6.4 Changes that would enhance UK involvement and increase the benefits derived

The survey sought views from FP7 participants on the changes to EU Framework Programmes that could improve UK involvement and the benefits from participation. A total of 227 comments were received, which can be grouped along the following broad themes.

6.4.1 Thematic coverage of funding programmes

Modifications to the thematic scope of forthcoming EU programmes to cover additional areas were suggested (from 17% of respondents). There was no consensus, however, on which thematic areas or technology readiness levels should be covered. For example, some respondents emphasised the need to allow for more 'blue sky' science, while others recommended a focus on later TRLs. The following are examples of the comments and recommendations provided:

"Retain the balance of fundamental research that was allowed in FP7 projects."

"[Ensure] more basic grants for blue skies research."

"H2020 seems much more technologically focused rather than scientifically focussed and this is disappointing. It makes it difficult for some fields to participate in the programmes except as a service to other more applied researchers."

"Have R&D programmes which covers the whole range of TRLs. It seems that for 16/17 work programmes have much less calls with lower TRLs."

"Focus on later TRLs."

6.4.2 Flexibility of programmes

Forthcoming calls should be less prescriptive regarding the specific topics covered and the rules for the creation of consortia. On consortium formation, many suggested that future programmes should allow smaller consortia. Some also recommended that participation from multiple participants from the same country should not be discouraged (12% of respondents). Suggestions included:

"[I recommend] a larger variety of topics. The calls are quite restrictive.

"The Framework Programme requires that each project has partners in different countries (!!) These partners typically do not know each other well - the reason that they are partnering up is to get the Framework money."

"If I was involved in designing programmes I would steer away from between-country networks and consortia and put more money into individuals or groups of co-located individuals."

"More ability to have smaller consortia targeting specific regional or thematic issues, so that the transaction costs of working with so many partners are reduced."

6.4.3 Administrative burdens

Reduce the overall administrative burdens arising from participation in funding programmes (10% of respondents) Suggestions on how this could be done included:

"Focus on output and communication towards the broader scientific and international community rather than on internal reports."

"Manageable, low impact project monitoring (cf. Innovate UK) would remove the need for us to outsource the highly bureaucratic project management requirements."

"Streamline six-monthly reporting to focus on hitting milestones, deliverables and defining re-worked plans where problems have arisen. "

6.4.4 Bidding process

Introduce changes to the bidding process to address the barriers to participation arising from complex application procedures paired with low application rates (8% of respondents). Suggestions included the introduction of a simplified two-stage application process:

"I understand our proposal took 300 hours [with] 12% success rate. Perhaps a mini-proposal would be helpful-- say 200 words - if successful, candidates would be invited to prepare a full proposal. This would cut down on the waste of time for all concerned."

"Applications are long, costly, and time-consuming with a very poor success rate. There should be a way (e.g. Expression of Interest) to have proposals vetted first, before going to a full application phase. I can understand why people may be put off FP projects as it requires an awful lot of effort for a very low chance of success."

"As for UK funding, if two-stage applications are involved, make stage one quick to apply for with a low percentage of success […] then work with successful applicants to ensure the stage two success rate is very high (80%). Also, promote support by external organisations who can write bids for companies, especially where success leads to the same company providing a management role whilst the project is live."

6.4.5 Summary of other recommendations from participants

Other recommendations are summarised in Table 6.2. These address perceived needs to improve the ease with which potential partners can use the programme to support their objectives, especially through changes in funding rules and instruments.

Table 6.2 Advice from participants on changes to EU Framework Programmes that would help enhance UK involvement and benefits

(n=227 respondents who provided recommendations)

Category of advice	Summary of recommendation	Quotes from survey responses	Number (and%) of respondents
Setting Priorities			
UK influence on the EU research agenda	■ The UK should be more involved in the definition of EU research priorities.	*"The UK should be better influencing technical areas for future calls."*	9 (4%)
UK research strategy	■ The UK research strategy should be more clearly communicated and better aligned to EU priorities.	*"Greater communication about how the topics of the EU calls is decided. Who decides the calls? Who are our UK representatives to this process? How can we submit input to increase the chances that our areas of interest are covered by the forthcoming calls?"* *"[There should be] Stronger links to directed UK national programmes and vice-versa."*	6 (3%)
Focussed calls	■ The scope of calls should be clearer and more focussed.	*"In Horizon 2020, there has been a great tendency for the calls to be too wide in scope. The call descriptions are woolly and vague, comprising too much all-encompassing jargon, which sometimes makes little sense. I suggest using writers who are skilled in getting information across without dilution."*	2 (1%)
Information and Support			
Information and awareness raising	■ More and clearer information should be available on different aspects of funding programmes, including the topics covered and potential benefits from participation.	*"More awareness of the schemes and application processes. I would not have known about the MC Career Integration Grant scheme except that a colleague mentioned it to me."*	17 (7%)

Category of advice	Summary of recommendation	Quotes from survey responses	Number (and%) of respondents
UK support	■ The UK should improve its support services to identify available opportunities, apply for funding and participate in research projects. ■ Support could be improved, such as: support targeted to specific applicants (SMEs or large companies) and support to different stage of the application and participation in research projects.	*"A simplified/shorter versions of the call could be circulated in UK to attract potential applicants."* *"Greater priority should be given to SMEs. Consortia bids that I am aware of tend to be dominated by Academia. I do not consider this to be healthy."* *"Would be good to see conditions improved for large industrial players like ours to participate. Currently most FP7/H2020 funding seems to go towards public institutions and universities. Special incentives are in place for SMEs, but these don't help the larger companies."* *"Possibly better legal support when the FP7 are involving a commercial company who are normally much stronger in this aspect in comparison with academic institutes."*	16 (7%)
Transparency of proposal evaluation	■ There should be more information on how evaluation of proposal is undertaken, including more feedback from evaluators.	*[The] evaluation process is quite arbitrary and results in many "good" applications that are rejected."* *"I think that there is still a perception among UK researchers that there is a political element in granting awards which depends on the "mix" of nationalities involved in the grant application. Many people think that a certain mix of "Old" EU member states and "Newer" member states stand a better chance of obtaining funding than, say, an application entirely constructed by original EU member states. Having been involved in judging grant applications last year I suspect that only the best applications are considered for funding. The EU needs to be more transparent about this aspect and how it features in the final selection process."*	8 (4%)

Category of advice	Summary of recommendation	Quotes from survey responses	Number (and%) of respondents
Funding Rules and Instruments			
Funding instruments	■ Funding instruments should be simplified. ■ Improve support for small organisations	*"Introduce medium sized projects with 3-5 partners to carry out novel collaborative research. Very big projects can be unwieldy and difficult to manage."* *"[Introduce a] "value for money" element - encourage lower budget projects (current advice is always to be most ambitious). Jumping from 0 to 1-2 Million in funding is a huge step, and especially in theory areas probably more benefit would accrue from having twice the number of projects at half the funding level (funding twice the number of [Principal Investigators])."*	6 (3%)
Ring-fencing	■ Funding in some research / geographic areas should be ring-fenced.	*"Ring-fence R&T investment funds for aerospace industry."* *"Administer all countries in the same as for Israel and Switzerland. That is, each country has its own allocation of its own funds. The country may then control its involvement, by increasing or decreasing funding to the scheme, according to its own priorities. Quality control would still occur via the current mechanism of proposal review, but rather than proposals being funded according to only those ranked above the "funding line", proposals would also be funded according to the available national budget."*	2 (1%)
Financial risk	■ Funding programmes should include instruments to address financial risks, such as risks from currency fluctuations.	*"A mechanism for adjusting payments to non-Euro area participants to reduce currency risks."*	3 (1%)
Project costing	■ Funding rules should be modified to ensure a fuller coverage of costs incurred by participants, specifically indirect costs. ■ Some suggested that UK organisations are disadvantaged as compared to international competitors who receive more institutional funding from their national governments	*"H2020 seems easier with 100% funding but indirect costs are still below what our organisations indirect costs really are. The UK could contribute to these costs directly?"* *"Rules to take into account the cost of research per country based on the core funding provided by governments or local institution, the UK is doing very poorly here with no core funding to support project when compared to other EU countries."*	12 (5%)

Category of advice	Summary of recommendation	Quotes from survey responses	Number (and%) of respondents
Funding for research equipment	■ Programme should provide more funding to cover costs of research equipment.	*"[programmes should provide] a higher amount of funds, perhaps aimed to the purchase of research equipment."*	2 (1%)
Funding for networking / collaborations	■ Future programmes should devote more funding to promote international cooperation.	*"[I recommend] programmes that favour exchange of researchers and development of international networks."*	3 (1%)
Exploitation			
Funding for follow-on research	■ More funding should be provided by the UK to follow-up on previous research projects	*"UK grants [should be provided] as follow up of EU grants to maximise benefits and exploitation of results."* *"Leverage of additional funds from the UK for successful EU proposals."*	6 (3%)
IPR rules	■ There should be clearer rules on IPR exploitation.	*"IPR ownership from projects needs to be made more open. Commercial research organisations can restrict national benefit for their own gain."* *"EU should vet the exploitation and IPR policies of each partner. Business cases are integral to proposals but rarely implemented post contract. EU should penalise those who fail to follow-up...but it doesn't or perhaps can't do this within existing legal frameworks?"*	2 (1%)

Source: ICF survey of UK FP7 participants, February 2016
Note: each respondent could provide more than one recommendation

6.5 Conclusions

FP7 participants were largely satisfied with the administrative mechanisms and reporting procedures of the programme. Further improvements were suggested in areas of project monitoring, contract negotiation and mechanisms for paying out EU contributions to beneficiaries

From feedback on administrative and reporting procedures, it can be concluded that FP7 participants were generally satisfied with various aspects of the administrative mechanisms and reporting procedures of FP7.

The areas of most satisfaction and least dissatisfaction concern (i) the information provided to applicants about how to apply, (ii) processes for dissemination and exploitation of results, and (iii) evaluation at national and EU level. The greatest levels of dissatisfaction were with monitoring and reporting procedures, contract negotiation procedures, and mechanisms for payment of the EU's financial contribution to the projects.

Whilst participants suggested that the European Commission should continue simplification efforts, the results from the online survey suggest that participants were generally satisfied with the programme and project management. Unsuccessful applicants were much less positive, as would be expected. They mostly gave negative feedback and emphasised that procedures are too complex and time consuming. Respondents also referred to the lack of transparency and insufficient guidance and feedback by evaluation panels regarding the selection of successful proposal. Some felt that the selection process was biased and not entirely based on merit.

7 Study conclusions

This section summarises the main conclusions from the analysis, particularly the strengths and weaknesses of UK participation in FP7. It covers added value, outputs, outcomes and impacts, barriers to participation and the effectiveness and adequacy of FP7's administrative and financial rules. It also offers conclusions on complementarity between FP7 and possible alternatives at the European and national level.

7.1 Strengths and weaknesses of the FP7 programme

Overall, FP7 was seen to be highly relevant by UK participants. 75% of survey respondents indicated that both the topics and funding instruments in FP7 were high or very high. Key motives for participating in FP7 were access to research funding (72%), the development of new or improved relationships or networks (55%), the desire to address specific scientific or technical questions or issues (54%), and to develop and extend internal knowledge and capabilities (53%).

Dominant presence of UK in FP7

Taking into account the relatively low investment in research and development, the UK performed very strongly in FP7 in terms of its overall participation and funding won. The UK won a total of €7 billion (or 15.4% of EU funding awarded in FP7), the second-highest of all participating countries behind Germany.

Overall, the UK performance in securing research funding was strong: its rate of success in competitions measured as the number of UK participants in successful project bids was more than 1.5 percentage points higher than the FP7 average for all participating countries. If measured by the amount of EU funding applied for and received, the UK's rate of success came 4th out of all EU member states, and performed more than three percentage points higher than the EU average (18% compared with 15%). However, UK applicants were less successful than those from Germany (19%) and France (23%).

The strong performance of the UK is also reflected in the following:

UK researchers participated in a third of all proposals and comprised 12% of all applicant researchers. EU funding requested by UK applicants represented 13% of all requested EU funding. On these three indicators the UK ranked higher than all member states that ranked similarly or higher in the Innovation Union Scoreboard. Even Germany and France (both of which in 2013 had a higher GDP and a larger population than the UK) did not participate in the application process as much as the UK.

UK researchers were participants in no fewer than 41% of all projects and comprised 13% of all FP7 participants. UK project bids secured 15% of all EU funding. Germany scored only slightly higher than the UK, but only in terms of the share of participants and funding allocated. No other country participated in the FP7 programme as much as the UK apart from Germany. However, the UK scored less strongly than other

countries ranked similarly or higher in the Innovation Union Scoreboard in terms of the overall success rate of applications. For example, application success rates for both France and Belgium were higher than those in the UK.

EU funding allocated to the UK was also higher than expected after accounting for the relative size of the country compared with other EU member states in terms of GDP, GERD, GOVERD and number of FTE researchers:

The UK performed above expectation relative to its GDP, GERD, GOVERD and its number of FTE researchers – when comparing the proportion of FP7 funding received to the proportion of EU GDP, GERD, GOVERD and FTE researchers.

Overall, rates of UK participation and EU funding won were higher than the FP7 average adjusting for its relative size, but these rates were lower than in some comparable countries.

UK participants took a coordinating role in FP7 projects more often than any other country

UK coordination rates have been above those of Germany and France across FP7 and during the early stages of Horizon 2020. The UK coordinated a total of 5,101 FP7 projects (49% of projects with UK participation), substantially more than either Germany (3,119, 35% of projects with German participation) or France (2,664, 37% of projects with French participation). In Horizon 2020, the UK held 57% of coordinator roles (1,785 out of 3,112 participations so far), a much higher proportion that either France (42%) or Germany (41%).

The UK was responsible for the highest share of project coordinators out of all countries participating in FP7. The UK was responsible for project coordination for 5,101 FP7 projects (23%), substantially more than Germany (3,119) and France (2,664).

Whilst the UK showed strong presence in the Ideas and People programmes, it coordinated relatively less of the more traditional R&D projects conducted under the Cooperation and Capacities programme.[88] It provided the largest share of project coordinators out of all countries in the Capacities programme (13% of all project coordinators). It came second behind Germany in the Cooperation programme, where the UK provided 13% of all project coordinators compared with Germany's 17%.

Survey respondents reported that they also played a very active role across almost all elements of their projects. More than two-thirds of the UK participants were involved to a large or very large extent in defining the objectives, scope and content of the project, conducting the research, disseminating the results of the project, and planning future research.

[88] It is important to note that coordination roles had different meaning across FP7. A large number of UK coordinators have led projects in the Marie Curie and Europe Research Council programmes, which are largely dominated by singe beneficiary projects (75% of all UK coordinators), a larger proportion than in Germany (50%) and France (61%). However the UK came second in terms of coordination roles behind Germany in the Cooperation programme, which is dominated by multi-partner, collaborative projects.

The UK continues to provide a significant share of project coordinators in Horizon 2020. UK coordinators are responsible for 21% of all projects funded so far, (1,785 out of 8,599 projects).

Strong UK participation in Ideas and People projects, lower participation in Cooperation projects

UK participants performed particularly well in securing funding form the Ideas and People programmes (funded respectively by Support for Frontier Research and Marie Curie actions). Indeed, the UK success in these two programmes was higher than in FP7 as a whole and higher than any of the comparator countries considered, both in terms of participation and EU funding allocated.

The UK has consistently had a higher than average share of its participations within the Marie Curie actions, accounting for 23% and 30% of UK participations in FP7 and Horizon 2020 respectively. The UK also accounted for 20% of all Marie Curie actions participations in FP7 and 24% in Horizon 2020. These data indicate that the UK's exceptionally strong performance in Marie Curie actions is increasing across successive FPs, and confirm that the UK continues to be the top destination in Europe for researcher training and career development.[89]

The UK has also performed extremely well in relation to European Research Council grants. In both FP7 and Horizon 2020 European Research Council grants have made up 7% of UK participations as compared with just 4% and 5% respectively within the programmes as a whole. In FP7 the UK was awarded 23% of all European Research Council participations – an exceptionally high share. The equivalent figure for Horizon 2020 is slightly lower at 20%, but is still exceptionally high.

Interviewees confirmed the importance of Marie Curie actions and the European Research Council and their added value to the UK. The Marie Curie actions programme is seen as a particularly effective instrument to recruit high potential researchers at the beginning of their career – interviewees suggested that in many cases these individual fellows would stay in the UK beyond the Marie Curie fellowship and provide substantial added value to the UK's research base.

The European Research Council was seen by interviewees to have a particularly strong effect on retaining world class researchers in the UK. Interviewees independently highlighted European Research Council funding as useful as it provided comparably large budgets and from the start focussed strongly on world leading, excellent research. It was therefore seen as a 'quality label'. Interviewees also regarded the European Research Council's bottom-up approach and its lean and flexible management as very positive.

Conversely, the UK participated less in the Cooperation programme when compared to the FP7 participations across all countries. This represented only 56% of all UK participations (compared with 66% for all of FP7) and only 52% of the EU funding

[89] Whilst Marie Curie Actions funded both researchers leaving and joining the UK, a crude analysis of the researcher recruitments and secondments in FP7 Marie Curie Actions suggests that the UK saw a net income of researchers through these programmes – with proportionately less researchers leaving the UK than in comparator countries.

allocated to UK participants (compared with 63% of all FP7 participants). These shares were higher in all of the other six comparator countries.

Compared with the overall FP7 profile, the UK's participation rates in FP7 were highest in the Health, Socio-economic Sciences and Humanities, Environment (including Climate Change), Security and Space priority areas. In each case the share of participations held by the UK was higher than the share within FP7 as a whole. This was particularly so for Health, where the UK participation rate was 33% higher than the FP7 rate. The relative strengths in areas such as health, as well as food, agriculture & biotechnology in terms of EU funding won do to some extent reflect the relatively importance of these areas to UK's economy – considering that throughout 2007-2014, pharmaceuticals was the product group that experienced the highest levels of business R&D investment (20% in 2014).

During the first years of Horizon 2020, the picture has changed slightly. Here, the UK so far achieved a relatively strong performance in the Societal Challenge Nanotechnologies, Advanced Materials, Advanced Manufacturing and Processing, and Biotechnology, but performed less strong in the Environment/Climate Change area. Performance in the societal challenge related to Socio-economic sciences and Humanities was also less strong than with FP7. However, this needs to be considered in the context of Socio-economic sciences and Humanities being mainstreamed across Horizon 2020. So far, Space has also decreased in relative importance in Horizon 2020.

In summary, these results indicate that the UK performs very well in leading edge research (Ideas) and in mobility programmes (People) – areas where UK universities are primarily involved - but that the UK participates less, in relative terms, in more traditional R&D projects conducted under the Cooperation and Capacities programme (which have a greater involvement of research institutes, industry and public bodies). The thematic areas where the UK performed well reflect to some extent areas that have seen large R&D investments (e.g. pharmaceuticals and biotechnology).

Strong presence of higher education institutions, and relatively less participation of industry compared to other European countries

The UK's participation in FP7 reflects a very substantial engagement in the programme by higher or secondary education (HES) organisations. They accounted for 60% of all UK participations and received 70% of all funding allocated to the UK. In comparison, for the programme overall HES organisations represented only 37% of FP7 participations and 43% of the funding. In none of the six other comparator countries were HES organisations as important.

In contrast, UK private commercial organisations (PRC) had a lower presence in the programme compared with the EU overall. The UK industry share of UK participation in FP7 ranked 23th out of all EU27 member states during FP7 (26% compared to an average of 31%).

Of the comparator countries, only in Finland did PRC organisations represent a lower share of participation than in the UK. In all the selected countries (including Finland),

PRC organisations represented a higher share of the EU funding allocated to the country than in the UK.

As regards the UK's shares of overall participations, UK universities were again particularly notable, representing the largest share of overall FP7 university participation (21%), ahead of Germany (12%). UK businesses represented 11% of overall business participation in FP7 (third place).

Presence of UK SMEs is similar to that of FP7 as a whole, with a particular strength in Capacities projects and a lower presence in People projects

For the EU27, SMEs represented 18% of all FP7 participants and received 14% of all EU funding. In the UK, the importance of SMEs was only very slightly smaller: SMEs represented 17% of all UK participants and received 13% of the EU funding allocated to the UK.

In terms of shares of overall SME participation in FP7, SMEs from the UK represented 12%, the second highest proportion behind Germany. The UK's SME participation in Horizon 2020 so far is slightly above its level of UK engagement in FP7.

7.2 Outputs, outcomes and impacts

UK participants cited the access to new networks and partnerships, opportunities to conduct research on specific issues and the development of new tools and techniques as important outputs – these were the main reasons for participating in FP7, especially for universities. By contrast companies participating in FP7 rated the opportunities for prototype development and demonstrations / pilots, and gaining newly-acquired knowledge about industrial processes or business parameters as important outputs as the main reasons for participating.

Peer-reviewed journal articles were widely reported as the key type of project output (87% of projects, 14.7 per project on average). A large proportion of FP7 projects recruited personnel specifically for the project (79%), with an average of just more than five Full Time Equivalents (FTEs) per project. Scientific exchanges were also very prevalent.

More commercially oriented outputs were less prevalent across UK participants, unsurprising due to the focus on basic research in the majority of FP7 projects. Less than one in five (18%) of the respondents' projects generated one or more new patent applications, and 7% applied for trademarks or registered designs as a result of an FP7 project. Around 26% of industry participants generated a patent application and 8% applied for a registered trademark / design.

The most important outcomes for UK participants were the opportunity for follow-up research, and the improved ability to attract and retain staff. Companies rated (i) development of new products, services and/or processes, (ii) access to new markets and supply chains (both within and outside of the UK), and (iii) reduced time to market for new or improved products or services as among their most important outcomes.

7.2.1 Realised outcomes/impacts

Over three quarters of participants report medium or high impacts in terms of:

- increased understanding and knowledge, in both new and existing areas;
- increased scientific and technological capabilities;
- improved relationships and networks;
- improved competitive position, and enhanced reputation; and
- increased mobility and improved career development for researchers.

40% or more of FP7 participants report high level outcomes in terms of increased understanding and knowledge, in both new and existing areas, increased scientific capabilities, and improved relationships and networks. Increased technological capabilities, improved competitive position, improved career development for researchers and enhanced reputation also feature as areas where a large number (30% or more) of participants reported a high level of impact.

Overall, businesses reported more frequently than universities that outcomes had been delivered below expectations.

FP7 had a significant impact on forming new networks and partnerships

FP7 played a key role in building new networks - approximately two-thirds (65%) of project partners were 'new' in the sense that the UK partner(s) had not previously worked with those organisations. This equates to an average of 8.4 new partners per FP7 project. Participants also reported that they expected to work again in the future with 46% of their FP7 project partners, which equates to a figure of 6.0 'future' partners per project on average. This networking impact contributes to an enhanced set of relationships for UK organisations, based on the addition of newer and more useful partnerships and the cessation of less productive ones.

The collaboration within FP7 contributed to the continuing evolution in relationships between UK researchers and other non-UK researchers:

- An estimate of 45,500 **new** partnerships were formed between UK and non-UK FP7 participants (65% of all UK partnerships were new so 24,500 of the partnerships were with pre-existing collaborators (35%)).
- UK partners expect to work with approximately 32,200 (46%) of their FP7 partners again in future.
- An estimated minimum of 7,700 (24%) of these future collaborations will be with overseas partners that the UK partner first collaborated with during FP7.

The impact of FP7 on creating new networks and accessing critical resources and knowledge outside of the UK was also highlighted in the five case studies, and therefore was the most widely-cited impact across all parts of the research programme (see Annex 3 for details).

Around 17% of survey respondents reported an increase in employment

Around 17% of respondents reported an increase in employment and 16% reported a safeguarding of employment. Just two respondents (<1%) reported a decrease in employment as a result of their project. These survey respondents reported that 3.9

FTEs on average had been created and 5.6 FTEs on average had been safeguarded.

Around 22% of survey respondents reported some commercial Impacts

As would be expected with a programme largely focussed on research activities which were not considered "close-to-market", and in line with only 26% of participants coming from industry, only 22% of all respondents reported that some commercial benefit had been achieved. In most of these cases the commercial returns came from the direct use of the project results within the organisation or from sale or licensing of products or intellectual property developed through the project.

Industry respondents reported commercial impacts much more frequently across all impacts queried. 39% of industry respondents reported commercial impacts from the direct use of project results, 18% said there were commercial impacts from sale or licensing of product, 11% described commercial impacts from sale or licensing of intellectual property. Among university respondents, 9% reported commercial impacts from the direct use of project results, 2% described commercial impacts from sale or licensing of product and 2% experienced commercial impacts from sale or licensing of intellectual property.

Around 9% of all respondents were able to quantify commercial benefits, indicating an average net gain of €815,000, and an estimated total net gain of around €35 million across their projects.

Around half of all respondents (53%) stated that the project would not result in any commercial benefit (other than the FP7 funding for their participation in the project).

Around 23% of survey respondents reported additional investments as a result of their project

Nearly a quarter of respondents (23%) reported that some investment had been made as result of participation in the project, of which 38 (or 8% of all responses) were able to provide some quantification. These 38 attested to investments totalling some €30.5 million, an average of just over €780,000 per organisation.

Impacts on policy development were indicated by 39% of survey respondents

Around 39% of survey respondents stated that their project had exerted an impact on policy, in most cases at the European level (24% of projects) but also at international / global level (11%). Only 4% of participants reported that their FP7 project had impacted on policy development at the national level.

7.3 Added value of FP7 for UK researchers

FP7 represented a significant funding source for the UK research community

FP7 was a relatively more important funding source for the UK compared with other EU member states. Between 2007 and 2013, FP7 funding constituted 3.1% of the UK's overall R&D investment. By comparison, FP7 made up 1.4% of R&D investment in Germany and 1.7% in France. FP7 was particularly significant for the UK's higher education sector, where it represented 7.2% of investment in R&D in 2007-2013.

Vast majority of the activities funded would not have been possible without FP7

Almost all (91%) of the UK participants stated that their projects would not have gone ahead without FP7 support.

This represents roughly 41,000 new partnerships between UK and non-UK participants which would not have been established without FP7 funding, and 29,000 future collaborations with non-UK participants that would have not materialised in the absence of FP7 funding.

Without FP7 funding, around 5% of funded projects would have been possible with similar levels of outputs and impacts

Around 5% of projects covered in the online survey of UK participants (22 out of 452) are considered to have been able to proceed achieving similar levels of outputs and impacts, in the absence of FP7 funding. These projects represented €37.8 million of EU funding or 7.4% of the total EU funding secured by survey respondents. This represents a minimum estimate for the deadweight effect of the programme.

Only 8% of unsuccessful applicants were able to go ahead with their project in absence of FP7 funding without major changes or limitations to project activities.

Funding and thematic areas in FP7 were highly relevant for UK stakeholders

Three-quarters (75%) of participants answering the online survey indicated that the relevance of both the topics and the instruments were high or very high for the research they wished to conduct, suggesting that the type and thematic areas of funding offered by FP7 were of high relevance.

Benefits outweighed costs for the majority of projects

Responses to the online survey reveal very high levels of performance for FP7 projects, with 80% of participants reporting that the benefits outweighed the costs (and 46% indicating that the benefit to cost ratio was very high). A further 13% of participants stated that benefits obtained were equal to the costs involved, and just 6% indicated that the costs of participation had outweighed the benefits.

FP7 enabled UK participants to collaborate with world leading partners

According to survey respondents, the vast majority of FP7 projects are helping UK participants to cooperate with world-class organisations, and thereby access some of their scientific and technological expertise, know-how and equipment. Three-quarters (75%) of respondents considered that half or more of their partners were world class in terms of their scientific / technological competences and know-how, while almost two-thirds (64%) considered that half or more of their partners were world class in terms of their equipment, instruments and tools.

For example, interviewees from areas related to the FP7 Health programme, such as biotechnology and medical research, highlighted its added value, because it provides:

- access to specialist manufacturers;
- access to scientific expertise and technical knowledge not available within UK;
- access to particular combinations of data and resources;

- access to different regions of Europe to prepare and conduct a clinical trial; and
- finance for clinical trials out of scope for most UK funding bodies.

FP7 was perceived to be largely complementary to national programmes

In the view of stakeholders, EU RTD Framework Programmes are largely complementary to research activities in the UK. Researchers and businesses in the UK can take national research to the EU level and collaborate with EU researchers.

The EU RTD Framework Programme was perceived to create research at critical scale in some areas which might be too large for individual national programmes to tackle, such as in the area of diseases, energy technologies or fusion research.

7.4 The role of national support services

National support services, such as the network of national contact points, are an important support mechanism for specific groups of applicants that do not have in-house expertise available. Applicants from larger institutions, such as large companies and universities, tend to use in-house support that offers a more in-depth assistance throughout the proposal preparation and project management lifecycle.

For those FP7 participants who used the national contact points, their support was critical in 25% of cases. Unsuccessful applicants who were supported by NCPs reported in 13% of cases that their FP7 application would have not been possible without assistance from NCPs.

First-time applicants and applicants without strong in-house support are most likely to need and appreciate help in understanding the programmes themselves, and are likely to need or appreciate help with sorting out the project and consortium arrangements. Qualitative feedback provided on the NCP support indicated that most respondents considered the advice provided by NCPs as valuable, however a small proportion of respondents felt that the support requested was not forthcoming or that the advice received was of little use, and more focus should be put on actively helping applicants to identify suitable project partners.

7.5 Barriers to participation for businesses

Businesses who had experience both with FP7 and EUREKA programmes highlighted the following reasons for choosing EUREKA programmes over FP7 or Horizon 2020 funding:

Resources needed at a pre-application stage: it was felt that, to be successful, applicants need to invest significant resources at a pre-application stage in order to create contacts with European Commission staff and obtain a good understanding of the EU research agenda. The lack of resources to engage in this process was perceived as a barrier to SME participation.

Resources needed at application stage: the application process was perceived as particularly burdensome. Complex application procedures combined with low

success rates represented an important barrier, especially for SMEs. Many commercial interviewees outlined that they had used services and resources of experienced academic institutions, to reduce their costs.

Resources needed for administration: interviewees reported that resources for project management, monitoring and reporting are too high and not always covered by the project budget, thus causing high internal project management overheads.

Low success rates, in particular for Horizon 2020: non-applicants reported that low success rates, in combination with the issues outlined above, have considerably increased the risk of applying for the Framework Programme.

7.6 Analysis of COST

The review of COST programme objectives and activities suggests that FP7 and COST are to a large extent, complementary programmes, but serve different objectives. COST actions are often seen as a precursor and provide support to prepare collaborative research which is then often funded under FP7. At the same time, COST actions are often used to help disseminate and promote project results of concluded research projects.

FP7 is generally perceived by UK participants to provide stronger benefits, outputs and impacts relating to the implementation of research, improving knowledge and skills as well as in accessing research infrastructure or equipment. The picture is less clear as regards the mobility of researchers, support to career development and the creation of new networks and partnerships – areas where COST is seen as equally effective or more effective in delivering outputs and impacts. The COST office does not collect comprehensive data on results and impacts for each COST action, therefore a disaggregated analysis was not possible.

For COST, the nature of the programme is such that UK participated in 98% of all actions. Hence there is no specific thematic focus reflected in the UK's participation in COST.

These results are broadly in line with the evidence presented by previous COST impact assessment studies.[90] COST in its current form provides for a bottom-up networking instrument, which is unique in the European funding landscape.

For the current Framework Programme Horizon 2020, stakeholders perceive COST to provide a bottom up networking instrument that is otherwise missing in the funding landscape.

7.7 Analysis of EUREKA Eurostars-1

The programme objectives and structure of EUREKA, in particular the EUREKA Eurostars-1 programme, are to some extent comparable to FP7 collaborative projects, in that they support collaborative R&D. However, they have a much clearer

[90] E.g. Technopolis (2014), COST impact assessment.

focus on industrial application than the majority of FP7 specific programmes and cater to mainly industrial participants. EUREKA Eurostars-1 funded mainly R&D performing SMEs, a group that was underrepresented in FP7. Therefore a direct like-for-like comparison between EUREKA Eurostars-1 and FP7 was not possible.

UK's participation in EUREKA Eurostars-1 reflected the thematic strengths that were also visible in FP7. ICT (34%) and Biotech (26%) were the dominant sectors. Energy (8%), Manufacturing/Materials/Transport (9%) and agriculture and marine resources (7%) follow.

Overall, stakeholders interviewed perceived Eurostars to be more effective in delivering commercial impacts. However the project reports reviewed suggest that Eurostars-1 projects reported smaller amounts on average than FP7 participants, if and when commercial impacts occurred. It was not possible to ascertain whether this was a result of different project size or differences in elapsed time during which commercial impacts could have occurred.

EUREKA programmes provide specific added value and benefits for international, industry driven research – and are largely complementary to FP7 and other initiatives within the European funding landscape.

ANNEXES

Annex 1 UK performance in FP7

A1.1 Methodology employed in undertaking the analysis

This section presents an analysis of UK 'performance' in FP7. It is based on CORDA data provided by BEIS in September 2015, relating to all applicants, proposals, participants and projects for FP7.

Data was imported in the statistical software Stata. Stata was then used to produce the summary tables presented below. The analysis below complements data presented above in section 3.

A1.1.1 Data used

The data used include:

- a list of all UK participants in FP7 projects;
- a list of all participants in FP7 projects;
- a list of all FP7 projects; and
- a list of all proposals and applicants to FP7, including all (80,050) UK applicants in FP7 proposals[91];

The analysis of UK participants takes into account the 25,282 FP7 projects for which participants' details were available. 18 FP7 projects are therefore excluded from the analysis of participants, as no participant data was available on these projects.

A1.1.2 Definitions used

The following definitions were used in this section. These definitions correspond with those used for similar studies.

- Participations – individual participations in projects. The same organisation can have multiple project participations across different projects.
- Participants – Number of discrete participations across a priority area, specific programme, country or FP7 overall, i.e. the number of organisation linked to a discrete (unique) participant ID.
- FP7 Specific programme - The Specific Programmes constitute the five major building blocks of FP7: Cooperation, Ideas, People, Capacities, Nuclear Research.
- FP7 priority areas / individual programmes – each specific programme includes a number of activity areas, these are described as priority areas or individual FP7 programmes – in detail these are presented in Table A1.1 below.

[91] The 80,050 UK applicants identified in proposals include eight applicants for which the country was wrongly reported. Five of these applicants were not successful. It is not possible to determine whether the other three applicants were successful (the applicants dataset does not contain information on project ID so it is not possible to know nor does the participants dataset contain information on proposal ID).

Table A1.1 FP7 specific programmes and individual programmes/priority areas

FP7 specific programme	FP7 programme/priority area
FP7 Cooperation	Health
	Food, Agriculture, and Biotechnology
	Information & Communication Technologies
	Nanosciences, Nanotechnologies, Materials and new Production Technologies
	Energy
	Environment (including Climate Change)
	Transport (including Aeronautics)
	Socio-economic sciences and Humanities
	Space
	Security
	General Activities (Annex IV)
	Joint Technology Initiatives (Annex IV-SP1)
FP7 Ideas	**European Research Council**
FP7 People	**Marie-Curie Actions**
FP7 Capacities	Research Infrastructures
	Research for the benefit of SMEs
	Regions of Knowledge
	Research Potential
	Science in Society
	Coherent development of research policies
	Activities of International Cooperation
Euratom indirect actions	Nuclear Fission and Radiation Protection
	Fusion Energy

A1.2 Summary of analysis

This section presents a short summary of the preliminary UK performance analysis in FP7. The key metrics of UK performance are summarises in bullet points below.

- **Importance of the UK within the FP7**. The UK was present in no less than 41% of all FP7 projects (10,372 out of 25,282). UK participations represented 13% of the total applications to FP7 (17,695 out of 134,737). UK organisations scored even better in terms of funding: they managed to receive 15% of the total EU funding allocated to FP7 (€7,002m out of €45,335m).
- **Organisation type**. Higher or secondary education (HES) organisations had a much larger importance in the UK than across all countries involved in FP7. In the UK, HES organisations represented 60% of all participations (versus 37% for FP7) and received 71% of EU funding (versus 43% for FP7). On the other hand, Private commercial organisations (PRC) and Research organisations

(REC) had a less important role in the UK than across all countries involved in FP7.

- **Business participations**. Business participations represented 30.3% of all FP7 participations and received 25% of all EU funding across all participating countries. As mentioned above, PRC organisations had a less important role in the UK: they represented only 25.9% of all UK participations and received only 18% of the EU funding allocated to the UK.
- **SME participations**. SME participations represented 18% of all FP7 participations and received 14% of all EU funding. In the UK, this proportion was slightly smaller: SME represented 17% of all UK participations and received 13% of the EU funding allocated to the UK.
- **Specific programmes**. In terms of the number of UK projects and UK participations, the specific programmes Cooperation and People were the most significant while in terms of the amount of EU funding allocated to UK organisations, the Cooperation and Ideas were most significant. However, when looking at shares of the FP7 totals, it appears that the UK performed particularly strongly in the specific programme People. The specific programme with the weakest performance was Euratom.
- **Success rates**. Overall, UK performance in terms of success rates for FP7 has been strong: the UK success rate by number of applications was more than 1.5 percentage points higher than the FP7 average for all participating countries (22.1% versus 20.5%), while the success rates by number of projects and by the amount of EU funding allocated were more than three percentage points higher than the FP7 averages (respectively 19.7% versus 15.9% and 18.1% versus 15.0%).
- **Comparison with other innovation leaders and followers**. Using the rank of individual countries in the Innovation Union Scoreboard ranking as a contextualising metric and comparing the UK to other countries classed either as innovation leaders or innovation followers, the UK was the second country to receive the most EU funding after Germany. However, the UK did not rank as well in terms of success rate by EU funding (5th after France, the Netherlands, Germany and Belgium) and in terms of success rate by applications (6th after the Netherlands, France, Belgium, Germany and Denmark).
- **Coordination levels**. UK partners occupied the role of project coordinator in 49% of the projects in which UK participants were involved, meaning UK participants were in a coordinating role for 29% of all UK FP7 participations. This is a much higher proportion than the overall FP7 coordinator-to-participant ratio (18.8%).
- **Collaboration within FP7 projects**. There were more than one UK partner in 37% of the projects in which the UK was involved. In volume terms, the greatest number and share of collaborations took place with partners in Germany, followed by France, Italy and Spain. When looking at the ratio of each country's share of all participations in UK projects to their overall share of FP7 participations, the most active 'Member State' collaboration partners were the Netherlands, Denmark, Sweden and Ireland.

A1.3 Detailed analysis

This section presents a detailed analysis of UK performance in FP7.

A1.3.1 Overall participation in FP7 by UK organisations

The overall statistics on UK participation in FP7 are as follows:

Demand: The total number of UK applications was 80,050 out of a total of 656,732 for the whole of FP7. UK's applications therefore constituted 12.1% of the total number of applications in FP7. UK organisations were involved in 52,696 proposals, out of a total of 158,609 proposals for the whole of FP7. UK organisations were therefore involved in 33.2% of all FP7 proposals. UK organisations requested a total of €38.6 billion in EU funding out of a total EU requested of €303.2 billion. UK organisations therefore requested 12.7% of all EU funding.

Projects: UK organisations were involved in 10,372 projects, out of a total of 25,282 projects for which participants details were available. UK organisations were therefore involved in 41.0% of all FP7 projects included in the analysis.

Participations: The total number of UK participations was 17,695, out of a total of 134,737 for the whole of FP7. UK's participations therefore constituted 13.1% of the total number of participations in FP7.

Organisations: A total of 2,909 discrete organisations from the UK participated in FP7, out of 28,985 participants (all countries). UK organisations therefore constituted 10.0% of all organisations involved in FP7.

Funding: UK organisations were allocated a total of €7.002 billion in EU funding[92], out of a total EU allocation of €45.335 billion[93]. UK organisations therefore received 15.4% of all EU funding.

Table A1.2 provides a summary of success rates by proposals, by applications, and by funding for the UK and the whole of FP7. Overall, the UK had higher success rates than the FP7 average.

[92] The amounts of EU funding allocated was unknown for four UK organisations and have therefore been excluded from the totals.

[93] The amounts of EU funding allocated was unknown for 49 organisations and have therefore been excluded from the totals.

Table A1.2 Summary of success rates

Success rates	UK	FP7
By proposals (no. of projects / no. of proposals)	19.7%	15.9%
By applications (no. of participants / no. of applicants)	22.1%	20.5%
By funding (amount of EU funding allocated / amount of EU funding requested)	18.1%	15.0%

A1.3.2 UK Participation in FP7 by specific programme and priority area

Table A1.3 provides a breakdown of key statistics on UK participation in FP7 (projects, participations, organisations and EU funding) by specific programme and priority area.

Regarding the specific programmes Cooperation, Capacities and Euratom, the share of FP7 projects in which the UK were involved was significantly higher than average. However, for these three programmes, the share of participations, organisations and EU funding received were roughly in line or below the UK averages for the entire FP7 programme.

On the contrary, regarding the specific programmes Ideas and People, the share of FP7 projects in which the UK was involved in was lower than average. However, for these two programmes, the share of participations and EU funding received was higher than the UK averages for the entire FP7 programme.

Table A1.3 Number of projects, participations and organisations, and EU funding for UK and total FP7, by specific programme and priority area

Specific programme	FP7 programme/priority area	Projects – with UK involvement	Projects – total FP7	Share of FP7 projects with UK involvement	Participations – UK	Participations – total FP7	Share of UK participations in all FP7	Discrete organisations – UK	Discrete organisations – total FP7	Share of UK organisations in all FP7	EU funding – allocated to UK organisations (€m)	EU funding – allocated to total FP7 (€m)	Share of total EU funding allocated to UK organisations
FP7 Cooperation	Health	756	1,008	75%	1,692	11,348	15%	358	3,466	10%	808	4,792	17%
	Food, Agriculture, and Biotechnology	375	516	73%	804	7,926	10%	288	3,260	9%	241	1,851	13%
	Information & Communication Technologies	1,354	2,328	58%	2,423	22,701	11%	671	6,552	10%	916	7,875	12%
	Nanosciences, Nanotechnologies, Materials and new Production Technologies	493	804	61%	1,062	10,304	10%	429	4,616	9%	352	3,237	11%
	Energy	186	374	50%	395	4,401	9%	206	2,288	9%	144	1,851	8%
	Environment (including Climate Change)	360	494	73%	835	7,173	12%	274	2,979	9%	238	1,719	14%
	Transport (including Aeronautics)	433	701	62%	936	8,907	11%	333	3,329	10%	260	2,269	11%
	Socio-economic sciences and Humanities	212	253	84%	361	2,782	13%	113	1,212	9%	94	580	16%
	Space	158	267	59%	299	2,641	11%	109	1,089	10%	96	713	13%
	Security	217	319	68%	448	3,950	11%	221	1,885	12%	157	1,332	12%
	General Activities (Annex IV)	7	26	27%	8	183	4%	8	132	6%	4	313	1%
	Joint Technology Initiatives (Annex IV-SP1)	266	783	34%	693	6,198	11%	272	2,499	11%	340	2,184	16%

Specific programme	FP7 programme/priority area	Projects – with UK involvement	Projects – total FP7	Share of FP7 projects with UK involvement	Participations – UK	Participations – total FP7	Share of UK participations in all FP7	Discrete organisations – UK	Discrete organisations – total FP7	Share of UK organisations in all FP7	EU funding – allocated to UK organisations (€m)	EU funding – allocated to total FP7 (€m)	Share of total EU funding allocated to UK organisations
	Sub-total: FP7 Cooperation	**4,817**	**7,873**	**61%**	**9,956**	**88,514**	**11%**	**3,282**	**33,307**	**10%**	**3,650**	**28,716**	**13%**
FP7 Ideas	**European Research Council**	**1,072**	**4,539**	**24%**	**1,235**	**5,462**	**23%**	**90**	**765**	**12%**	**1,715**	**7,710**	**22%**
FP7 People	**Marie-Curie Actions**	**3,328**	**10,705**	**31%**	**4,000**	**19,565**	**20%**	**355**	**3,547**	**10%**	**1,086**	**4,778**	**23%**
FP7 Capacities	Research Infrastructures	267	341	78%	627	5,276	12%	146	1,657	9%	273	1,528	18%
	Research for the benefit of SMEs	609	1,029	59%	1,358	9,165	15%	743	5,587	13%	189	1,250	15%
	Regions of Knowledge	25	84	30%	66	1,007	7%	58	870	7%	9	127	7%
	Research Potential	5	206	2%	5	307	2%	4	228	2%	6	378	2%
	Science in Society	123	183	67%	205	1,835	11%	117	1,105	11%	35	288	12%
	Coherent development of research policies	8	27	30%	19	131	15%	19	115	17%	2	28	6%
	Activities of International Cooperation	29	157	18%	35	1,400	3%	20	668	3%	5	173	3%
	Sub-total: FP7 Capacities	**1,066**	**2,027**	**53%**	**2,315**	**19,121**	**12%**	**1,107**	**10,230**	**11%**	**519**	**3,773**	**14%**
Euratom indirect actions	Nuclear Fission and Radiation Protection	86	134	64%	181	2,008	9%	52	525	10%	31	353	9%
	Fusion Energy	3	4	75%	8	67	12%	8	58	14%	1	5	20%
	Sub-total: Euratom	**89**	**138**	**64%**	**189**	**2,075**	**9%**	**60**	**583**	**10%**	**32**	**358**	**9%**
TOTAL		**10,372**	**25,282**	**41%**	**17,695**	**134,737**	**13%**	**4,894**	**48,432**	**10%**	**7,002**	**45,335**	**15%**

NB: Subtotals for discrete organisations do not add up as the same organisation can participate in several programmes/priority areas.

Table A1.4 explores further the results presented in Table A1.3 by looking at the importance of the UK in FP7 in terms of projects, participations, organisations and EU funding, by type of organisations. It appears that compared to the average UK organisation, UK businesses (PRC) represented a smaller share of FP7 projects with UK involvement, a smaller share of UK participations in FP7 and a smaller share of total EU funding allocated to UK.

UK businesses were involved in the highest share of projects in the Capacities programme. Higher or secondary education organisations were involved in the most number of projects in the Cooperation programme, and represented 28.7% of all HES organisations in the Ideas specific programme. HES organisations from the UK were allocated 32% out of the total EU budget allocated to all HES organisations in FP7.

Table A1.4 Share of UK in FP7 (projects, participations, organisations and EU funding), by specific programme and type of organisations

Share of FP7 projects with UK involvement	Capacities	Cooperation	Euratom	Ideas	People	Total
Higher or secondary education organisations (HES)	34.6%	49.7%	46.6%	29.4%	37.9%	**40.3%**
Private commercial organisations (PRC)	43.4%	33.0%	38.0%	3.0%	20.9%	**33.1%**
Research organisations (REC)	16.7%	11.8%	18.6%	5.9%	6.8%	**10.6%**
Public bodies (PUB)	15.4%	20.3%	12.2%	21.4%	15.0%	**18.7%**
Other (OTH)	13.9%	12.7%	7.1%	0.0%	3.9%	**12.1%**
Total	**52.6%**	**61.2%**	**64.5%**	**23.6%**	**31.1%**	**41.0%**

Share of UK participations in all FP7	Capacities	Cooperation	Euratom	Ideas	People	Total
Higher or secondary education organisations (HES)	16.2%	18.3%	14.6%	28.7%	27.5%	**21.2%**
Private commercial organisations (PRC)	15.5%	10.1%	11.7%	2.9%	12.5%	**11.2%**
Research organisations (REC)	6.5%	4.3%	4.2%	5.6%	5.4%	**4.8%**
Public bodies (PUB)	6.4%	9.0%	6.5%	20.0%	12.2%	**8.6%**
Other (OTH)	7.0%	8.7%	5.9%	0.0%	2.7%	**7.7%**
Total	**12.1%**	**11.2%**	**9.1%**	**22.6%**	**20.4%**	**13.1%**

Share of FP7 projects with UK involvement	Capacities	Cooperation	Euratom	Ideas	People	Total
Share of UK organisations in all FP7	Capacities	Cooperation	Euratom	Ideas	People	Total
Higher or secondary education organisations (HES)	9.5%	6.7%	14.3%	14.6%	10.7%	**6.2%**
Private commercial organisations (PRC)	13.8%	11.2%	10.2%	5.7%	13.5%	**11.8%**
Research organisations (REC)	5.4%	5.1%	5.9%	6.9%	4.4%	**5.0%**
Public bodies (PUB)	5.4%	7.5%	6.3%	23.1%	5.1%	**7.1%**
Other (OTH)	8.6%	10.6%	5.3%	0.0%	5.2%	**9.2%**
Total	**11.0%**	**9.7%**	**10.1%**	**11.8%**	**10.0%**	**10.0%**
Share of total EU funding allocated to UK	Capacities	Cooperation	Euratom	Ideas	People	Total
Higher or secondary education organisations (HES)	16.6%	22.1%	15.9%	28.4%	32.0%	**25.2%**
Private commercial organisations (PRC)	20.7%	9.9%	15.4%	3.0%	14.3%	**11.3%**
Research organisations (REC)	6.2%	4.4%	4.1%	5.5%	4.6%	**4.8%**
Public bodies (PUB)	14.1%	13.3%	9.2%	14.4%	5.0%	**12.2%**
Other (OTH)	5.5%	5.9%	2.8%	0.0%	2.9%	**5.5%**
Total	**13.8%**	**12.7%**	**9.1%**	**22.2%**	**22.7%**	**15.4%**

Table A1.5 provides a breakdown of the share of UK participations by project start year. The share of UK participations remained fairly constant throughout time for the specific programmes Cooperation, Ideas, Euratom and Capacities. On the other hand, the UK saw an improvement in its share of participations for People (from 5% in 2007 to 30% in 2014).

Table A1.5 Share of UK participations in FP7, by specific programme/priority area and by project start year

Specific programme	FP7 programme/priority area	2007	2008	2009	2010	2011	2012	2013	2014*
FP7 Cooperation	Health		15%	14%	15%	16%	15%	14%	18%
	Food, Agriculture, and Biotechnology		10%	9%	10%	11%	11%	9%	10%
	Information & Communication Technologies	8%	10%	10%	10%	11%	11%	12%	11%
	Nanosciences, Nanotechnologies, Materials and new Production Technologies		9%	11%	9%	11%	10%	11%	9%
	Energy	0%	10%	8%	9%	9%	8%	9%	8%
	Environment (including Climate Change)	0%	13%	10%	10%	13%	13%	12%	12%
	Transport (including Aeronautics)	10%	9%	11%	10%	13%	10%	11%	4%
	Socio-economic sciences and Humanities	18%	15%	13%	10%	13%	14%	12%	12%
	Space	0%	10%	8%	11%	8%	13%	13%	20%
	Security		9%	11%	11%	11%	11%	13%	12%
	General Activities (Annex IV)	0%	7%	4%	0%	7%	0%		
	Joint Technology Initiatives (Annex IV-SP1)			13%	9%	12%	13%	10%	10%
	Sub-total: FP7 Cooperation	**9%**	**11%**	**11%**	**11%**	**12%**	**11%**	**12%**	**12%**
FP7 Ideas	**European Research Council**		**18%**	**19%**	**21%**	**24%**	**24%**	**26%**	**21%**
FP7 People	**Marie-Curie Actions**	**5%**	**19%**	**19%**	**20%**	**17%**	**19%**	**21%**	**30%**
FP7 Capacities	Research Infrastructures	10%	11%	12%	10%	13%	11%	13%	17%
	Research for the benefit of SMEs	4%	14%	13%	16%	17%	15%	14%	15%
	Regions of Knowledge		1%	6%	9%	7%	8%	10%	0%
	Research Potential		3%	0%	0%	0%	0%	0%	17%
	Science in Society	0%	10%	16%	8%	11%	9%	11%	10%
	Coherent development of research policies		0%	6%	12%	0%	43%	21%	17%
	Activities of International Cooperation		2%	1%	3%	7%	2%	2%	1%
	Sub-total: FP7 Capacities	**9%**	**11%**	**11%**	**12%**	**14%**	**13%**	**12%**	**13%**
Euratom indirect actions	Nuclear Fission and Radiation Protection		10%	10%	10%	8%	9%	8%	8%
	Fusion Energy		11%	100%				0%	
	Sub-total: Euratom		**10%**	**10%**	**10%**	**8%**	**9%**	**8%**	**8%**
Total		**8%**	**12%**	**12%**	**12%**	**13%**	**13%**	**14%**	**16%**

NB: blanks mean there were no participations at the FP7 level for that specific year and that specific programme/priority area. 134,607 observations (incl. 17,675 for UK)

** All projects started in 2014 or later*

Table A1.6 provides a breakdown of the share of EU funding allocated to UK organisations by project start year. Over the years, the UK saw its share of EU funding decrease for Euratom (from 14% in 2008 to 3% in 2014). However, it also saw some improvements in terms of share of EU funding for Cooperation (from 2% in 2007 to 13% in 2014), Capacities (from 6% in 2007 to 14% in 2014) and People (from 10% in 2007 to 29% in 2014).

Table A1.6 Share of total EU funding in FP7 allocated to UK organisations, by specific programme/priority area and by project start year

Specific programme	FP7 programme/priority area	2007	2008	2009	2010	2011	2012	2013	2014*
FP7 Cooperation	Health		16%	19%	18%	18%	16%	14%	23%
	Food, Agriculture, and Biotechnology		13%	14%	12%	15%	13%	10%	18%
	Information & Communication Technologies	11%	11%	13%	11%	13%	11%	13%	9%
	Nanosciences, Nanotechnologies, Materials and new Production Technologies		9%	12%	9%	12%	10%	13%	9%
	Energy	0%	9%	8%	9%	8%	5%	9%	7%
	Environment (including Climate Change)	0%	14%	12%	14%	15%	14%	14%	14%
	Transport (including Aeronautics)	7%	10%	14%	10%	13%	10%	11%	4%
	Socio-economic sciences and Humanities	52%	19%	16%	13%	21%	14%	15%	15%
	Space	0%	8%	12%	10%	13%	14%	15%	28%
	Security		14%	10%	12%	10%	11%	13%	12%
	General Activities (Annex IV)	0%	13%	17%	0%	7%	0%		
	Joint Technology Initiatives (Annex IV-SP1)			16%	14%	16%	21%	13%	14%
	Sub-total: FP7 Cooperation	**2%**	**14%**	**19%**	**12%**	**14%**	**13%**	**13%**	**13%**
FP7 Ideas	**European Research Council**		**19%**	**19%**	**21%**	**22%**	**24%**	**26%**	**20%**
FP7 People	**Marie-Curie Actions**	**10%**	**20%**	**20%**	**22%**	**19%**	**20%**	**25%**	**29%**
FP7 Capacities	Research Infrastructures	6%	15%	27%	10%	13%	11%	28%	13%
	Research for the benefit of SMEs	6%	14%	13%	18%	16%	16%	14%	13%
	Regions of Knowledge		1%	4%	7%	13%	8%	9%	0%
	Research Potential		0%	0%	0%	0%	0%	0%	23%
	Science in Society	0%	14%	18%	9%	12%	8%	13%	12%
	Coherent development of research policies		0%	3%	10%	0%	7%	16%	24%
	Activities of International Cooperation		4%	1%	2%	4%	2%	3%	1%
	Sub-total: FP7 Capacities	**6%**	**13%**	**20%**	**12%**	**13%**	**11%**	**14%**	**14%**
Euratom indirect actions	Nuclear Fission and Radiation Protection		15%	8%	11%	8%	10%	6%	3%
	Fusion Energy		4%	100%				0%	
	Sub-total: Euratom		**14%**	**10%**	**11%**	**8%**	**10%**	**6%**	**3%**

Specific programme	FP7 programme/priority area	2007	2008	2009	2010	2011	2012	2013	2014*
Total		**3%**	**13%**	**16%**	**14%**	**16%**	**16%**	**17%**	**18%**

NB: blanks mean there was no EU funding at the FP7 level for that specific year and that specific programme/priority area. 134,607 observations (incl. 17,675 for UK)

** All projects started in 2014 or later*

A1.3.2.2 By UK organisations

Participations

The standard classification of participants in FP7 by organisation type contains five main categories. These are:

- PUB – public bodies
- REC – research organisations
- HES – higher or secondary education organisations
- PRC – private commercial organisations
- OTH – other

Table A1.7 compares the breakdown of UK participations by organisation type with the breakdown for all FP7 participations.

The data indicate that UK's participation profile in terms of participation by different types of organisation was different to that of FP7 as a whole. First, HES accounted for a significantly larger proportion of UK participations (60%) than that of overall FP7 (37%). Secondly, PRC and REC from UK accounted for less than the FP7 average (26% versus 30% and 9% versus 25% respectively).

The divergence between the participation of HES and REC comparing UK to the FP7 average is likely a function of different national research & innovation systems, and different institutional landscapes. For instance, in Germany, which has a research & innovation system strongly build on research organisations such as Fraunhofer and the Helmholtz institutes, the REC category represented 28% of the total German FP7 participations. In France, the REC category represented 39% of all participations, with a strong performance of the Centre National de la Recherche Scientifique CNRS).In France in turn, the proportion of the HES category was considerably below the FP7 average (17% versus 37%).

The share of participations accounted for by government bodies (PUB) and other types of organisations (OTH) from the UK were roughly in line with FP7 averages.

Table A1.7 Breakdown of UK FP7 participations and all FP7 participations, by organisation type

Organisation Type	Number (and share) of participations – UK	Number (and share) of participations – FP7 overall
Higher or secondary education organisations (HES)	10,662 (60%)	50,239 (37%)
Private commercial organisations (PRC)	4,577 (26%)	40,834 (30%)
Research organisations (REC)	1,602 (9%)	33,256 (25%)
Public bodies (PUB)	530 (3%)	6,193 (5%)
Other (OTH)	324 (2%)	4,215 (3%)
Total	**17,695 (100%)**	**134,737 (100%)**

A1.3.2.3 EU Funding

UK organisations were allocated a total of €7.002 billion in EU funding from FP7, out of a total EU allocation of €45.335 billion. UK organisations therefore received 15.4% of all EU funding.

The average volume of EU funding allocated to each UK organisation throughout the lifetime of FP7 was €2.406 million. Across FP7 as a whole the average amount of EU funding per organisation was around €1.564 million. The average volume of EU funding allocated to UK organisations per participation was around €395,700. Again, this was higher than the average for FP7 as a whole (around €336,470).

Table A1.8 shows the total EU funding allocations for UK organisations, by organisation type, and compares these to EU allocations as a whole. The data show that UK HES were allocated a total of €4.951 billion in EU funding. This represented 71% of all EU funding to UK organisations, a significantly larger than that obtained by HES across FP7 as a whole (43%). For PRC, REC and PUB organisations, the respective shares of UK's total were roughly in line or slightly lower than the shares of EU funding obtained across FP7 as a whole. Other UK organisations were allocated €59 million. This represented 8% of UK's total EU funding, significantly lower than the share of EU funding received by other organisations across FP7 as a whole (27%).

Again, the proportion of EU funding allocated to PRC and REC organisations was much larger in Germany and France than in the UK. The proportion of EU funding allocated to HES organisations was substantially larger in the UK (71% versus 38% in Germany and 14% in France).

Table A1.8 EU funding, by organisation type, allocated to UK and in FP7 in total

Organisation Type	EU funding allocated to UK organisations in FP7 (€m)	Total EU funding allocated in FP7 (€m)
Higher or secondary education organisations (HES)	4,951 (71%)	19,678 (43%)
Private commercial organisations (PRC)	1,263 (18%)	11,162 (25%)
Research organisations (REC)	582 (8%)	12,235 (27%)
Public bodies (PUB)	146 (2%)	1,193 (3%)
Other (OTH)	59 (1%)	1,067 (2%)
Total	**7,001 (100%)**	**45,335 (100%)**

As shown in 0, the share of UK participation and of EU funding allocated to the UK in FP7 kept increasing towards the end of the programme for HES and PUB organisations. The share of participations for other organisations remained fairly constant through time between 2008 and 2014.

Table A1.9 Share of UK participations in FP7, by organisation type and by project start year

Organisation Type (UK share of overall FP7 participations)	2007	2008	2009	2010	2011	2012	2013	2014*
Higher or secondary education organisations (HES)	15%	19%	20%	19%	21%	22%	22%	27%
Private commercial organisations (PRC)	7%	10%	11%	11%	11%	11%	12%	12%
Research organisations (REC)	5%	5%	5%	5%	5%	5%	4%	5%
Public bodies (PUB)	3%	7%	7%	8%	9%	10%	10%	10%
Other (OTH)	0%	9%	9%	5%	10%	7%	7%	8%
Overall share of FP7 participation	**8%**	**12%**	**12%**	**12%**	**13%**	**13%**	**14%**	**17%**

134,607 observations (incl. 17,675 for UK)

** All projects started in 2014 or later*

Table A1.10 shows that the share of EU funding allocated to the UK in FP7 kept increasing towards the end of the programme for HES and REC organisations. The share of funding for other organisations remained fairly constant through time between 2008 and 2014.

Table A1.10 Share of EU funds allocated to UK participations, by organisation type and by project start year

Organisation Type (UK share of overall FP7 participations)	2007	2008	2009	2010	2011	2012	2013	2014*
Higher or secondary education organisations (HES)	23%	22%	24%	23%	25%	26%	27%	28%
Private commercial organisations (PRC)	6%	9%	16%	10%	11%	10%	12%	10%
Research organisations (REC)	1%	4%	6%	5%	6%	4%	4%	6%
Public bodies (PUB)	11%	14%	12%	9%	12%	14%	13%	10%
Other (OTH)	0%	11%	7%	5%	11%	6%	6%	6%
Overall share of FP7 participation	**3%**	**13%**	**16%**	**14%**	**16%**	**16%**	**17%**	**18%**

134,607 observations (incl. 17,675 for UK)

** All projects started in 2014 or later*

A1.3.2.4 Business participation

As illustrated in Table A1.11, the total number of UK PRC participations was 4,577 out of a total of 40,834 for the whole of FP7, with UK business participations representing 11.2% of all business participations in FP7. Business participations represented 30.3% of all FP7 participations. The share of UK business participations compared to overall UK participations was lower (25.9%). However, UK business organisations represented a higher proportion of participations than the average for FP7 for the specific programmes Capacities and Euratom.

Compared to German and French businesses, UK business organisations represented a higher proportion of participations for Capacities (48% versus 35% for each of Germany and France) but a lower proportion of participations for Cooperation (32% versus 40% in Germany and 45% in France).

Table A1.11 Number of business participations, by specific programme and priority area

Specific programme	FP7 programme/priority area	UK business participations (% of total UK participations)	FP7 business participation (% of total)
FP7 Cooperation	Health	263 (15.5%)	2,203 (19.4%)
	Food, Agriculture, and Biotechnology	170 (21.1%)	2,002 (25.3%)
	Information & Communication Technologies	796 (32.9%)	8,551 (37.7%)
	Nanosciences, Nanotechnologies, Materials and new Production Technologies	480 (45.2%)	4,630 (44.9%)
	Energy	182 (46.1%)	1,939 (44.1%)
	Environment (including Climate Change)	146 (17.5%)	1,393 (19.4%)
	Transport (including Aeronautics)	456 (48.7%)	4,396 (49.4%)
	Socio-economic sciences and	10 (2.8%)	135 (4.9%)

Specific programme	FP7 programme/priority area	UK business participations (% of total UK participations)	FP7 business participation (% of total)
	Humanities		
	Space	87 (29.1%)	802 (30.4%)
	Security	206 (46.0%)	1,665 (42.2%)
	General Activities (Annex IV)	1 (12.5%)	9 (4.9%)
	Joint Technology Initiatives (Annex IV-SP1)	356 (51.4%)	3,352 (54.1%)
	Sub-total: FP7 Cooperation	**3,153 (31.7%)**	**31,077 (35.1%)**
FP7 Ideas	**European Research Council**	**2 (0.2%)**	**70 (1.3%)**
FP7 People	**Marie-Curie Actions**	**253 (6.3%)**	**2,017 (10.3%)**
FP7 Capacities	Research Infrastructures	62 (9.9%)	434 (8.2%)
	Research for the benefit of SMEs	988 (72.8%)	6,077 (66.3%)
	Regions of Knowledge	17 (25.8%)	307 (30.5%)
	Research Potential	0 (0%)	6 (2.0%)
	Science in Society	30 (14.6%)	182 (9.9%)
	Coherent development of research policies	4 (21.1%)	18 (13.7%)
	Activities of International Cooperation	10 (28.6%)	150 (10.7%)
	Sub-total: FP7 Capacities	**1,111 (48.0%)**	**7,174 (37.5%)**
Euratom indirect actions	Nuclear Fission and Radiation Protection	58 (32%)	496 (24.7%)
	Fusion Energy	0 (0%))	0 (0%)
	Sub-total: Euratom	**58 (30.7%)**	**496 (23.9%)**
Total		**4,577 (25.9%)**	**40,834 (30.3%)**

From Table A1.12, it appears that the share of UK business participations in overall FP7 business participations improved with time for the specific programmes Cooperation and People. However, the UK did not perform as well in other programmes, for which the share of participations remained stable or decreased over time.

Table A1.12 Share of UK business participations in overall FP7 business participations, by specific programme and by project start year

Specific programme	2007	2008	2009	2010	2011	2012	2013	2014*
Cooperation	6%	9%	10%	9%	11%	10%	11%	11%
Ideas		0%	0%	0%	0%	8%	0%	5%
People	0%	14%	15%	12%	8%	13%	12%	20%
Capacities	31%	15%	14%	17%	16%	15%	15%	15%
Euratom		14%	11%	20%	6%	8%	12%	0%
Total	**7%**	**10%**	**11%**	**11%**	**11%**	**11%**	**12%**	**12%**

NB: blanks mean there were no participations at the FP7 level for that specific year and that specific programme. 40,803 observations (incl. 4,574 for UK)

** All projects started in 2014 or later*

As illustrated in Table A1.13, the total EU funding allocated to UK businesses amounted to €1,263 million out of a total of €11,162 million allocated to businesses in all of FP7. EU funding to businesses represented 24.6% of all FP7 allocated EU funding. In the UK, the share of EU funding received by PRC was lower (18.0%). However, UK business organisations were allocated a higher proportion of EU funding than the average for FP7 for the specific programmes Capacities and Euratom. These results are consistent with the findings from Table A1.11.

German and French organisations were allocated a higher proportion of EU funding than UK businesses (27% for each of Germany and France versus 18% for the UK).

The proportion of businesses in Capacities and Euratom projects was larger in the UK than in Germany or France. However, the proportion of businesses in Cooperation and People projects was smaller in the UK than in Germany or France.

Table A1.13 EU funding to businesses, by specific programme

Specific programme	UK business - EU funding allocations (€m) (% of total UK allocated EU funding)	Total EU funding allocations to business (€m) (% of total allocated EU funding)
Cooperation	913 (25.0%)	9,230 (32.1%)
Ideas	2 (0.1%)	79 (1%)
People	72 (6.6%)	502 (10.5%)
Capacities	266 (51.3%)	1,288 (34.1%)
Euratom	10 (29.6%)	63 (17.5%)
Total	**1,263 (18.0%)**	**11,162 (24.6%)**

NB: 40,803 observations (incl. 4,574 for UK)

Table A1.14 shows the evolution of the share of EU funding allocated to UK businesses in overall EU funding to businesses. Results are broken down by specific programme. There are no clearly identifiable patterns.

Table A1.14 Share of EU funding allocated to UK businesses in overall EU funding to businesses, by specific programme and by project start year

Specific programme	2007	2008	2009	2010	2011	2012	2013	2014*
Cooperation	6%	8%	11%	9%	10%	10%	11%	10%
Ideas		0%	0%	0%	0%	11%	0%	4%
People	0%	18%	15%	12%	8%	13%	15%	24%
Capacities	26%	14%	41%	18%	16%	15%	22%	14%
Euratom		37%	9%	21%	6%	16%	16%	0%
Total	**6%**	**9%**	**16%**	**10%**	**11%**	**10%**	**12%**	**10%**

NB: blanks mean there was no EU funding at the FP7 level for that specific year and that specific programme. 40,803 observations (incl. 4,574 for UK)

** All projects started in 2014 or later*

A1.3.2.5 SME participation

As illustrated in Table A1.15, the total number of UK SME participations was 3,034 out of a total of 24,336 for the whole of FP7, with UK SME participations representing 12.4% of all SME participations in FP7. SME participations represented 18% of all FP7 participations. The share of UK SME participations was slightly lower (17.1%). However, UK SME organisations represented a higher proportion of participations than the average for FP7 for the specific programmes Capacities and Cooperation.

Table A1.15 Number of SME participations, by specific programme

Specific programme	UK SME participations (% of total UK participations)	FP7 SME participation (% of total)
Cooperation	1,918 (19.3%)	16,582 (18.7%)
Ideas	2 (0.2%)	29 (0.5%)
People	136 (3.4%)	1,106 (5.7%)
Capacities	967 (41.8%)	6,496 (34%)
Euratom	11 (5.8%)	123 (5.9%)
Total	**3,034 (17.1%)**	**24,336 (18.1%)**

As illustrated in Table A1.16, the total EU funding allocated to UK SMEs amounted to €890 million out of a total of €6,367 million allocated to SMEs in all of FP7. EU funding to SMEs represented 14% of all FP7 allocated EU funding to SMEs. UK SME organisations were allocated a higher proportion of EU funding than the average for FP7 for the specific programmes Capacities (50.6% versus 34.5%). These results are consistent with the findings from Table A1.15.

Table A1.16 EU funding to SME, by specific programme

Specific programme	UK SMEs - EU funding allocations (€m) (% of total UK allocated EU funding)	Total EU funding allocations to SMEs (€m) (% of total allocated EU funding)
Cooperation	587 (16.1%)	4,752 (16.5%)
Ideas	0.15 (0.01%)	21 (0.3%)
People	39 (3.6%)	274 (5.7%)
Capacities	262 (50.6%)	1,300 (34.5%)
Euratom	1.7 (5.1%)	19 (5.3%)
Total	**890 (12.7%)**	**6,367 (14%)**

A1.3.2.6 Innovation Union Scoreboard

Table A1.17 provides a summary of success rates by EU funding and by applications for all countries classified as Innovation leaders or Innovation followers in the Innovation Union Scoreboard (2013)(IUS).[94] The table is sorted by the final column, so the countries listed towards to the top of the table are those where the share of EU27 funding was the highest.

The UK was the second country to receive the most EU funding after Germany. However, the UK was ranked 5th in terms of success rate by EU funding (after France, the Netherlands, Germany and Belgium) and 6th in terms of success rate by applications (after the Netherlands, France, Belgium, Germany and Denmark).

Table A1.17 Success rate by EU funding and by applications, share of EU27 funding, by innovation leader and innovation follower countries

Member State	IUS category	Success rate by EU funding	Success rate by applications	Share of EU funding totals under FP7, allocated to EU27
Germany	Innovation leader	19.1%	23.4%	17.7%
United Kingdom	**Innovation follower**	**18.1%**	**22.1%**	**17.3%**
France	Innovation follower	23.1%	24.6%	12.9%
Netherlands	Innovation follower	20.2%	24.8%	8.4%
Belgium	Innovation follower	18.6%	23.6%	4.5%
Sweden	Innovation leader	15.5%	22.0%	4.3%
Austria	Innovation follower	16.4%	21.7%	2.9%
Denmark	Innovation leader	15.6%	23.1%	2.7%
Finland	Innovation leader	13.0%	20.5%	2.2%
Ireland	Innovation follower	15.4%	20.5%	1.5%
Slovenia	Innovation follower	9.4%	15.4%	0.4%
Estonia	Innovation follower	14.3%	20.9%	0.2%
Cyprus	Innovation follower	9.3%	14.4%	0.2%

[94] https://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_de [accessed 21st November 2016]

Member State	IUS category	Success rate by EU funding	Success rate by applications	Share of EU funding totals under FP7, allocated to EU27
Luxembourg	Innovation follower	15.8%	22.1%	0.1%

A1.3.2.7 By specific programme and thematic priority area

Table A1.18 shows the number of UK projects and participations, and the volume of EU funding allocated, in each of the FP7 specific programmes and priority areas.

Due to the differing scales of the different programmes/priority areas within FP7 it is not possible to draw conclusions on the performance of UK from this table. The specific programmes Cooperation and People were the most significant in terms of the number of UK projects and UK participations. However, the Cooperation and Ideas were the specific programmes for which the UK received the most EU funding.

Table A1.18 Number of UK projects, participations, and EU funding, by specific programme and priority area

Specific programme	FP7 programme/priority area	Number of projects with UK involvement	Number of UK participations	EU funding allocated to UK organisations (€ million)
FP7 Cooperation	Health	756	1,692	808
	Food, Agriculture, and Biotechnology	375	804	241
	Information & Communication Technologies	1,354	2,423	916
	Nanosciences, Nanotechnologies, Materials and new Production Technologies	493	1,062	352
	Energy	186	395	144
	Environment (including Climate Change)	360	835	238
	Transport (including Aeronautics)	433	936	260
	Socio-economic sciences and Humanities	212	361	94
	Space	158	299	96
	Security	217	448	157
	General Activities (Annex IV)	7	8	4
	Joint Technology Initiatives (Annex IV-SP1)	266	693	340
	Sub-total: FP7 Cooperation	**4,817**	**9,956**	**3,650**
FP7 Ideas	**European Research**	**1,072**	**1,235**	**1,715**

Specific programme	FP7 programme/priority area	Number of projects with UK involvement	Number of UK participations	EU funding allocated to UK organisations (€ million)
	Council			
FP7 People	**Marie-Curie Actions**	**3,328**	**4,000**	**1,086**
	Research Infrastructures	267	627	273
	Research for the benefit of SMEs	609	1,358	189
	Regions of Knowledge	25	66	9
FP7 Capacities	Research Potential	5	5	6
	Science in Society	123	205	35
	Coherent development of research policies	8	19	2
	Activities of International Cooperation	29	35	5
	Sub-total: FP7 Capacities	**1,066**	**2,315**	**519**
Euratom indirect actions	Nuclear Fission and Radiation Protection	86	181	31
	Fusion Energy	3	8	1
	Sub-total: Euratom	**89**	**189**	**32**
Total		**10,372**	**17,695**	**7,002**

In order to place the raw numbers shown in Table A1.18 in context, projects with UK involvement, UK participations and EU funding allocated to UK organisations have been expressed as a share of the FP7 totals for each priority area. The results are shown in 0, and (+), (=) and (-) have been used to symbolise whether UK has performed comparatively strongly or less well in each area, as compared to UK's overall performance in FP7[95]. For example, across FP7 as a whole the UK participated in 41% of the projects, so we can say that a project participation rate of 40% in the research infrastructures area is 'close to average' (=) while involvement in 75% of Health projects is 'above' average (+).

The results indicate that the UK performed particularly strongly in the specific programme People. The specific programme with the weakest performance was Euratom. In terms of involvements in projects, the UK performed comparably strong in all FP7 Cooperation programmes apart from General Activities (Annex IV) and the Joint Technology Initiatives. In terms of the numbers of participations and the share of total EU funding allocated, the UK performed comparably strong in programmes of the European Research Council and the Marie Curie Actions.

[95] (-): difference between UK's performance in priority area and K's overall performance <-2%
(=): difference between UK's performance in priority area and K's overall performance [-2%; 2%]
(+): difference between UK's performance in priority area and K's overall performance >2%

Table A1.19 UK projects, participations and EU funding, expressed as a share of FP7 totals, by specific programme and priority area

Specific programme	FP7 programme/priority area	Share of total number of projects	Share of total number of participations	Share of total EU funding
FP7 Cooperation	Health	75% **(+)**	15% **(=)**	17% **(=)**
	Food, Agriculture, and Biotechnology	73% **(+)**	10% **(-)**	13% **(=)**
	Information & Communication Technologies	58% **(+)**	11% **(=)**	12% **(-)**
	Nanosciences, Nanotechnologies, Materials and new Production Technologies	61% **(+)**	10% **(-)**	11% **(-)**
	Energy	50% **(+)**	9% **(-)**	8% **(-)**
	Environment (including Climate Change)	73% **(+)**	12% **(=)**	14% **(=)**
	Transport (including Aeronautics)	62% **(+)**	11% **(=)**	11% **(-)**
	Socio-economic sciences and Humanities	84% **(+)**	13% **(=)**	16% **(=)**
	Space	59% **(+)**	11% **(=)**	13% **(=)**
	Security	68% **(+)**	11% **(=)**	12% **(-)**
	General Activities (Annex IV)	27% **(-)**	4% **(-)**	1% **(-)**
	Joint Technology Initiatives (Annex IV-SP1)	34% **(-)**	11% **(=)**	16% **(=)**
	Sub-total: FP7 Cooperation	**61% (+)**	**11% (=)**	**13% (=)**
FP7 Ideas	**European Research Council**	**24% (-)**	**23% (+)**	**22% (+)**
FP7 People	**Marie-Curie Actions**	**31% (+)**	**20% (+)**	**23% (+)**
FP7 Capacities	Research Infrastructures	78% **(+)**	12% **(=)**	18% **(+)**
	Research for the benefit of SMEs	59% **(+)**	15% **(=)**	15% **(=)**
	Regions of Knowledge	30% **(-)**	7% **(-)**	7% **(-)**
	Research Potential	2% **(-)**	2% **(-)**	2% **(-)**
	Science in Society	67% **(+)**	11% **(=)**	12% **(-)**
	Coherent development of research policies	30% **(-)**	15% **(=)**	6% **(-)**
	Activities of International Cooperation	18% **(-)**	3% **(-)**	3% **(-)**
	Sub-total: FP7 Capacities	**53% (+)**	**12% (=)**	**14% (=)**
Euratom indirect	Nuclear Fission and Radiation Protection	64% **(+)**	9% **(-)**	9% **(-)**

Specific programme	FP7 programme/priority area	Share of total number of projects	Share of total number of participations	Share of total EU funding
actions	Fusion Energy	75% **(+)**	12% **(=)**	20% **(+)**
	Sub-total: Euratom	**64% (+)**	**9% (-)**	**9% (-)**
Total		**41.0%**	**13.1%**	**15.4%**

Table A1.20 compares the profile of UK participation across the specific programmes and the priority areas with the profile of all FP7 participations, and these data are then split out for each type of organisation. Ratios are calculated by comparing the proportion of UK participations accounted for by a specific programme and priority area with the proportion of all participations accounted for by that programme/area. As such, percentages greater than 100% indicate that UK participation has been higher in this area compared with the overall FP7 profile of the UK.

The data indicate the UK participation has been higher in the following programmes/priority areas: Health (Cooperation), European Research Council (Ideas), Marie-Curie Actions (People), Research for the benefit of SMEs and Coherent development of research policies (Capacities).

Table A1.20 Comparison of profile of UK FP7 participations, by specific programme and priority area (overall and then by organisation type)

Specific programme	FP7 programme/priority area	Overall ratio	HES	PRC	REC	PUB	Other (OTH)
FP7 Cooperation	Health	114%	102%	107%	136%	92%	79%
	Food, Agriculture, and Biotechnology	77%	69%	76%	129%	140%	128%
	Information & Communication Technologies	81%	82%	83%	45%	99%	146%
	Nanosciences, Nanotechnologies, Materials and new Production Technologies	78%	82%	92%	69%	40%	143%
	Energy	68%	78%	84%	37%	76%	110%
	Environment (including Climate Change)	89%	83%	94%	146%	123%	108%
	Transport (including Aeronautics)	80%	96%	93%	59%	84%	70%
	Socio-economic sciences and Humanities	99%	85%	66%	113%	68%	47%
	Space	86%	102%	97%	108%	146%	61%
	Security	86%	90%	110%	59%	135%	115%
	General Activities (Annex IV)	33%	118%	99%	74%	23%	145%

Specific programme	FP7 programme/priority area	Overall ratio	HES	PRC	REC	PUB	Other (OTH)
	Joint Technology Initiatives (Annex IV-SP1)	85%	84%	95%	83%	246%	184%
	Sub-total: FP7 Cooperation	**86%**	**86%**	**91%**	**89%**	**105%**	**113%**
FP7 Ideas	**European Research Council**	**172%**	**135%**	**25%**	**117%**	**234%**	**0%**
FP7 People	**Marie-Curie Actions**	**156%**	**129%**	**112%**	**113%**	**143%**	**35%**
FP7 Capacities	Research Infrastructures	90%	85%	127%	151%	99%	88%
	Research for the benefit of SMEs	113%	89%	145%	188%	132%	89%
	Regions of Knowledge	50%	55%	49%	56%	100%	53%
	Research Potential	12%	13%	0%	16%	0%	0%
	Science in Society	85%	71%	147%	71%	55%	132%
	Coherent development of research policies	110%	88%	198%	358%	112%	163%
	Activities of International Cooperation	19%	26%	59%	8%	10%	59%
	Sub-total: FP7 Capacities	**92%**	**76%**	**138%**	**134%**	**74%**	**91%**
Euratom indirect actions	Nuclear Fission and Radiation Protection	69%	68%	104%	87%	76%	77%
	Fusion Energy	91%	79%	n/a	83%	n/a	n/a
	Sub-total: Euratom	**69%**	**69%**	**104%**	**87%**	**76%**	**77%**

NB: PUB = public bodies, REC = research organisations, HES = higher or secondary education organisations, PRC = private commercial organisations and OTH = other

A1.3.2.8 By type of instrument

FP7 employed a range of different types of instruments (projects and actions) to implement its priorities.[96]

Table A1.21 shows the numbers of projects and participations, and the volume of EU funding, achieved by UK participations for the main types of instrument covered by the FP7 database. As with the specific programmes/priority areas, the various instruments were used to a greater or lesser degree across FP7 and so it is not

[96] Research for the Benefit of Specific Groups (BSG-CSO, BSG-SME and BSG-SME-AG) / Collaborative Projects (CP, CP-FP, CP-FP-INFSO, CP-FP-INFSO-NET, CP-FP-SICA, CP-IP, CP-IP-INFSO-FET, CP-IP-SICA, CP-SICA, CP-SICA-INFSO, CP-SOU and CP-TP) / Coordination and Support Actions (CSA-CA, CSA-CA-INFSO-FET, CSA-ERANET, CSA-ERA-PLUS, CSA-SA, CSA-SA(POC) and CSA-SA-INFSO-FET) / CP-CSA (CP-CSA, CP-CSA-INFRA, CP-CSA-INFRA-IP and CP-CSA-INFRA-PP) / Support for Frontier Research (ERC-AG, ERC-CG, ERC-SG and ERC-SYG) / Support for Training and Career Development of Researchers (MC-CIG,MC-COFUND, MC-ERG, MC-IAPP, MC-IEF, MC-IIF, MC-IIFR, MC-IOF, MC-IRG, MC-IRSES AND MC-ITN) / Joint Technology Initiatives (JTI-CP-ARTEMIS, JTI-CP-ENIAC, JTI-CP-FCH, JTI-CP-IMI, JTI-CS, JTI-CSA-FCH) / Networks of Excellence (NoE).

possible to draw firm conclusions on the performance of UK from this table. However, in terms of numbers alone, UK participation was highest for CPs and MCs.

Looking at the number of projects, of participations as well as the amount of EU funding allocated for European Research Council and Marie Curie - MC, the UK is ahead of Germany and France, as well as all other comparator countries.

Table A1.21 UK projects, participations and EU funding, by type of instrument

Instrument	Number of projects	Number of participations	EU funding (€ million)
Research for the Benefit of Specific Groups (BSG)	583	1,318	182
Collaborative Projects (CP)	3,904	8,161	3,117
Coordination and Support Actions (CSA)	1,008	1,632	233
CP-CSA	214	565	286
Support for Frontier Research (ERC)	1,037	1,199	1,710
Support for Training and Career Development of Researchers (Marie Curie -MC)	3,312	3,982	1,085
Joint Technology Initiatives (JTI)	266	683	340
Networks of Excellence (NoE)	48	145	50
Total	**10,372**	**17,695**	**7,002**

In order to place the raw numbers shown in Table A1.22 in context, UK projects, participations and EU funding have been expressed as a share of the FP7 totals for each type of instrument. The results are shown in Table A1.22, and (-), (=) and (+) have been used to symbolise whether the UK has used each type of instrument comparatively more frequently or less frequently, as compared to UK's overall performance in FP7[97].

Table A1.22 UK projects, participations and EU funding, expressed as a share of FP7 totals, by type of instrument

Instrument	Project share	Participation share	EU funding share
Research for the Benefit of Specific Groups (BSG)	60.2% **(+)**	15.0% **(=)**	15.1% **(=)**
Collaborative Projects (CP)	65.7% **(+)**	11.6% **(=)**	12.7% **(-)**
Coordination and Support Actions (CSA)	39.2% **(=)**	8.1% **(-)**	8.1% **(-)**
CP-CSA	80.8% **(+)**	10.9% **(-)**	15.8% **(=)**

[97] (-): difference between UK's performance with instrument and UK's overall performance <-2%
(=): difference between UK's performance with instrument and UK's overall performance [-2%; 2%]
(+): difference between UK's performance with instrument and UK's overall performance >2%

Instrument	Project share	Participation share	EU funding share
Support for Frontier Research (ERC)	23.8% **(-)**	22.9% **(+)**	22.3% **(+)**
Support for Training and Career Development of Researchers (Marie Curie -MC)	32.0% **(-)**	22.1% **(+)**	22.9% **(+)**
Joint Technology Initiatives (JTI)	34.0% **(-)**	11.2% **(=)**	15.6% **(=)**
Networks of Excellence (NoE)	84.2% **(+)**	13.0% **(=)**	16.0% **(=)**
Total	**41.0%**	**13.1%**	**15.4%**

Table A1.23 compares the profile of UK participation across the different types of instruments with the profile of all FP7 participations, and these data are then split out for each type of organisation. As in Table A1.20 , ratios are calculated by comparing the proportion of UK participations accounted for by a specific type of instrument with the proportion of all participations accounted for by that instrument. As such, percentages greater than 100% indicate that UK participation has been higher with this instrument compared with the overall FP7 profile.

The data indicate the UK participation has been higher for the following instruments: BSGs, ERCs and Marie-Curie projects.

Table A1.23 Comparison of profile of UK FP7 participations, by type of instrument (overall and then by organisation type)

Instrument	Overall ratio	HES	PRC	REC	PUB	Other (OTH)
Research for the Benefit of Specific Groups (BSG)	114%	88%	146%	193%	228%	92%
Collaborative Projects (CP)	89%	88%	89%	91%	149%	125%
Coordination and Support Actions (CSA)	62%	64%	97%	76%	49%	85%
CP-CSA	83%	77%	123%	134%	108%	65%
Support for Frontier Research (ERC)	174%	136%	31%	121%	234%	0%
Support for Training and Career Development of Researchers (Marie Curie -MC)	169%	137%	118%	121%	280%	147%
Joint Technology Initiatives (JTI)	85%	84%	95%	83%	246%	184%
Networks of Excellence (NoE)	99%	90%	81%	95%	173%	0%

NB: PUB = public bodies, REC = research organisations, HES = higher or secondary education organisations, PRC = private commercial organisations and OTH = other

Table A1.24 shows the profile of involvement of each of the main groups of participants in each of the instruments, overall for FP7 and for UK only. For example, the UK participants in BSG projects were mainly private commercial organisations (76% of the participations). The profile of UK involvement in BSGs shows that most of its involvement was through the private sector, with the remaining participation in BSGs split between higher or secondary education organisations (14% of the participations) and other types of organisations.

Table A1.24 Profile of involvement in each type of instrument, split by organisation type for all FP7 participants and UK only

Instrument		HES	PRC	REC	PUB	Other (OTH)	Total
BSG	UK only	14%	72%	9%	1%	3%	**100%**
	all FP7	12%	66%	15%	1%	7%	**100%**
CP	UK only	55%	31%	9%	3%	2%	**100%**
	all FP7	34%	36%	25%	3%	2%	**100%**
CSA	UK only	46%	25%	13%	8%	8%	**100%**
	all FP7	28%	19%	28%	16%	10%	**100%**
CP-CSA	UK only	56%	11%	25%	6%	2%	**100%**
	all FP7	38%	9%	43%	7%	4%	**100%**
ERC	UK only	93%	0%	6%	0%	0%	**100%**
	all FP7	74%	1%	25%	0%	0%	**100%**
MC	UK only	87%	6%	6%	1%	0%	**100%**
	all FP7	66%	11%	22%	1%	0%	**100%**
JTI	UK only	37%	51%	7%	2%	2%	**100%**
	all FP7	24%	54%	20%	1%	1%	**100%**
NoE	UK only	79%	8%	11%	3%	0%	**100%**
	all FP7	53%	11%	31%	2%	2%	**100%**

NB: PUB = public bodies, REC = research organisations, HES = higher or secondary education organisations, PRC = private commercial organisations and OTH = other

A1.3.2.9 Nature of FP7 participation

Participants in FP7 can occupy the role of project coordinator or are otherwise listed simply as one of the participants. Analysis of UK's FP7 participations reveals that UK partners occupied the role of project coordinator in 5,101 cases, or 49% of the projects in which UK participants were involved. This means that the UK participants were in a coordinating role for 29% of all UK FP7 participations, which was more than the FP7 average of 19%. As a comparison, 17% of German participants and 21% of French participants were in a coordinating role.

Table A1.25 presents the number of UK coordinators for each type of instrument and the ratio of UK coordinators to participants. The average FP7 coordinator to participant ratio for each type of instrument is also shown for comparison. The data indicate that UK partners occupied the role of coordinator to a higher degree than might have expected within BSG, MC and JTI projects. UK coordination was lower than might have expected primarily for the ERC projects.
The coordinator to participant ratio was higher in France than in the UK or Germany for ERC projects (89% in France versus 81% for the UK and Germany). The ratio was however much higher in the UK for Marie Curie –MC projects than in France or Germany (70% versus 44-57%).

Table A1.25 UK coordination levels by type of instrument

Instrument	Number of UK coordinators	Coordinator to participant ratio (UK)	Coordinator to participant ratio (FP7 overall)
Research for the Benefit of Specific Groups (BSG)	183	13.9%	11.0%
Collaborative Projects (CP)	782	9.6%	8.5%
Coordination and Support Actions (CSA)	222	13.6%	12.8%
CP-CSA	29	5.1%	5.1%
Support for Frontier Research (ERC)	970	80.9%	83.1%
Support for Training and Career Development of Researchers (Marie Curie -MC)	2,799	70.3%	57.5%
Joint Technology Initiatives (JTI)	105	15.2%	12.6%
Networks of Excellence (NoE)	11	7.6%	5.1%
Total	**5,101**	**28.8%**	**18.8%**

Patterns of UK coordination by F7 specific programmes and priority areas have also been analysed, and are shown in Table A1.26. It reveals a significantly higher than expected coordination rate for UK in the specific programme Ideas (70% versus 55%). The only specific programme for which the coordinator to participant ratio was lower than expected was Euratom.

As a comparison, Germany and France had a smaller coordinator to participant ratio for People projects than the UK (44-55% versus 70%), but a higher ratio for Euratom projects (11-14% versus 5%).

Table A1.26 UK coordination levels by specific programme and priority area

Specific programme	FP7 programme/priority area	Number of UK coordinators	Coordinator to participant ratio (UK)	Coordinator to participant ratio (FP7 overall)
FP7 Cooperation	Health	180	11%	9%
	Food, Agriculture, and Biotechnology	75	9%	7%
	Information & Communication Technologies	237	10%	10%
	Nanosciences, Nanotechnologies, Materials and new Production Technologies	96	9%	8%
	Energy	35	9%	8%
	Environment (including Climate Change)	70	8%	7%
	Transport (including Aeronautics)	81	9%	8%
	Socio-economic sciences and Humanities	50	14%	9%

Specific programme	FP7 programme/priority area	Number of UK coordinators	Coordinator to participant ratio (UK)	Coordinator to participant ratio (FP7 overall)
	Space	38	13%	10%
	Security	39	9%	8%
	General Activities (Annex IV)	2	25%	14%
	Joint Technology Initiatives (Annex IV-SP1)	105	15%	13%
	Sub-total: FP7 Cooperation	**1,008**	**10%**	**9%**
FP7 Ideas	**European Research Council**	**1,004**	**81%**	**83%**
FP7 People	**Marie-Curie Actions**	**2,812**	**70%**	**55%**
FP7 Capacities	Research Infrastructures	41	7%	6%
	Research for the benefit of SMEs	190	14%	11%
	Regions of Knowledge	4	6%	8%
	Research Potential	2	40%	67%
	Science in Society	25	12%	10%
	Coherent development of research policies	2	11%	21%
	Activities of International Cooperation	3	9%	11%
	Sub-total: FP7 Capacities	**267**	**12%**	**11%**
Euratom indirect actions	Nuclear Fission and Radiation Protection	9	5%	7%
	Fusion Energy	1	13%	6%
	Sub-total: Euratom	**10**	**5%**	**7%**
Total		**5,101**	**29%**	**19%**

A1.3.2.10 Collaboration within FP7 projects

Number of participants in UK FP7 projects

The average number of partners in projects in which UK participated was 8.35, higher than the average number of participants in a 'typical' FP7 project (n=5.33).

Collaboration between UK organisations within FP7 projects

With 17,695 participations across 10,372 projects it is clear that in some cases more than one UK partner was involved in the same FP7 project. In fact, there were 3,828 FP7 projects with more than one UK partner involved (37% of the projects in which the UK was involved). The profile of intra-UK collaboration within the 10,372 projects is shown in Table A1.27 below. The largest number of UK participants in a single FP7 project was 18.

Table A1.27 Number and share of UK FP7 projects with UK partners

UK partners	Number of FP7 projects	Share of FP7 projects
1 (no intra-UK collaboration)	6,544	63.1%
2	2,062	19.9%
3	932	9.0%
4	410	4.0%
5	205	2.0%
6	107	1.0%
7	50	0.5%
8	25	0.2%
9	19	0.2%
10	8	0.1%
11	4	0.04%
12	4	0.04%
13	1	0.01%
18	1	0.01%
Total	**10,372**	**100.0%**

Table A1.28 shows the extent of intra-UK collaboration within each of the FP7 specific programmes and priority areas. It reveals that there have been high levels (more than 50%) of intra-UK collaborations for the following programmes: Cooperation, Capacities and Euratom. The level of intra-UK collaborations was lower for Ideas (13%) and People (14%).

Table A1.28 UK projects with intra-UK collaboration, by specific programme and priority area

Specific programme	FP7 programme/priority area	UK projects	UK projects with more than 1 UK partner	Share of projects with more than one UK partner
FP7 Cooperation	Health	756	434	57.4%
	Food, Agriculture, and Biotechnology	375	212	56.5%
	Information & Communication Technologies	1,354	651	48.1%
	Nanosciences, Nanotechnologies, Materials and new Production Technologies	493	282	57.2%
	Energy	186	94	50.5%
	Environment (including Climate Change)	360	217	60.3%

Specific programme	FP7 programme/priority area	UK projects	UK projects with more than 1 UK partner	Share of projects with more than one UK partner
	Transport (including Aeronautics)	433	235	54.3%
	Socio-economic sciences and Humanities	212	100	47.2%
	Space	158	70	44.3%
	Security	217	126	58.1%
	General Activities (Annex IV)	7	1	14.3%
	Joint Technology Initiatives (Annex IV-SP1)	266	147	55.3%
	Sub-total: FP7 Cooperation	**4,817**	**2,569**	**53.3%**
FP7 Ideas	**European Research Council**	**1,072**	**137**	**12.8%**
FP7 People	**Marie-Curie Actions**	**3,328**	**480**	**14.4%**
FP7 Capacities	Research Infrastructures	267	154	57.7%
	Research for the benefit of SMEs	609	367	60.3%
	Regions of Knowledge	25	15	60.0%
	Research Potential	5	0	0.0%
	Science in Society	123	48	39.0%
	Coherent development of research policies	8	6	75.0%
	Activities of International Cooperation	29	5	17.2%
	Sub-total: FP7 Capacities	**1,066**	**595**	**55.8%**
Euratom indirect actions	Nuclear Fission and Radiation Protection	86	45	52.3%
	Fusion Energy	3	2	66.7%
	Sub-total: Euratom	**89**	**47**	**52.8%**
Total		**10,372**	**3,828**	**36.9%**

Table A1.29 shows the extent of intra-UK collaboration for each type of instrument. It reveals that there have been high levels of intra-UK collaborations for the following instruments: NoE, CP-CSA and BSG. The level of intra-UK collaborations was lower for ERC and Marie Curie projects.

Table A1.29 UK projects with intra-UK collaboration, by type of instrument

Instrument	UK projects	UK projects with more than 1 UK partner	Share of projects with more than one UK partner
Research for the Benefit of Specific Groups (BSG)	583	358	61.4%
Collaborative Projects (CP)	3,904	2173	55.7%
Coordination and Support Actions (CSA)	1,008	361	35.8%
CP-CSA	214	141	65.9%
Support for Frontier Research (ERC)	1,037	136	13.1%
Support for Training and Career Development of Researchers (Marie Curie –MC)	3,312	478	14.4%
Joint Technology Initiatives (JTI)	266	147	55.3%
Networks of Excellence (NoE)	48	34	70.8%
Total	**10,372**	**3,828**	**36.9%**

Collaboration with actors from different countries

There were 68,946 participations by organisations from other countries in UK FP7 projects, with the partners being drawn from a total of 119 different countries.

Table A1.30 presents data on the number and share of participations by actors from other countries within UK projects.

In volume terms the greatest number and share of collaborations took place with partners in Germany, followed by France, Italy and Spain. However, this reflects mainly the high levels of participation in FP7 by these countries as a whole. A better indicator of the strength of collaboration between the UK and other countries is shown in the final column, which expresses the ratio of each country's share of all participations in UK projects to their overall share of FP7 participations. Using this indicator, the most active 'Member State' collaboration partners were the Netherlands, Denmark, Sweden and Ireland.

Table A1.30 UK collaboration with actors from different countries

	Country	Participations in UK projects	Share of all other participations in UK projects	Ratio of participation in UK projects to overall level of FP7 participation
Old EU member states (EU15)-UK	Austria	1,956	2.8%	107.9%
	Belgium	3,351	4.9%	119.0%
	Denmark	1,733	2.5%	121.6%
	Finland	1,641	2.4%	117.4%
	France	7,413	10.8%	114.0%
	Germany	11,085	16.1%	118.8%
	Greece	2,177	3.2%	114.1%
	Ireland	1,216	1.8%	121.2%
	Italy	6,963	10.1%	114.1%
	Luxembourg	154	0.2%	119.4%
	Netherlands	5,166	7.5%	122.4%
	Portugal	1,306	1.9%	107.9%
	Spain	6,304	9.1%	109.4%
	Sweden	2,829	4.1%	121.5%
New EU members States (EU12)	Bulgaria	420	0.6%	116.1%
	Cyprus	282	0.4%	119.0%
	Czech Republic	864	1.3%	119.0%
	Estonia	307	0.4%	109.5%
	Hungary	893	1.3%	108.4%
	Latvia	164	0.2%	96.2%
	Lithuania	250	0.4%	116.0%
	Malta	101	0.1%	101.7%
	Poland	1,308	1.9%	115.5%
	Romania	606	0.9%	111.3%
	Slovakia	295	0.4%	118.4%
	Slovenia	548	0.8%	115.9%
Third countries	Europe (other)	5,078	7.4%	113.9%
	Americas	994	1.4%	130.2%
	Africa	728	1.1%	116.3%
	Asia	2,605	3.8%	98.6%
	Oceania	209	0.3%	157.1%

Collaboration between different types of organisation

The partners in the UK FP7 projects breakdown by organisation type as shown in the final column of Table A1.31. For comparison, the table also re-shows the breakdown of all FP7 participations and all UK participations by organisation type.

The UK has a considerably higher HES participation than UK partners (60% versus 32%) and slightly lower participation by other activity types.

Table A1.31 Partners in UK FP7 projects, by organisation type

Organisation Type	Participations - UK	Participations – FP7 overall	Partners in UK projects
Higher or secondary education organisations (HES)	10,662 (60%)	50,239 (37%)	22,113 (32%)
Private commercial organisations (PRC)	4,577 (26%)	40,834 (30%)	22,064 (32%)
Research organisations (REC)	1,602 (9%)	33,256 (25%)	19,045 (28%)
Public bodies (PUB)	530 (3%)	6,193 (5%)	3,418 (5%)
Other (OTH)	324 (2%)	4,215 (3%)	2,306 (3%)
Total	**17,695 (100%)**	**134,737 (100%)**	**68,946 (100%)**

A1.3.2.11 UK participation in proposals and success rates

Proposals submitted to FP7 with UK applications

The number of discrete proposals in which UK applicants were named was calculated as 52,696. The CORDA data provided indicates that the total number of proposals submitted to FP7 was 158,609, so we can calculate that UK's application rate measured in proposals was 33.2%. This is an indicator of the level of 'demand' for participation in FP7 by UK organisations.

Table A1.32 provides a breakdown of the number of discrete proposals over time. The share of proposals with UK application was roughly constant through time until 2013. In 2014, the proportion jumped from around 32% to almost 59%, possibly a function of the expected gap in funding opportunities at the EU level during the transition from FP7 to Horizon 2020.

Table A1.32 Number of discrete proposals in which UK applicants are named and number of total discrete proposals, by year of call deadline

	2007	2008	2009	2010	2011	2012	2013	2014	**Total**
FP7	25,354	16,389	20,370	19,878	25,739	29,311	21,522	46	**158,609**
UK	8,833	5,456	7,105	6,227	8,561	9,566	6,921	27	**52,696**
Share of UK	34.8%	33.3%	34.9%	31.3%	33.3%	32.6%	32.2%	58.7%	**33.2%**

Table A1.33 shows the breakdown of FP7 proposals with UK involvement, by specific programme and priority area. In terms of numbers alone, proposals with UK application were most numerous in the specific programme Cooperation. However, the share of bids with UK involvement was the highest for the following programme: Euratom.

Table A1.33 Number of proposals with UK involvement, compared to total number of FP7 proposals by specific programme and priority area

Specific programme	FP7 programme/priority area	All proposals	UK proposals	Demand – share of bids with UK involvement
FP7 Cooperation	Health	7,107	3,086	43%
	Food, Agriculture, and Biotechnology	3,042	1,767	58%
	Information & Communication Technologies	17,299	9,485	55%
	Nanosciences, Nanotechnologies, Materials and new Production Technologies	6,555	2,151	33%
	Energy	2,163	917	42%
	Environment (including Climate Change)	3,396	1,653	49%
	Transport (including Aeronautics)	3,186	1,772	56%
	Socio-economic sciences and Humanities	**2,729**	1,770	65%
	Space	1,005	535	53%
	Security	1,815	1,143	63%
	General Activities (Annex IV)	73	16	22%
	Joint Technology Initiatives (Annex IV-SP1)	2,948	933	32%
	Sub-total: FP7 Cooperation	**51,318**	**25,228**	**49%**
FP7 Ideas	**European Research Council**	**44,923**	**8,003**	**18%**
FP7 People	**Marie-Curie Actions**	**50,937**	**14,812**	**29%**
FP7 Capacities	Research Infrastructures	926	592	64%
	Research for the benefit of SMEs	5,917	3,104	52%
	Regions of Knowledge	458	113	25%
	Research Potential	2,287	44	2%
	Science in Society	873	494	57%
	Coherent development of research policies	56	18	32%
	Activities of International Cooperation	613	121	20%
	Sub-total: FP7 Capacities	**11,130**	**4,486**	**40%**
Euratom indirect actions	Nuclear Fission and Radiation Protection	290	163	56%
	Fusion Energy	11	4	36%
	Sub-total: Euratom	**301**	**167**	**55%**
Total		**158,609**	**52,696**	**33%**

Table A1.34 shows the breakdown of FP7 proposals with UK application, by type of instrument, and gives an indication of the relative level of demand for involvement in each type. In terms of numbers alone UK's proposal application rate was highest in proposals submitted in relation to NoE and CP-CSA projects. UK application rates were lowest in relation to ERCs actions.

Table A1.34 Proposals with UK involvement, compared to total number of FP7 proposals by type of instrument

Type of instrument	All proposals	UK proposals	Demand – share of bids with UK involvement
Research for the Benefit of Specific Groups (BSG)	5,747	3,051	53.1%
Collaborative Projects (CP)	44,138	22,339	50.6%
Coordination and Support Actions (CSA)	9,632	2,946	30.6%
CP-CSA	782	511	65.3%
Support for Frontier Research (ERC)	44,869	7,994	17.8%
Support for Training and Career Development of Researchers (Marie Curie -MC)	50,293	14,774	29.4%
Joint Technology Initiatives (JTI)	2,948	933	31.6%
Networks of Excellence (NoE)	200	148	74.0%
Total	**158,609**	**52,696**	**33%**

UK applications in proposals submitted to FP7

There were 80,050 UK applications in FP7 proposals. The data indicates that there were a total of 656,732 applications in all of the submitted proposals received under FP7, so UK's share of the applications in proposals is calculated as 12%. This is an indicator of the level of 'demand' for participation in FP7 by individual applications.

Table A1.35 provides a breakdown of the number of applications over time. The share of UK applications was roughly constant through time until 2013. In 2014, there was a slight increase in the proportion of UK applications.

Table A1.35 Number of UK applications in proposals and total number of applications, by year of call deadline

	2007	2008	2009	2010	2011	2012	2013	2014	**Total**
FP7	127,041	76,232	91,657	77,631	100,483	110,785	72,283	620	**656,732**
UK	13,886	8,743	10,717	9,485	12,926	14,561	9,628	104	**80,050**
Share of UK	10.9%	11.5%	11.7%	12.2%	12.9%	13.1%	13.3%	16.8%	**12.20%**

Table A1.36 and Table A1.37 are similar to Table A1.33 and Table A1.34 but provide information on the number of applications instead of the number of proposals. Differences between specific programmes and between types of instrument were less strongly marked for the number of applications than for the number of proposals.

Table A1.36 provides the number of applications by specific programme and priority area. In terms of volume, the two specific programmes for which the UK applied were Cooperation and People. In terms of the share of UK applications in all FP7 applications, Ideas and People were the two most significant programmes.

Table A1.36 UK's applications in FP7 proposals by specific programme and priority area

Specific programme	FP7 programme/priority area	All applications	UK applications	Demand – share of UK applications
FP7 Cooperation	Health	42,152	5,440	13%
	Food, Agriculture, and Biotechnology	36,390	3,317	9%
	Information & Communication Technologies	136,546	15,250	11%
	Nanosciences, Nanotechnologies, Materials and new Production Technologies	36,281	3,772	10%
	Energy	18,382	1,701	9%
	Environment (including Climate Change)	33,021	3,114	9%
	Transport (including Aeronautics)	32,555	3,497	11%
	Socio-economic sciences and Humanities	24,928	2,573	10%
	Space	8,356	853	10%
	Security	18,968	2,168	11%
	General Activities (Annex IV)	293	17	6%
	Joint Technology Initiatives (Annex IV-SP1)	19,100	2,013	11%
	Sub-total: FP7 Cooperation	**406,972**	**43,715**	**11%**
FP7 Ideas	**European Research Council**	**54,462**	**8,746**	**16%**
FP7 People	**Marie-Curie Actions**	**110,131**	**18,267**	**17%**
FP7 Capacities	Research Infrastructures	10,897	1,247	11%
	Research for the benefit of SMEs	49,917	6,513	13%
	Regions of Knowledge	4,703	271	6%
	Research Potential	3,259	50	2%
	Science in Society	8,384	763	9%
	Coherent development of research policies	372	30	8%
	Activities of International Cooperation	4,199	145	3%
	Sub-total: FP7 Capacities	**81,731**	**9,019**	**11%**
Euratom indirect	Nuclear Fission and Radiation Protection	3,356	294	9%

Specific programme	FP7 programme/priority area	All applications	UK applications	Demand – share of UK applications
actions	Fusion Energy	80	9	11%
	Sub-total: Euratom	**3,436**	**303**	**9%**
Total		**656,732**	**80,050**	**12%**

Table A1.37 provides the number of applications by type of instrument. Almost half of UK applications were Collaborative Projects (CP).However, in terms of the share of UK applications in all FP7 applications, the most significant instruments were Support for Frontier Research (ERC) and Support for Training and Career Development of Researchers (Marie Curie -MC).

Table A1.37 UK's applications in FP7 proposals, by type of instrument

Type of instrument	All applications	UK applications	Demand – share of UK applications
Research for the Benefit of Specific Groups (BSG)	49,115	6,414	13.1%
Collaborative Projects (CP)	353,351	38,568	10.9%
Coordination and Support Actions (CSA)	59,874	4,597	7.7%
CP-CSA	10,673	1,169	11.0%
Support for Frontier Research (ERC)	54,337	8,736	16.1%
Support for Training and Career Development of Researchers (Marie Curie -MC)	107,618	18,209	16.9%
Joint Technology Initiatives (JTI)	19,100	2,013	10.5%
Networks of Excellence (NoE)	2,664	344	12.9%
Total	**656,732**	**80,050**	**12%**

Table A1.38 shows the breakdown of UK applications in FP7 proposals by organisation type and gives an indication of the relative level of demand for involvement by each type.

The data shows that HES organisations from the UK accounted for the greatest proportion (52%) of applications in proposals, followed by PRC organisations (21%).

Table A1.38 Number of UK applications, by organisation type

Organisation Type	Number of UK applications	Share of all UK applications
Higher or secondary education organisations (HES)	41,840	52%
Private commercial organisations (PRC)	17,145	21%
Research organisations (REC)	5,454	7%
Public bodies (PUB)	1,964	2%
Other (OTH)	4,911	6%
N/A	8,736	11%
Total	**80,050**	**100%**

UK success rates by specific programmes/priority areas

UK success rates in applying to FP7, by proposals

UK organisations have participated in 52,696 FP7 proposals and in 10,372 FP7 projects. This means that UK's overall project-level success rate was 20%, above the average success rate figures for FP7 as a whole (16%). As a comparison, the success rates for Germany and France were respectively 20% and 21%.

Table A1.39 shows the success rates of proposals with UK application and compares these to the overall success rates for all proposals submitted to FP7, by specific programme and priority area. It shows that UK proposal success rates were above the FP7 average in 21 of the 23 priority areas.

Table A1.39 UK and FP7 proposal success rates by specific programme and priority area

Specific programme	FP7 programme/priority area	UK proposals	UK projects	Proposal success rate -UK	Proposal success rate – all FP7	Ratio of UK success rates to FP7 success rates
FP7 Cooperation	Health	3,086	756	24%	14%	173%
	Food, Agriculture, and Biotechnology	1,767	375	21%	17%	125%
	Information & Communication Technologies	9,485	1,354	14%	13%	106%
	Nanosciences, Nanotechnologies, Materials and new Production Technologies	2,151	493	23%	12%	187%
	Energy	917	186	20%	17%	117%
	Environment (including Climate Change)	1,653	360	22%	15%	150%
	Transport (including Aeronautics)	1,772	433	24%	22%	111%
	Socio-economic sciences and Humanities	1,770	212	12%	9%	129%
	Space	535	158	30%	27%	111%
	Security	1,143	217	19%	18%	108%
	General Activities (Annex IV)	16	7	44%	36%	123%
	Joint Technology Initiatives (Annex IV-SP1)	933	266	29%	27%	107%
	Sub-total: FP7 Cooperation	**25,228**	**4,817**	**19%**	**15%**	**124%**
FP7 Ideas	**European Research Council**	**8,003**	**1,072**	**13%**	**10%**	**133%**
FP7 People	**Marie-Curie Actions**	**14,812**	**3,328**	**22%**	**21%**	**107%**
FP7 Capacities	Research Infrastructures	592	267	45%	37%	122%
	Research for the benefit of SMEs	3,104	609	20%	17%	113%
	Regions of Knowledge	113	25	22%	18%	121%
	Research Potential	44	5	11%	9%	126%
	Science in Society	494	123	25%	21%	119%
	Coherent development of research policies	18	8	44%	48%	92%
	Activities of International Cooperation	121	29	24%	26%	94%

Specific programme	FP7 programme/priority area	UK proposals	UK projects	Proposal success rate -UK	Proposal success rate – all FP7	Ratio of UK success rates to FP7 success rates
	Sub-total: FP7 Capacities	**4,486**	**1,066**	**24%**	**18%**	**130%**
Euratom indirect actions	Nuclear Fission and Radiation Protection	163	86	53%	46%	114%
	Fusion Energy	4	3	75%	36%	206%
	Sub-total: Euratom	**167**	**89**	**53%**	**46%**	**116%**
Total		**52,696**	**10,372**	**20%**	**16%**	**123%**

UK success rates in applying to FP7, by applications

There were 80,050 UK applicants and 17,695 UK participants in FP7. This means that UK's overall participation-level success rate was 22%, just above the average success rate figures for FP7 as a whole (21%). As a comparison, the success rates for Germany and France were respectively 23% and 25%.

Table A1.40 shows the success rates of UK applications and compares these to the overall success rates for all applications in FP7, by specific programme and priority area. It shows that UK application success rates were above the FP7 average in 16 of the 23 priority areas.

Table A1.40 UK and FP7 application success rates by specific programme and priority area

Specific programme	FP7 programme/priority area	UK applicants	UK participants	Application success rate -UK	Application success rate – all FP7	Ratio of UK success rates to FP7 success rates
FP7 Cooperation	Health	5,440	1,692	31%	27%	116%
	Food, Agriculture, and Biotechnology	3,317	804	24%	22%	111%
	Information & Communication Technologies	15,250	2,423	16%	17%	96%
	Nanosciences, Nanotechnologies, Materials and new Production Technologies	3,772	1,062	28%	28%	99%
	Energy	1,701	395	23%	24%	97%
	Environment (including Climate Change)	3,114	835	27%	22%	123%
	Transport (including Aeronautics)	3,497	936	27%	27%	98%

Specific programme	FP7 programme/priority area	UK applicants	UK participants	Application success rate -UK	Application success rate – all FP7	Ratio of UK success rates to FP7 success rates
	Socio-economic sciences and Humanities	2,573	361	14%	11%	126%
	Space	853	299	35%	32%	111%
	Security	2,168	448	21%	21%	99%
	General Activities (Annex IV)	17	8	47%	62%	75%
	Joint Technology Initiatives (Annex IV-SP1)	2,013	693	34%	32%	106%
	Sub-total: FP7 Cooperation	**43,715**	**9,956**	**23%**	**22%**	**105%**
FP7 Ideas	**European Research Council**	**8,746**	**1,235**	**14%**	**10%**	**141%**
FP7 People	**Marie-Curie Actions**	**18,267**	**4,000**	**22%**	**18%**	**123%**
FP7 Capacities	Research Infrastructures	1,247	627	50%	48%	104%
	Research for the benefit of SMEs	6,513	1,358	21%	18%	114%
	Regions of Knowledge	271	66	24%	21%	114%
	Research Potential	50	5	10%	9%	106%
	Science in Society	763	205	27%	22%	123%
	Coherent development of research policies	30	19	63%	35%	180%
	Activities of International Cooperation	145	35	24%	33%	72%
	Sub-total: FP7 Capacities	**9,019**	**2,315**	**26%**	**23%**	**110%**
Euratom indirect actions	Nuclear Fission and Radiation Protection	294	181	62%	60%	103%
	Fusion Energy	9	8	89%	84%	106%
	Sub-total: Euratom	**303**	**189**	**62%**	**60%**	**103%**
Total		**80,050**	**17,695**	**22%**	**21%**	**108%**

UK success rates in applying to FP7, by funding

UK organisations requested €38.649 billion from the EU, and were allocated a total of €7.002 billion. This means that UK's overall project-level success rate was 18%, above the average success rate figures for FP7 as a whole (15%). As a comparison, the success rates for Germany and France were respectively 19% and 23%.

Table A1.41 shows the success rates by EU funding for UK proposals and compares these to the overall success rates for all proposals submitted to FP7, by specific programme and priority area. It shows that UK funding success rates were above the FP7 average in 12 of the 22 considered priority areas.

Table A1.41 UK and FP7 funding success rates by specific programme and priority area[98]

Specific programme	FP7 programme/priority area	UK funding requested (€m)	UK funding allocated (€m)	Funding success rate -UK	Funding success rate – all FP7	Ratio of UK success rates to FP7 success rates
FP7 Cooperation	Health	4,869	808	17%	14%	117%
	Food, Agriculture, and Biotechnology	1,219	241	20%	17%	119%
	Information & Communication Technologies	6,341	916	14%	15%	99%
	Nanosciences, Nanotechnologies, Materials and new Production Technologies	3,340	352	11%	12%	86%
	Energy	823	144	17%	19%	94%
	Environment (including Climate Change)	1,287	238	18%	15%	127%
	Transport (including Aeronautics)	1,123	260	23%	24%	95%
	Socio-economic sciences and Humanities	822	94	11%	10%	121%
	Space	260	96	37%	31%	119%
	Security	837	157	19%	20%	95%
	General Activities (Annex IV)	10	4	46%	260%	18%
	Joint Technology Initiatives (Annex IV-SP1)	1,996	340	17%	7%	259%
	Sub-total: FP7 Cooperation	**22,926**	**3,650**	**16%**	**14%**	**114%**
FP7 Ideas	**European Research Council**	**13,772**	**1,715**	**12%**	**10%**	**126%**
FP7 Capacities	Research Infrastructures	603	273	45%	31%	147%
	Research for the benefit of SMEs	1,014	189	19%	17%	111%
	Regions of Knowledge	39	9	23%	20%	113%
	Research Potential	38	6	17%	9%	192%
	Science in Society	146	35	24%	21%	117%
	Coherent development of research policies	3	2	59%	62%	95%
	Activities of International Cooperation	21	5	23%	26%	87%

[98] The FP7 PEOPLE programme is excluded from this analysis, as the design of Marie Curie projects and the data provided through CORDA by BEIS does not allow constructing meaningful measures of success rate by EU funding requested/allocated.

Specific programme	FP7 programme/priority area	UK funding requested (€m)	UK funding allocated (€m)	Funding success rate -UK	Funding success rate – all FP7	Ratio of UK success rates to FP7 success rates
	Sub-total: FP7 Capacities	**1,864**	**519**	**28%**	**19%**	**143%**
Euratom indirect actions	Nuclear Fission and Radiation Protection	78	31	40%	45%	89%
	Fusion Energy	2	1	51%	56%	90%
	Sub-total: Euratom	**80**	**32**	**41%**	**46%**	**89%**
Total		**38,649**	**7,002**	**18%**	**15%**	**118%**

UK success rates by Instrument Type

UK success rates in applying to FP7, by proposals

Table A1.42 shows the success rates of proposals with UK application and compares these to the overall success rates for all proposals submitted to FP7, by instrument. It shows that UK proposal success rates were above the FP7 average in all of the types of instruments, with the UK performing particularly well in relation to ERC and CP actions.

Table A1.42 UK and FP7 proposal success rates by type of instrument

Type of instrument	UK proposals	UK projects	Proposal success rate -UK	Proposal success rate – all FP7	Ratio of UK success rates to FP7 success rates
Research for the Benefit of Specific Groups (BSG)	3,051	583	19%	17%	113%
Collaborative Projects (CP)	22,339	3,904	17%	13%	130%
Coordination and Support Actions (CSA)	2,946	1,008	34%	27%	128%
CP-CSA	511	214	42%	34%	124%
Support for Frontier Research (ERC)	7,994	1,037	13%	10%	134%
Support for Training and Career Development of Researchers (Marie Curie -MC)	14,774	3,312	22%	21%	109%
Joint Technology Initiatives (JTI)	933	266	29%	27%	107%
Networks of Excellence (NoE)	148	48	32%	29%	114%
Total	**52,696**	**10,372**	**20%**	**16%**	**123%**

UK success rates by Organisation Type

UK success rates in applying to FP7, by applications

There were 80,050 UK applications in FP7 proposals and 17,695 UK participations in FP7 projects. The UK success rate at the level of participations was therefore 22.1%. This is higher than the success rate for FP7 participations overall (20.5%).
Table A1.43 shows the success rates of UK participations in proposals submitted to FP7, by the different organisation types. It suggests that success rates were highest amongst participations from REC, PRC and HES (higher than the FP7 success rate), while success rates for participations from PUB and Other organisations were below the UK and FP7 averages.

Table A1.43 UK and FP7 application success rates by organisation type

Organisation Type	UK applications in proposals	UK participations in projects	UK success rates	FP7 success rate
Higher or secondary education organisations (HES)	41,840	10,662	25.5%	20.8%
Private commercial organisations (PRC)	17,145	4,577	26.7%	24.4%
Research organisations (REC)	5,454	1,602	29.4%	27.3%
Public bodies (PUB)	1,964	530	17.0%	26.1%
Other (OTH)	4,911	324	6.6%	8.8%
N/A	8,736	n/a	n/a	n/a
Total	**80,050**	**17,695**	**22.1%**	**20.5%**

A1.3.2.12 UK demand for participation in the FP7

The first two columns of Table A1.44 present data on UK participation rates and success rates by specific programme/priority area in FP7, relative to FP7 rates overall. These ‘participation ratios’ and ‘success ratios’ have been presented in Table A1.20 and Table A1.39. Participation ratio is calculated by comparing the proportion of UK participations accounted for by a specific priority area with the proportion of all participations accounted for by that area. Success ratio is calculated by comparing the UK proposal success rate with the proposal success rate for all FP7.

Each cell is marked as ‘very low’, ‘low’, ‘average’, ‘high’ or ‘very high’ depending on the difference between the UK ratio and the overall average.

The final column presents the implied level of UK demand for participation in each area, set in context to overall demand across all countries. The percentages shown are calculated by dividing the UK participation ratio by the UK success ratio.

Table A1.44 Levels of UK demand: a comparison between UK's relative success and participation rates in FP7

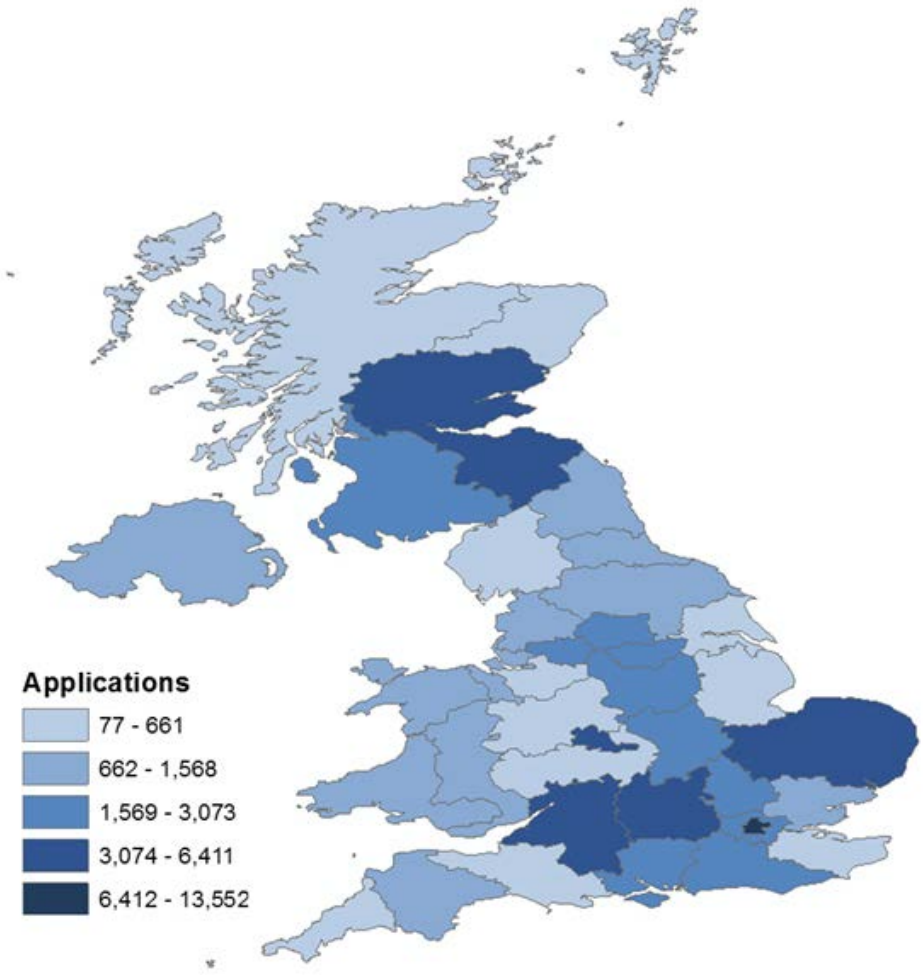
Specific programme	FP7 programme/priority area	UK participation ratio (ratio of UK to FP7 participation rates)	UK success ratio (ratio of UK to FP7 success rate)	Implied level of UK demand for participation
FP7 Cooperation	Health	High - 114%	Very high - 173%	Low - 66%
	Food, Agriculture, and Biotechnology	Low - 77%	High - 125%	Low - 62%
	Information & Communication Technologies	Low - 81%	Average - 106%	Low - 76%
	Nanosciences, Nanotechnologies, Materials and new Production Technologies	Low - 78%	Very high - 187%	Very low - 42%
	Energy	Low - 68%	High - 117%	Low - 58%
	Environment (including Climate Change)	Low - 89%	High - 150%	Low - 59%
	Transport (including Aeronautics)	Low - 80%	High - 111%	Low - 72%
	Socio-economic sciences and Humanities	Average - 99%	High - 129%	Low - 77%
	Space	Low - 86%	High - 111%	Low - 77%
	Security	Low - 86%	Average - 108%	Low - 80%
	General Activities (Annex IV)	Very low - 33%	High - 123%	Very low - 27%
	Joint Technology Initiatives (Annex IV-SP1)	Low - 85%	Average - 107%	Low - 79%
	Sub-total: FP7 Cooperation	Low - 86%	High - 124%	Low - 69%
FP7 Ideas	**European Research Council**	Very high - **172%**	High - 133%	High - 129%
FP7 People	**Marie-Curie Actions**	Very high - **156%**	Average - 107%	High - 146%
FP7 Capacities	Research Infrastructures	Low - 90%	High - 122%	Low - 74%
	Research for the benefit of SMEs	High - 113%	High - 113%	Average - 100%
	Regions of Knowledge	Low - 50%	High - 121%	Very low - 41%
	Research Potential	Very low - 12%	High - 126%	Very low - 10%
	Science in Society	Low - 85%	High - 119%	Low - 71%
	Coherent development of research policies	High - 110%	Average - 92%	High - 120%
	Activities of International Cooperation	Very low - 19%	Average - 94%	Very low - 20%
	Sub-total: FP7 Capacities	Average - 92%	High - 130%	Low - 71%

Specific programme	FP7 programme/priority area	UK participation ratio (ratio of UK to FP7 participation rates)	UK success ratio (ratio of UK to FP7 success rate)	Implied level of UK demand for participation
Euratom indirect actions	Nuclear Fission and Radiation Protection	Low - 69%	High - 114%	Low - 61%
	Fusion Energy	Average - 91%	Very high - 206%	Very low - 44%

A1.3.3 UK demand by location

This section presents an analysis of demand for FP7 funding by UK NUTS 2 region. It presents the numbers of applications received from each NUTS2 region across the UK. It has to be noted that out of 80,050 UK applications, 6,013 did not include a NUTS2 code (7.5% of total number of applications), i.e. the application did not include the necessary address information. These applications are excluded from the analysis. Figure A1.1 overleaf presents the geographical distribution of FP7 applications across the UK. It can be seen that demand for FP7 is roughly in line with the presence of research performing organisations and large conurbations.

Figure A1.1 Applications to FP7 – United Kingdom



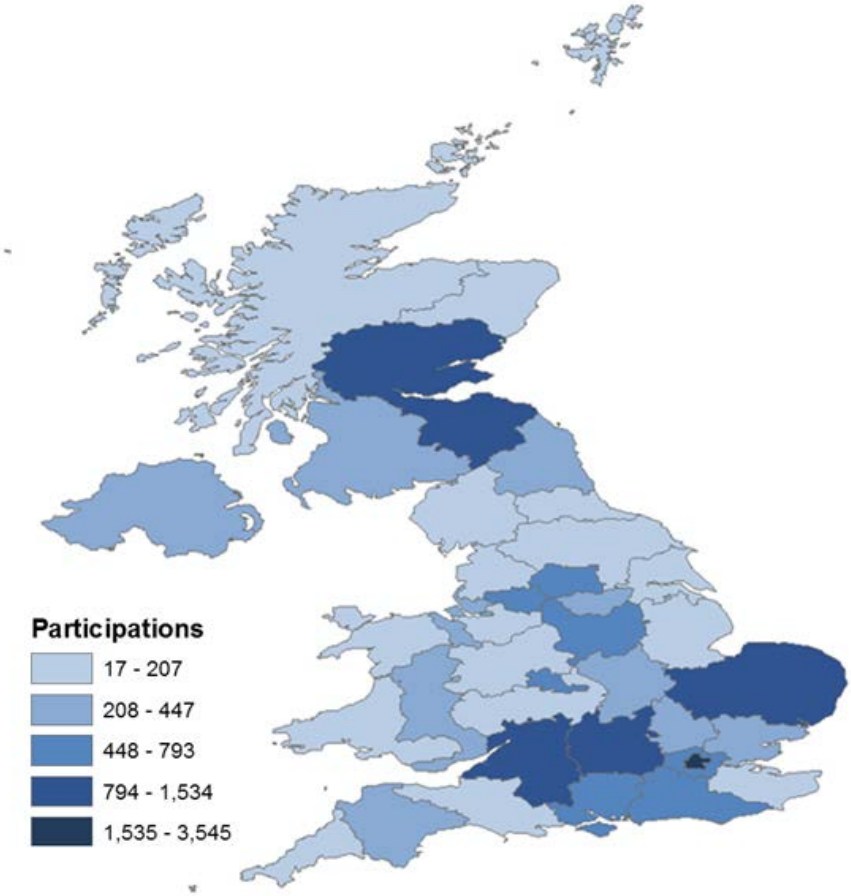
Note: The intervals are defined using the 'Jenks natural breaks optimization' method, which is the default for Arc Map. This is a "data clustering method designed to determine the best arrangement of values into different

classes. This is done by seeking to minimize each class's average deviation from the class mean, while maximizing each class's deviation from the means of the other groups. In other words, the method seeks to reduce the variance within classes and maximize the variance between classes."[99]

A1.3.4 UK participation location

This section presents an analysis of UK participation by NUTS2 region across the UK. Figure A1.2 shows that a large proportion of participations (those NUTS2 regions with more than 793 project participations) is concentrated in six NUTS2 regions: Easter Scotland, Berkshire, Buckinghamshire and Oxfordshire, Surrey, East and West Sussex, Gloucestershire, Wiltshire and Bristol/Bath as well as inner London (West and East).

Figure A1.2 FP7 participations – United Kingdom



Note: The intervals are defined using the "Jenks natural breaks optimization" method, which is the default for Arc Map. This is a "data clustering method designed to determine the best arrangement of values into different classes. This is done by seeking to minimize each class's average deviation from the class mean, while maximizing each class's deviation from the means of the other groups. In other words, the method seeks to reduce the variance within classes and maximize the variance between classes."[100]

[99] https://en.wikipedia.org/wiki/Jenks_natural_breaks_optimization
[100] https://en.wikipedia.org/wiki/Jenks_natural_breaks_optimization

Annex 2 UK performance in Horizon 2020 – first evidence from 2014-16

This section provides a preliminary analysis of UK performance in Horizon 2020 between January 2014 and February 2016.
A summary of the analysis below is presented above in section 3.

A2.1.1 Summary of analysis

The overall statistics on UK participation in Horizon 2020 between January 2014 and February 2016 are as follows:

Demand: The total number of UK applications was 31,176 out of a total of 258,519. UK's applications therefore constituted 12.1% of the total number of applications in Horizon 2020. UK organisations were involved in 21,297 proposals, out of a total of 75,519 proposals. UK organisations were therefore involved in 28.1% of all Horizon 2020 proposals. UK organisations requested a total of €16.814 billion in EU funding out of a total EU requested of €132.281 billion. UK organisations therefore requested 12.7% of all EU funding in Horizon 2020.

Projects: UK organisations were involved in 3,112 projects, out of a total of 8,598 projects. UK organisations were therefore involved in 36.2% of Horizon 2020 projects included in the analysis.

Participations: The total number of UK participations was 4,731, out of a total of 35,359. UK's participations therefore constituted 13.4% of the total number of participations included in the analysis.

Project coordinator role: The UK so far took up the coordinator role 1,785 times. This is the highest number of coordinators in Horizon 2020 out of all countries, significantly ahead Spain (1,029), Germany (984) and France (794).

Organisations: A total of 1,305 discrete organisations from the UK participated in Horizon 2020 so far, out of 13,291 participants (all countries). UK organisations therefore constituted 9.8% of all organisations involved in projects included in the analysis.

Funding: UK organisations were allocated a total of €2,172 billion in EU funding so far, out of a total EU allocation to all participating countries of €14,492 billion so far. UK organisations therefore received 15% of all EU funding included in the analysis. The total project cost for UK organisations was €2.405 billion, representing 13.3% of all Horizon 2020 project costs of €18.046 billion up to February 2016.

Table A2.1 provides a summary of success rates by proposals, by applications, and by funding for the UK and Horizon 2020 for 2014/15. The UK so far has had success rates which were higher than the Horizon 2020 average.

Table A2.1 Summary of success rates in Horizon 2020 (2014 - 02/2016)

Success rates	UK	All countries
By proposals (no. of projects / no. of proposals)	14.6%	11.4%
By applications (no. of participants / no. of applicants)	15.2%	13.7%
By funding (amount of EU funding allocated / amount of EU funding requested)	11.8%	9.86%

Source: ICF analysis of CORDA data

A2.1.2 Detailed analysis

The section below presents some further analysis which complements the analysis presented in section 3 above.

A2.1.2.1 EU funding by pillar and objective

Table A2.2 provides a breakdown of the funding received by UK organisations in Horizon 2020 by pillar and objective, compared to the total funding in the programme, between January 2014 and February 2016. In this period, the UK was awarded €2.405 billion out of a total of €18.046 billion in EU funding – or 13.3% of all EU funding awarded.

In terms of EU funding as well as in terms of the share of UK funding in the total Horizon 2020 programme, the pillars Excellent Science and Societal Challenges were the most significant so far. The pillar with the lowest funding values and share of UK funding was "Spreading excellence and widening participation". A large difference is noticeable between the share of EU funding awarded to the UK in Excellent Science (20%) and the share of EU funding awarded to the UK under Industrial Leadership (12%). The pillar Spreading Excellence and Widening Participation is focussing on support for countries with less developed research and innovation systems, therefore the low share of EU funding awarded to the UK under this pillar is an expected result of the pillar's objectives and structure.

Table A2.2 EU funding allocated to UK under Horizon 2020 funding, EU funding allocated to all countries under Horizon 2020 and share of UK funding, by pillar and objective (2014 - 02/2016)

Pillar	Objective	UK funding (€ million)	Total funding (€ million)	Share of UK funding
Excellent Science	European Research Council	461	2,274	20%
	Future and Emerging Technologies	70	440	16%
	Marie Sklodowska-Curie actions	376	1,649	22%
	Research infrastructures	67	582	12%
	Subtotal: Excellent Science	**974**	**4,946**	**20%**

Pillar	Objective	UK funding (€ million)	Total funding (€ million)	Share of UK funding
Industrial Leadership	Industrial Leadership - Cross-theme	15	103	15%
	Information and Communication Technologies	224	1,787	13%
	Nanotechnologies, Advanced Materials and Production	35	261	13%
	Advanced materials	22	215	10%
	Biotechnology	8	93	8%
	Advanced manufacturing and processing	36	442	8%
	Space	28	263	11%
	Access to risk finance[101]	1	5	14%
	Innovation in SMEs	4	37	10%
	Subtotal: Industrial Leadership	**372**	**3,207**	**12%**
Societal Challenges	Societal Challenges - Cross-theme	10	42	24%
	Health, demographic change and wellbeing	237	1,291	18%
	Food security, sustainable agriculture and forestry, marine and maritime and inland water research	68	622	11%
	Secure, clean and efficient energy	165	1,344	12%
	Smart, green and integrated transport	83	805	10%
	Climate action, environment, resource efficiency and raw materials	83	659	13%
	Europe in a changing world - inclusive, innovative and reflective Societies	37	248	15%
	Secure societies - Protecting freedom and security of Europe and its citizens	63	449	14%
	Subtotal: Societal Challenges	**746**	**5,460**	**14%**
Spreading excellence and widening participation	Teaming of excellent research institutions and low performing RDI regions	1	14	7%
	Twinning of research institutions	6	66	9%
	ERA chairs	0	34	0%
	Transnational networks of National Contact Points	0	2	0%
	Spreading excellence and widening participation – cross-theme	0	0.2	0%
	Subtotal: Spreading excellence and widening participation	**7**	**117**	**6%**

[101] The CORDA data provided does not include debt and equity products managed by the European Investment Bank as part of their InnovFin – EU Finance for Innovators programme. Therefore the number of activities reported in CORDA does not account for the majority of Horizon 2020 budget earmarked and already spent under the 'Access to Risk Finance' heading.

Pillar	Objective	UK funding (€ million)	Total funding (€ million)	Share of UK funding
Science with and for Society	Science with and for Society - Cross-theme	1	6	18%
	Make scientific and technological careers attractive for young people	2	27	8%
	Promote gender equality in research and innovation	1	19	7%
	Integrate society in science and innovation	5	34	15%
	Develop the governance for the advancement of responsible research and innovation	2	20	10%
	Subtotal: Science with and for Society	**12**	**106**	**11%**
Euratom	**Euratom**	**32**	**515**	**6%**
Cross-theme	**Cross-theme**	**28**	**142**	**20%**
TOTAL		**2,172**	**14,492**	**15%**

Source: ICF analysis of CORDA data

A2.1.2.2 Participations by pillar and objective

Table A2.3 provides a breakdown of the number of UK participations in Horizon 2020 by pillar and objective, compared to the total number of participations in the programme. Between January 2014 and February 2016, there were 4,731 UK participations out of a total of 35,359. UK's participations therefore constituted 13.4% of the total number of participations in Horizon 2020.

In terms of volume of participations as well as in terms of the share of UK participations in the total Horizon 2020 programme, the pillars Excellent Science and Societal Challenges were the most significant. A large differential is noticeable between the share of UK participations in Excellent Science (20%) and the share of UK participations in Industrial Leadership (10%) and Societal Challenges (11%). The pillar with the fewest number of participations and the smallest share of UK participations was Euratom.

Table A2.3 Number of UK participations, total number of Horizon 2020 participations and share of UK participations, by pillar and objective (2014 - 02/2016)

Pillar	Objective	Number of UK participations	Total number of participations	Share of UK participations
Excellent Science	European Research Council	344	1,703	20%
	Future and Emerging Technologies	124	790	16%
	Marie Sklodowska-Curie actions	1,437	6,083	24%
	Research infrastructures	175	1,587	11%
	Subtotal: Excellent Science	**2,080**	**10,163**	**20%**
Industrial Leadership	Industrial Leadership - Cross-theme	22	310	7%
	Information and Communication Technologies	491	4,457	11%
	Nanotechnologies, Advanced Materials and Production	75	640	12%
	Advanced materials	40	445	9%
	Biotechnology	11	149	7%
	Advanced manufacturing and processing	93	1,077	9%
	Space	112	1,040	11%
	Access to risk finance	2	21	10%
	Innovation in SMEs	46	807	6%
	Subtotal: Industrial Leadership	**892**	**8,946**	**10%**
Societal Challenges	Societal Challenges - Cross-theme	8	46	17%
	Health, demographic change and wellbeing	391	2,847	14%
	Food security, sustainable agriculture and forestry, marine and maritime and inland water research	204	2,041	10%
	Secure, clean and efficient energy	305	3,137	10%
	Smart, green and integrated transport	237	2,128	11%
	Climate action, environment, resource efficiency and raw materials	203	2,111	10%
	Europe in a changing world - inclusive, innovative and reflective Societies	119	1,123	11%
	Secure societies - Protecting freedom and security of Europe and its citizens	161	1,298	12%
	Subtotal: Societal Challenges	**1,628**	**14,731**	**11%**

Pillar	Objective	Number of UK participations	Total number of participations	Share of UK participations
Spreading excellence and widening participation	Spreading excellence and widening participation - Cross-theme	0	1	0%
	Teaming of excellent research institutions and low performing RDI regions	6	133	5%
	Twinning of research institutions	31	263	12%
	ERA chairs	0	14	0%
	Transnational networks of National Contact Points	0	17	0%
	Subtotal: Spreading excellence and widening participation	**37**	**428**	**9%**
Science with and for Society	Science with and for Society - Cross-theme	3	15	20%
	Make scientific and technological careers attractive for young people	13	149	9%
	Promote gender equality in research and innovation	5	79	6%
	Integrate society in science and innovation	17	154	11%
	Develop the governance for the advancement of responsible research and innovation	9	112	8%
	Subtotal: Science with and for Society	**47**	**509**	**9%**
Euratom	**Euratom**	**25**	**407**	**6%**
Cross-theme	**Cross-theme**	**22**	**175**	**13%**
TOTAL		**4,731**	**35,359**	**13%**

Source: ICF analysis of CORDA data

Project coordination rates

Table A2.4 presents an overview of how often the UK has taken on coordinator roles in Horizon 2020 so far, split by programme pillar and theme. As a function of the large number of UK participations in individual grant instruments under the Excellent Science pillar, the number of coordinator roles taken by UK organisations is highest under the Excellent Science pillar. In terms of thematic areas funded under Industrial Leadership and Societal Challenges, the share of UK coordinators is highest in Nanotechnologies, Advanced Materials and Production (13%); Health, Demographic Change and Wellbeing (16%); and Inclusive, Innovative and Reflective Societies (17%). The UK so far took up the coordinator role 1,785 times. This is the highest number of coordinators in Horizon 2020 out of all countries, significantly ahead Spain (1,029), Germany (984) and France (794).

Table A2.4 Number of project coordinators, UK and total in Horizon 2020 (2014 - 02/2016)

Pillar	Objective	Number of UK project coordinators	Total number of coordinators	Share of UK coordinators
Excellent Science	European Research Council	305	1,556	20%
	Future and Emerging Technologies	10	79	13%
	Marie Sklodowska-Curie actions	1,030	3,125	33%
	Research infrastructures	11	100	11%
	Subtotal: Excellent Science	**1,356**	**4,860**	**28%**
Industrial Leadership	Industrial Leadership - Cross-theme	4	29	14%
	Information and Communication Technologies	78	687	11%
	Nanotechnologies, Advanced Materials and Production	23	178	13%
	Advanced materials	4	32	13%
	Biotechnology	2	38	5%
	Advanced manufacturing and processing	5	90	6%
	Space	10	169	6%
	Access to risk finance	1	4	25%
	Innovation in SMEs	12	183	7%
	Subtotal: Industrial Leadership	**139**	**1,410**	**10%**
Societal Challenges	Societal Challenges - Cross-theme	2	2	100%
	Health, demographic change and wellbeing	68	420	16%
	Food security, sustainable agriculture and forestry, marine and maritime and inland water research	20	245	10%
	Secure, clean and efficient energy	46	472	10%
	Smart, green and integrated transport	59	430	14%
	Climate action, environment, resource efficiency and raw materials	36	251	14%
	Europe in a changing world - inclusive, innovative and reflective Societies	24	141	17%
	Secure societies - Protecting freedom and security of Europe and its citizens	20	146	14%
	Subtotal: Societal Challenges	**279**	**2,107**	**13%**
Spreading excellence and widening participation	Spreading excellence and widening participation - Cross-theme	0	1	0%
	Teaming of excellent research institutions and low performing RDI regions	0	31	0%
	Twinning of research institutions	0	66	0%
	ERA chairs	0	14	0%
	Transnational networks of National Contact Points	0	1	0%

Pillar	Objective	Number of UK project coordinators	Total number of coordinators	Share of UK coordinators
	Subtotal: Spreading excellence and widening participation	**0**	**66**	**0%**
Science with and for Society	Science with and for Society - Cross-theme	1	6	17%
	Make scientific and technological careers attractive for young people	1	14	7%
	Promote gender equality in research and innovation	0	9	0%
	Integrate society in science and innovation	2	10	20%
	Develop the governance for the advancement of responsible research and innovation	1	12	8%
	Subtotal: Science with and for Society	**5**	**51**	**10%**
Euratom	**Euratom**	**1**	**24**	**4%**
Cross-theme	**Cross-theme**	**5**	**33**	**15%**
TOTAL		**1,785**	**8,598**	**21%**

Source: ICF analysis of CORDA data

A2.1.2.3 Participation of discrete organisations

Table A2.5 shows that between January 2014 and February 2016, a total of 1,305 discrete organisations from the UK participated in Horizon 2020, out of 13,291 discrete participants overall (all countries). In terms of volume as well as in terms of the share of UK in the total Horizon 2020 programme, the pillars Excellent Science, Industrial Leadership and Societal Challenges were the most significant and saw the highest number and share of discrete organisations from the UK. The pillar with the fewest number of discrete organisations and the smallest share of UK was Euratom. It is interesting to note that the share of discrete UK organisations under the Excellent Science pillar is lower than the share of EU funding awarded to UK organisations under this pillar. This points to a continued success of a group of high-performing UK organisations in programmes like the ERC and the Marie Sklodowska Curie actions, comparable to the pattern visible in FP7.

Table A2.5 Number of discrete UK organisations, total number of Horizon 2020 discrete organisations and share of UK organisations out of totals, by pillar and objective (2014 - 02/2016)

Pillar	Objective	Number of discrete UK organisations	Total number of discrete organisations	Share of UK organisations out of total organisations, in%
Excellent Science	European Research Council	68	480	14%
	Future and Emerging Technologies	64	468	14%
	Marie Sklodowska-Curie actions	215	1,903	11%
	Research infrastructures	80	797	10%
	Subtotal: Excellent Science	**281**	**2,597**	**11%**
Industrial Leadership	Industrial Leadership - Cross-theme	19	260	7%
	Information and Communication Technologies	276	2,561	11%
	Nanotechnologies, Advanced Materials and Production	65	543	12%
	Advanced materials	30	367	8%
	Biotechnology	10	131	8%
	Advanced manufacturing and processing	73	803	9%
	Space	70	705	10%
	Access to risk finance	2	20	10%
	Innovation in SMEs	31	556	6%
	Subtotal: Industrial Leadership	**481**	**5,035**	**10%**
Societal Challenges	Societal Challenges - Cross-theme	8	45	18%
	Health, demographic change and wellbeing	194	1,599	12%
	Food security, sustainable agriculture and forestry, marine and maritime and inland water research	126	1,324	10%
	Secure, clean and efficient energy	222	2,190	10%
	Smart, green and integrated transport	154	1,432	11%
	Climate action, environment, resource efficiency and raw materials	151	1,510	10%
	Europe in a changing world - inclusive, innovative and reflective Societies	87	821	11%
	Secure societies - Protecting freedom and security of Europe and its citizens	117	943	12%

Pillar	Objective	Number of discrete UK organisations	Total number of discrete organisations	Share of UK organisations out of total organisations, in%
	Subtotal: Societal Challenges	**805**	**7,923**	**10%**
Spreading excellence and widening participation	Spreading excellence and widening participation - Cross-theme	0	1	0%
	Teaming of excellent research institutions and low performing RDI regions	5	111	5%
	Twinning of research institutions	24	202	12%
	ERA chairs	0	13	0%
	Transnational networks of National Contact Points	0	17	0%
	Subtotal: Spreading excellence and widening participation	**28**	**308**	**9%**
Science with and for Society	Science with and for Society - Cross-theme	3	15	20%
	Make scientific and technological careers attractive for young people	13	139	9%
	Promote gender equality in research and innovation	5	76	7%
	Integrate society in science and innovation	15	146	10%
	Develop the governance for the advancement of responsible research and innovation	9	103	9%
	Subtotal: Science with and for Society	**37**	**410**	**9%**
Euratom	**Euratom**	**17**	**223**	**8%**
Cross-theme	**Cross-theme**	**15**	**163**	**9%**
TOTAL		**1,305**	**13,291**	**10%**

Source: ICF analysis of CORDA data

Note that subtotals for discrete organisations do not add up as the same organisation can participate in several programmes/priority areas.

A2.1.2.4 Performance in context

Table A2.6 lists the EU-28 member states and shows, for each and again covering Horizon 2020 projects started up to February 2016, total EU funding received, share of EU-28 funding, share of 2014 EU-28 intramural research & development expenditure (GERD)[102], and the ratio of share of EU-28 funding to share of EU-28 GERD. The table is sorted by the 4th column (ratio), so the countries listed towards the top of the table are those where their share of EU-28 funding allocations were greater proportionately than their share of EU-28 GERD.

In 2014, UK's contribution towards total EU-28 GERD was 14%. This information can be used to normalise the EU funding awarded under Horizon 2020 up to February 2016. UK's share of EU funding amongst the EU-28 was 15%. On this basis UK's share of Horizon 2020 between January 2014 and February 2016 was therefore higher than what might have been expected, given its level of R&D expenditure (+10%).

UK's position in the table indicates that it was 18th out of the EU-28 in terms of the amount of EU funding realised in comparison with its R&D expenditure.

Table A2.6 EU funding allocation in Horizon 2020 to EU28 in comparison with GERD (2014 - 02/2016)

Member State	EU funding (€m)	Share of EU-28 Funding	Share of EU-28 GERD (2014)	Ratio EU funding to GERD
Cyprus	45	0.3%	0.0%	1055%
Greece	305	2.3%	0.5%	402%
Estonia	57	0.4%	0.1%	391%
Latvia	19	0.1%	0.1%	223%
Portugal	251	1.9%	0.8%	220%
Malta	7	0.1%	0.0%	213%
Romania	59	0.4%	0.2%	200%
Spain	1,286	9.5%	4.5%	197%
Ireland	273	2.0%	1.0%	186%
Slovenia	81	0.6%	0.3%	177%
Netherlands	1,137	8.4%	4.6%	170%
Croatia	26	0.2%	0.1%	149%
Belgium	635	4.7%	3.5%	126%
Bulgaria	21	0.2%	0.1%	121%
Luxembourg	37	0.3%	0.2%	117%
Slovakia	39	0.3%	0.2%	113%
Hungary	82	0.6%	0.5%	113%
United Kingdom	**2,172**	**16.0%**	**13.5%**	**111%**
Italy	1,177	8.7%	7.3%	111%

[102] Eurostat GERD t2020_20.

Member State	EU funding (€m)	Share of EU-28 Funding	Share of EU-28 GERD (2014)	Ratio EU funding to GERD
Denmark	372	2.7%	2.8%	91%
Lithuania	16	0.1%	0.1%	85%
Finland	277	2.0%	2.3%	83%
Austria	399	2.9%	3.5%	79%
Poland	136	1.0%	1.4%	69%
Sweden	464	3.4%	4.8%	67%
France	1,506	11.1%	17.0%	61%
Germany	2,574	19.0%	29.3%	61%
Czech Republic	91	0.7%	1.1%	58%
Total	**13,543**	**100%**	**100%**	**100%**

Source: ICF analysis of CORDA data

A2.1.2.5 Success rates

Table A2.7 provides a summary of success rates by EU funding and by applications during the first year of Horizon 2020. For comparison, the table lists all countries classified as Innovation leaders or Innovation followers in the Innovation Union Scoreboard (2015). The table is sorted by the final column, so the countries listed towards to the top of the table are those where the share of EU-28 funding was the highest.

As for FP7, the UK was the second country to receive the most EU funding after Germany. However, the UK was ranked 5th in terms of success rate by EU funding and 7th in terms of success rate by applications.

Table A2.7 Success rate in Horizon 2020 by EU funding and by applications, share of EU-28 funding, by innovation leader and innovation follower countries (2014 - 02/2016)

Member State	IUS category	Success rate by EU funding	Success rate by applications	Share of EU funding totals under Horizon 2020, allocated to EU-28
Germany	Innovation leader	14%	16%	18%
United Kingdom	**Innovation follower**	12%	15%	15%
France	Innovation follower	14%	17%	10%
Netherlands	Innovation follower	12%	16%	8%
Belgium	Innovation follower	14%	16%	4%
Sweden	Innovation leader	10%	14%	3%
Austria	Innovation follower	12%	16%	3%
Denmark	Innovation leader	11%	15%	3%
Finland	Innovation leader	8%	12%	2%
Ireland	Innovation follower	11%	15%	2%

Member State	IUS category	Success rate by EU funding	Success rate by applications	Share of EU funding totals under Horizon 2020, allocated to EU-28
Slovenia	Innovation follower	7%	10%	1%
Luxembourg	Innovation follower	9%	17%	0%

Source: ICF analysis of CORDA data

Annex 3 Case studies

This section presents the case studies which have been used to support the evidence from the online surveys and illustrate a number of aspects investigated, in particular the pathways to FP7 participation and the variety and types of impacts reported. The projects to be covered were selected by the Steering Group composed of BIS, InnovateUK, UKRO and Universities UK. The approach for selecting case study projects and writing the case studies up is presented in section 2.3.5. The five case studies cover the following research areas:

- Additive manufacturing
- Social Sciences
- Medical research
- Factories of the Future
- Robotics and assisted living

A3.1 AMAZE: Additive Manufacturing Aiming Towards Zero Waste & Efficient Production of High-Tech Metal Products

AMAZE is a unique project set up to design, demonstrate and deliver four streamlined pilot-scale additive manufacturing factories to produce metal materials, giving European manufacturers of additive manufacturing and industrial end-users components a first mover advantage.

A3.1.1 Overview

Total project costs	€ 18.2 million
EU funding	€ 10.2 million
Project coordinator	Manufacturing Technology Centre, United Kingdom
Number of partners involved	29
Project start date	01/01/2013
Project end date	30/06/2017
Type of project	CP

Source: ICF consultation with MTF (project coordinator); CORDIS database

A3.1.2 Project description

The project was set up to design, demonstrate and deliver four streamlined pilot-scale additive manufacturing (AM) factories to produce metal materials, giving European manufacturers of additive manufacturing and industrial end-users components a first mover advantage. In selected application areas (automotive, aeronautics, space, nuclear fusion and tooling), components were defined and their manufacturing trialled. The overall objective of the project is to particularly produce larger defect-free metallic components up to 2 meter in size. Furthermore, the project attempts to:

- Increase dimensional accuracy of components by 25%;

- Increase manufacturing speed tenfold; and
- Reduce the amount of material loss to less than 5%.

The project is designed to benefit specifically its industrial participants. These include both manufacturers of materials, research service providers and industrial end users.

A3.1.3 The project consortium

The project brought together a partnership of eight academic institutions, 19 industry partners and one intergovernmental agency. The UK partners were:

- The University of Birmingham's Interdisciplinary Research Centre on Netshape Processing;
- Swansea University ;
- Cranfield University;
- The University of Manchester ;
- Granta Design;
- BAE Systems;
- Short Brothers Plc (Bombardier Aero);
- United Kingdom Atomic Energy Authority (CCFE);
- Manufacturing Technology Centre (MTC); and
- Renishaw (previously MTT).

The consortium was set up to provide a broad background of skills and partner along the value chain of technical skills, prototype and process development, information and data management, standardisation, component specification and the requirements and demand by industrial end users. Most of the academic partners specialised in providing equipment for additive manufacturing, whilst industrial partners were more experienced in piloting and developing processes and components.

It includes provides a partnership along the technology development and innovation value chains of additive manufacturing in a variety of application areas.

The project is split in so called application pods that work towards end users such as BAE, Volvo and Bombardier which have specified components they would like to see developed.

A3.1.4 Pathways to FP7 participation

The partnership formed mainly on the initiative of the former coordinator at the European Space Agency[103]. Around 50% of the consortium had worked together previously, on a bilateral and multilateral basis, and the ability of the coordinator to assemble and manage international consortia was very helpful in this regard. A number of core partners had been involved in unsuccessful proposals to FP7 in the past, including an early version of AMAZE, which helped understand better how to balance the consortium for the AMAZE project between different application areas

[103] The role of coordinator was transferred to the MTC during the project lifetime.

with different cost bases, and the complementarity of needed technology. For the involved service providers such as Granta Design (UK), the partnership offered good exposure to potential new customers.

Industrial end-users were attracted to the project as it offered a unique combination of manufacturing technology know-how feeding into high-value component development, complementary to existing in house activities.

FP7 was chosen as it, for one, provided a suitable thematic call for proposals and secondly offered the necessary financial support over relatively long timescales (AMAZE is running for 4.5 years). The EU funding process was also well known to the coordinator and many of the other partners from FP6, which meant that the consortium had substantial experience in preparing Framework Programme applications. FP7 also allowed for a flexible arrangement regarding the coordinator, whilst other funding programmes such as Eurostars would have mandated a specific type of coordinating organisation.

"FP7 allows some development of the work programme as the project progresses through amendments (Annexes). These are very important as they allow resource to be moved between partners ensuring problems are overcome and bottlenecks addressed. However the process of project amendments is rather slow. The funding rate for larger partners was rather low (50%) somewhat limiting their participation." [University of Birmingham]

A3.1.5 Project outputs and results

Whilst the project is still ongoing, a number of peer-reviewed articles have been published already. Several patent applications have been submitted by UK partners. The blue box below summarises other expected project outputs.

Anticipated project results

- Information and data collection on composition/process/structure/property relations, based on extensive testing of AM samples and standard components, which would permit a useful comparison between the different AM techniques;
- A wider portfolio of certified alloys and the demonstration of new metallic alloys that are specifically tailored to AM processes, and give superior properties compared with cast, forged or machined parts;
- Establishment of the "AMAZE Design/Process/Materials Database" – the most comprehensive database of its kind in the world, and a marketable deliverable in its own right;
- Commercial software package capable of modelling and predicting AM processing, component properties, performance and life-time, as well as tolerance to defects;
- Maximising the benefits of AM to metal components by exploiting the design freedom that it offers, and extensively using free-material and topological optimisation modelling in the design phase. This allows component designs that were not achievable previously;
- Development of a complete future supply chain in Europe for certified AM technologies and feedstock materials, which has not been achieved to date;

- World-wide PCT patents, design rights and copyrights protecting the most promising AM innovations, in-situ techniques, post-processing steps, alloy compositions, structures and databases;
- International ISO and ASTM standards for AM materials and processes, co-developed between designers, feedstock suppliers, AM producers and industrial end-users in a multi-sectoral way. This will naturally lead towards industrial certification, which is currently in its infancy;
- Sustainability assessment of new AM processes and components, based on ISO-guided life-cycle analyses, as well as the establishment of new eco-design principles.

A3.1.6 Impacts of the project

The project will run until June 2017. However, participants have already reported significant positive impacts.

The main impact is seen in building pilot scale factories across Europe, which will help to demonstrate how individual components can be produced and how their production could be scaled up to a commercial level. These will be the first pilot scale facilities for the production of large scale components allowing the industrial partners to fully explore the cost benefit of additive manufacturing. The project has investigated in detail the production of 15 different components covering a wide range of materials, scales and manufacturing processes to develop the knowledge required for manufacturing by AM.

Furthermore, AMAZE has managed to open up knowledge in a market which has formerly been wrapped up in proprietary knowledge, through creating a very complementary partnership. The project has enabled to link UK capability in aerospace and significant investment in the Manufacturing Technology Centre to be linked up with partners across Europe who offer complementary capacity in e.g. polymer composites, aerospace-grade titanium and represent potential industrial end users. The project has generated substantial interest and is being watched by researchers, manufacturers and industrial end users in Europe, China and the US.

Within the UK, the project had a substantial impact on the SMEs involved. MTT, one of the SMEs involved, had been bought by Renishaw. Subsequent to the first results of the AMAZE project, their UK-based operations have been significantly scaled up. The extent to which this was due to the FP7 partnership is impossible to ascertain, however interviewees advised that the AMAZE project helped MTT demonstrating their technologies and capabilities. For Granta Design, a company which has grown by around 30% over the last five years, the AMAZE project has been key in maintaining growth. The project has helped substantially in speeding up the development of a process and materials information management solution, one of Granta's main products.

Furthermore, the process and material information collected throughout the project helped both manufacturers and industrial end users to verify their component specifications and internal processes for manufacturing large metal components. Interviewees agreed that the AMAZE project will thus have a direct impact on income

and commercial uptake of additive manufacturing of aerospace components, airframe specific components and components in automotive in the short run.

Interviewees agreed that the project has already resulted in substantial intangible benefits. For the academic partners involved, the main intangible benefit is the sustained knowledge transfer with industrial end users and complementary research groups which have also improved collaboration opportunities for future projects.

A3.1.7 Future

A number of partnerships to move components to industry-scale manufacturing and application are planned. The consortium has a number of ideas regarding further research grants and proposals have been submitted to both UK and EU programmes.

A3.2 ESS-DACE: The European Social Survey — Data for a Changing Europe

The European Social Survey (ESS) is a cross-national biennial survey that has been conducted across Europe for over a decade. The survey measures the attitudes, beliefs and behaviour patterns of diverse populations in more than thirty nations. ESS seeks to provide a uniquely reliable account of the direction and momentum of attitude change in Europe.

A3.2.1 Overview

Total project costs	€6.7 million
EU funding	€5.0 million
Project coordinator	City University London, UK
Number of partners involved	7
Project start date	1 July 2010
Project end date	30 June 2014
Type of project	Integrating Activities (IA)

Source: ICF consultation with City University (project coordinator); CORDIS database

A3.2.2 Project description

A3.2.2.1 Key objectives

Since 2001, the ESS provides data on attitudes, beliefs and behaviour across 30 participating countries in Europe. To date, seven waves of the survey have been undertaken. Key aims of the ESS are:

1. to produce rigorous trend data at a national and European level about people's social, political and moral values in the context of Europe's changing institutions;
2. to achieve and encourage higher standards of rigour in cross-national research in the social sciences, specifically, in relation to questionnaire design and piloting, sampling, data collection, reduction of bias and the reliability of survey questions;
3. to bring social indicators into closer focus as a means of monitoring national progress or quality of life across European nations;
4. to facilitate or offer training to European social researchers in comparative quantitative measurement and analysis; and
5. to improve the visibility and outreach of data on social change among key user groups, notably: academics, policy-makers and the wider public.

A3.2.2.2 Funding

Since its establishment, the ESS project has been funded through various channels, notably:

1. **The European Commission**: funds the design, coordination and overall control of the project. Since its establishment, ESS has received funding from the Fifth, Sixth and Seventh R&D Framework Programmes administered by the Commission.
2. **The European Science Foundation**: who initiated the project and funded all of its early design and development, now meets the costs of liaison and wider academic input into the project.
3. **National funding councils in the participating countries**: cover the costs of fieldwork and coordination at a national level.

A3.2.3 The project consortium

The consortium consists of seven partner institutions: (1) City University (UK); (2) Leibniz Institute for the Social Sciences (Germany); (3) Netherlands Institute for Social Research, SCP (The Netherlands); (4) University Pompeu Fabra, UPF (Spain); (5) Catholic University of Leuven (Belgium); (6) Norwegian Social Science Data Services, NSD (Norway); and (7) University of Ljubljana (Slovenia). Together, the seven organisations constitute the Central Coordinating Team (CCT). Each partner has pre-specified responsibilities.

As Project Coordinator, City University has an 'oversight' role. It provides overall coordination, direction and management of the project.

"We coordinate ESS which entails a range of activities: (1) overseeing the work carried out by each of the other six partner institutions; (2) maintaining/improving the ESS website; (3) reviewing and implementing ESS's sampling strategy; (4) designing the survey questionnaire; (5) organising regular training (e.g. training on quantitative analysis for researchers; policy training); and (6) building and maintaining the data repository."

[City University]

Findings from the consultation with stakeholders do not reveal any particular reasons for selecting the aforementioned partners.

"The network of partners has been stable since the survey was established. There was no particular reason for their selection, except that the NSD had already won a tender exercise to provide archive services for the project. As regards GESIS, we wanted to work with a particular researcher which is why we collaborated with them."

[City University]

A3.2.4 Pathways to FP7 participation

The decision to bid for FP7 funding was based on past experiences of participation to EU R&D Framework Programmes. As such, the consortium first applied for EU funding "in 2005," when the Sixth Framework Programme (FP6) was launched.

"Our first application for EU funding was in 2005 […]. As a result, our participation to FP7 is only a continuation of what we have been doing before."

[City University]

Findings from the interviews indicate that the requirement to include a cost breakdown, as part of the FP7 application, could have acted as a deterrent to FP7 participation among many prospective applicants.

" […]. The different cost categories rendered the application process unnecessarily complex – for instance, different cost rates applied, depending on the nature of the cost – i.e. direct, indirect, subcontracting and other direct costs.

[City University]

It was however remarked that this requirement is no longer in force for Horizon 2020, which was regarded as an improvement on FP7.

With H2020, on the other hand, everything is much clearer – flat rates now apply, such that the Commission reimburses 100% of a project's eligible direct costs and 25% of its indirect costs."

[City University]

A3.2.5 Impacts of the project

The evidence gathered indicates that ESS-DACE has delivered significant benefits, notably in two main areas:

- **Improving survey methodology**: the ESS has set new and improved methodological and coordination standards in cross-national survey research. These have led to higher quality data outcomes for ESS and, through their subsequent adoption by other national and international survey programmes, higher standards of measurement in public-oriented surveys and commercial survey practice.

  "The survey has had a positive impact on other pan-European surveys which have replicated our methodology. Examples are: the Eurofound survey, the European Value Survey (EVS)."

  [City University]

- **Influencing the policy-making process and society**: the ESS's high-quality biennial social survey datasets and associated dissemination activities have facilitated immediate and easy use of ESS data and findings by a wide variety of stakeholders.

  "To a large extent, ESS has achieved its objectives. The goal was to allow people to access important social data for free as well as to help policy-makers access important data to shape policy and tackle societal challenges. To date, 80,000 people have registered to our service. About 3,000 publications cite ESS data and have used it in their work. Moreover, many countries have used the data to shape national policy, for instance: Bulgaria has used ESS data on immigration."

  [City University]

A3.2.6 Future

In late 2013, the ESS became a European Research Infrastructure Consortium (ERIC).[104] ESS ERIC, directed by City University, currently has 16 member countries and two observer countries.

ESS ERIC, along with five other research infrastructures, has acquired €8.5 million under H2020 to coordinate a new project, entitled “Synergies for Europe's Research Infrastructures in the Social Sciences” (SERISS).

SERISS brings together three research infrastructures in the social sciences: (1) the European Social Survey (ESS); (2) the Survey for Health Ageing and Retirement in Europe (SHARE); and (3) the Consortium of European Social Science Data Archives (CESSDA). Also involved in SERISS are non-ESFRI research infrastructures:[105] Generations and Gender Programme (GGP); European Values Survey (EVS) and the WageIndicator Survey. The overarching objective of this project is to support the European Union, the European Commission and the member states to tackle these challenges with a solid base of socio-economic evidence.

[104] A European Research Infrastructure Consortium – ERIC is a full legal entity under European Union law. With a membership of at least one EU member states and two EU member states or associated states, it has legal personality and full legal capacity recognized in all member states.

[105] Research Infrastructures of pan-European interest (ESFRI) correspond to the long term needs of the European research communities and receive specific support through Horizon 2020.

A3.3 FLUTCORE: Development of a universal influenza vaccine based on tandem core technology

FLUTCORE aims to develop a powerful new universal influenza vaccine. If successful, this will mean the end of annual "flu jabs" and will provide long-term protection against this highly variable virus.

A3.3.1 Overview

Total project costs	€ 5.063 million
EU funding	€ 3.873 million
Project coordinator	iQur Ltd., UK
Number of partners involved	7
Project start date	01/09/2013
Project end date	31/03/2017
Type of project	Collaborative Project (CP)

Source: ICF consultation with iQur Ltd. (project coordinator); CORDIS database

A3.3.2 Project description

The influenza virus undergoes fast mutation. This means that current vaccines need to be 'updated' every year. This is currently done each year on the basis of events in the Southern Hemisphere, roughly six months before the onset of winter in Europe. Current vaccines are based on two proteins found on the surface of the virus (hemagglutinin and neuraminidase), which mutate rapidly.

The FLUTCORE project aims to develop a new, universal influenza vaccine. This would provide coverage against all current and future strains of the virus and greatly improve the effectiveness over current vaccines. The approach of the research relies on using parts of the influenza virus which do not mutate as fast as the virus' components which form the basis for the current vaccine. The innovative approach focusses on the way in which the used proteins are presented to the immune system, using so called 'virus-like particles'[106] and a technology called tandem core™.[107] This would potentially remove the need for annual vaccination and provide long-term protection.

The project is expected to finish with a phase I clinical trial. FLUTCORE is part of a cluster of FP7 projects which all work to improve current influenza vaccines.[108]

A3.3.3 The project consortium

London-based IQUR Ltd. are the coordinator of the project and have been developing the tandem core™ technology since 2007, after it licensed at the University of Leeds. The Department of Biochemical Engineering at University

[106] https://en.wikipedia.org/wiki/Virus-like_particle [accessed 9th March 2016].
[107] http://www.iqur.com/index.php/the-science/more-in-depth-science/ [accessed 9th March 2016].
[108] EDUFLUVAC, UNISEC, FLUNIVAC, UNIVAX, FLUTCORE.

College London brings in expertise in micro-scale development technology with application to the bioprocessing of novel vaccines and therapeutic protein.

This UK expertise is combined with 3P Biopharmaceuticals from Spain, Contract Development and Manufacturing Organization (CDMO) specialized in the Development and manufacturing of biopharmaceutical and cell therapy products from early stages (Proof of Concepts) up to clinical and commercial.

Vall d'Hebron University Hospital in Barcelona, Spain, which is widely considered a pioneer in the establishment of vaccination programs, supervising the staff vaccination and immunization of patients in special circumstances as immunosuppression, transplantation, prematurity, international travel and post-exposure situations. The research group at the hospital has wide experience in clinical assays on immunogenicity, efficacy and safety of influenza and other vaccines and is coordinating the phase I clinical trial of the FLUTCORE vaccine.

The Latvian Biomedical Research and Study Centre brought in world-class expertise relating to the use of virus-like particles (VLP). The Latvian team is the home of Prof. Paul Pumpens, an acknowledged world leading researcher in HBV core virus-like particles. Other partners include the Luxembourg Institute of Health and the University of Leeds.

A3.3.4 Pathways to FP7 participation

The research topic required a critical mass of effort and resources which were not available in the UK. It was therefore of pivotal importance to go beyond the support and funding programmes available at the national level to

- Access contract manufacturers to produce materials
- Access expertise in virus led particles and other scientific expertise not available within UK
- Combine data and resources
- Cover different regions of Europe to prepare and conduct a clinical trial
- Combine IQUR tandem platform with knowledge and IP on specific protein targets which can be used to produce vaccines.

The European partnership provided critical input for the project. Interviewees confirmed that the project could not have been conducted under any other funding programme.

In particular the inclusion of a large scale clinical trial is out of scope for most UK funding bodies. FP7 allowed the project to include a vaccine development from inception, through toxicology and clinical testing. One further advantage of FP7 was that proprietary IP could be brought into the project without the need for full disclosure. In life science research programmes in the UK, this is often a major hurdle for the involvement of commercial enterprises in collaborative R&D.

The project was considered too "difficult" for most UK grant awarding bodies, and was best addressed at the European level. Similar activities were being funded by

the US Biomedical Advanced Research and Development Authority, which started a large-scale programme in 2011.[109] Interviewees considered FLUTCORE and its sister projects funded under FP7 to help Europe in staying ahead of global competition, and compared it in scale and potential impact to any of the projects funded by BARDA.
Initial collaborations existed between the coordinator, Leeds University and University College London. The rest of the consortium was put together on the basis of a 'wish list' and individual recruiting efforts by the coordinator. The partner from Luxembourg was identified through a partnership request on the European Commission's CORDIS website.

Support to bid writing was provided by UCL's department for European projects which provides a similar support as the national contact points and commercial bid writing services. This was based on the experience of the coordinator, who advised that reporting and project administration can be 'bureaucratic' and burdensome, and is best left to specialist teams such as UCL's project managers.

A3.3.5 Project outputs and results

The project has developed a working prototype universal influenza vaccine, which will be tested in a phase I clinical trial throughout 2016 and 2017. Interviewees suggested that a phase I clinical trial is unusual in a sense for vaccines, as they will provide a good idea as to whether the vaccine works. However a phase II trial is necessary to ascertain its efficacy and exclude placebo effects.

The manufacturing technology is such that we could apply this to other antigens from different diseases that we are working on. For example, malaria and cytomegalovirus. The learnings from this project are directly applicable.

To date, the project outputs can be divided into three areas, all of which are prerequisites for a successful conclusion of the project

- **Antigen discovery**: The FLUTCORE vaccine uses areas of the influenza proteins which do not mutate significantly. However, within these areas there are multiple potential targets. Two main proteins have been the focus of this work; M2e and HA-stalk. Each antigen is complex and so there are several different possible ways in which these targets may be combined. These studies are currently underway and a lead candidate VLP will be chosen for manufacturing and scale-up within the next three months.
- **Purification**: virus-like particles are very complex molecules, being an assembly of multiple copies of an equally complex protein. This means that their production is far from trivial and the FLUTCORE team has developed a method for protein expression and purification which is compatible with industrial scale manufacture. A combination of filtration and chromatography is used to produce highly pure VLP of good quality. All processes that are currently in use are capable of being carried out at industrial scale.

[109] http://novavax.com/page/16/barda-contract [accessed 9th march 2016].

- **Characterisation of virus-like particles**: virus-like particles are made from complexes of tandem core proteins carrying influenza antigens. The assembly of these molecules is highly complex and does not always result in the formation of properly assembled virus-like particles. The FLUTCORE team have now developed a routine method for virus-like particles production and analysis suitable for manufacturing a vaccine used in the phase I clinical trial.

A3.3.6 Impacts of the project

The project is still ongoing, however it has already resulted in significant impact both on participating organisations and beyond.

Whilst the lead candidate programme for FLUTCORE is obviously influenza, several other tandem core based vaccines are also in development at the coordinating organisation IQUR for targets such as malaria, Burkholderia and hepatitis A & B. The technology is such that a wide variety of targets of different vaccines can be made using this platform technology. Furthermore, the lessons learned during the development of a universal influenza vaccine will also apply to other tandem core based vaccines.

As a result of the FLUTCORE work and that of other EU projects focussing on new influenza vaccines the European Medicines Agency (EMA) received further incentive to change the legislation required for influenza vaccine licensing since this was no longer fit for purpose.[110]

As regards the commercial impact of the project, the project has enabled IQUR to leverage funding to use the tandem core technology™ for other vaccines and safeguard up to five research staff. For instance, collaboration with the Edward Jenner Institute for Vaccine Research to develop a new malaria vaccine was currently being funded through the Innovate UK Biocatalyst programme.

If the phase I clinical trial is successful, the consortium will enter into a partnership with a large pharmaceutical company to carry out late stage clinical trials or sell the generated Intellectual Property.

A phase III trial would need approximately 20,000 individuals in the intention to treat group. Should this be achieved, then this clearly has implications for both value of the product and employment within the EU.

[110] In particular, the use of hemagglutinin inhibition assay as a release criterion for influenza vaccines has been discontinued since none of the new products either require it or would meet these standards.

From a socio-economic standpoint the advantages of a successful universal influenza vaccine are manifold and include

- lower healthcare costs during influenza outbreaks. This is particularly true for the elderly population; and
- increased productivity due to fewer days lost to influenza.

The value of such a vaccine is considerable. Currently, an annual influenza vaccine is approximately €5. However, this is needed annually. Therefore, it would not be unreasonable to position the FLUTCORE vaccine as a premium product and charge around €50 for coverage lasting at least 3-5 years, although life-long would be the ultimate goal. Obviously, such a product would have considerable value with profits, and associated taxes, remaining within the EU, a large share of which could be commercialised in the UK through the Coordinator IQUR Ltd.

A3.3.7 Future

The project is scheduled to run until March 2017. Currently, 3P Pharmaceuticals in Spain are preparing the vaccine for the phase I clinical trial, to be launched at the end of 2016.

As regards plans for following up on the project results, the project coordinator described these as below.

We would seek a partner after Phase I [to conduct subsequent clinical trials]. However, we fully intend to continue collaborating with our EU partners in several other vaccine projects. We have several applications ongoing and will submit further ones

[Project coordinator].

A3.4 FORTISSIMO - Factories of the Future Resources, Technology, Infrastructure and Services for Simulation and Modelling

The Fortissimo project was set up to enable European SMEs engaged in manufacturing and engineering to become more globally competitive by using simulation services running on a High Performance Computing (HPC) cloud infrastructure. Unlike larger companies, SMEs often face significant technological hurdles and financial challenges. Fortissimo therefore acts as a "one-stop-shop," where SMEs can easily access simulation services through an HPC cloud at an affordable price, such as on a pay-per-use basis.

A3.4.1 Overview

Total project costs	€ 21.7 million
EU funding	€ 16.0 million
Project coordinator	University of Edinburgh, United Kingdom
Number of partners involved	122
Project start date	July 1st 2013
Project end date	June 30th 2016
Type of project	Collaborative Project (CP)

Source: ICF consultation with project coordinators and participants; Fortissimo press release (2013), CORDIS database

A3.4.2 Project description

A3.4.2.1 Key objectives

High-performance computing (HPC) is the use of super computers and parallel processing techniques for solving advanced problems and performing research activities through computer modelling, simulation and analysis

The principal objective of Fortissimo is to enable European manufacturing industries to benefit from the efficiency and competitive advantages inherent in the use of simulation. Fortissimo seeks to make advanced simulation more easily accessible, particularly to SMEs, through the realisation of a "one-stop shop," also known as the 'Marketplace,' where hardware, expertise, applications, visualisation and tools will be easily available and affordable on a pay-per-use basis (see box below).

To achieve this objective, Fortissimo provides simulation services, which run on a cloud infrastructure, by making use of HPC systems and appropriate skills and tools available in a distributed, internet-based environment.

The Fortissimo Marketplace

Fortissimo seeks to create a 'Marketplace' that brings together all the actors of the HPC solution value chain [i.e. end-users, domain experts, HPC experts, computer centres, engineers, Independent Software Vendors (ISVs)] so that "the different skills of the different participants in the value chain can be brokered and used by SMEs, especially those in the manufacturing sector, whose business can benefit from advanced simulations."

The Portal

The Fortissimo Marketplace portal provides different types of information to SMEs, such as the type of services which are being brokered and where they can get the necessary expertise and support. SMEs are also able to find 'success stories' which should give them a clear indication of how their business might benefit from the availability of simulation solutions.

Source: primeurmagazine.com (2015); Fortissimo Marketplace

A3.4.2.2 Business model

Fortissimo is coordinated by EPCC at the University of Edinburgh and involves a large network of partners. There are 13 core partners in total, including supercomputing centres (the HPC cloud service providers) and large private companies. Other partnering organisations include: manufacturing companies, application developers, domain experts and IT solution providers.

Fortissimo's business model is driven by end-user requirements which, in turn, form the basis of business-relevant application experiments designed to develop, test and demonstrate both the HPC cloud infrastructure and the "marketplace" (also referred to as "one-stop pay-per-use shop"). Each experiment typically involves: (1) a core partner; (2) a software provider; (3) an expert in engineering; and (4) a small or mid-cap company ("the problem-holder").

20 experiments were launched at the start of Fortissimo, notably in the following fields: the simulation of continuous casting and die casting, environmental control and urban planning, and aerodynamic design and optimisation. Another 38 experiments were selected through two open calls in 2013 and 2014 respectively (25 were selected in the first call; 13 in the second). The UK is involved in five of the experiments.

A3.4.3 The project consortium

The consortium behind the Fortissimo project was formed by bringing together past and new connections. As the project coordinator, the University of Edinburgh reached out to 13 core partners who provide the HPC cloud services. The remaining 109 partners were selected on the basis of the business challenges they posed and skills and expertise they brought to the experiments they were involved in, many through the two open calls.

> *"[…] you always have a core set of people with whom you have worked with before and whom you trust […] so you would seek to work with them at every new opportunity. As project coordinator, your task is to reach out to the best partners and put together a network that looks compelling to the reviewers"*

[University of Edinburgh].

Of the 122 partners, eight are based in the UK, including:

- two universities; and
- six SMEs, each focusing on specialty areas (including environment, engineering, building / modelling, algorithms, and seismic analysis).

As the project coordinator, the University of Edinburgh is responsible for day-to-day management, although some of the task activities have been outsourced to a small consultancy firm.

As regards consortium partners, the vast majority are involved in the application experiments. Additionally, 13 partners are actively engaged in furthering the "long-term activity of the project[111]" which essentially comprises the creation of the 'Marketplace.'

A3.4.4 Pathways to FP7 participation

The decision to launch Fortissimo through the FP7 'Factories of the Future' programme constituted a collective effort among multiple actors with a common interest: that of boosting company/industrial competitiveness through the use of HPC to deliver new or improved products and services.

The decision to fund Fortissimo through FP7 funding was largely influenced by the project coordinator's extensive experience with EU research Framework Programmes. Another key motivating factor was the opportunity to work with leading researchers and industry players at European and/or international level.

"Our participation goes back a long way – we have participated in EU research Framework Programmes since the Fourth Framework Programme (FP4) – and it's just something that's grown over time. At any one time, my organisation – which is the biggest supercomputing centre in the UK– is leading three or four FP projects and is involved as a partner in three or four other projects. […] we are a very international organisation and the programmes have allowed us to interact with many European organisations."

[University of Edinburgh].

To further interest among new partners, who were mainly solicited through open calls, the University of Edinburgh (along with existing core partners) "went to enormous lengths to simplify the application process […]"

A3.4.5 Project outputs and results

The main contribution of the Fortissimo project lies in the provision of cloud-based simulation services to help solve SMEs' business challenges. As outlined in Table A3.1 below, a number of experiments, involving SMEs, have been undertaken to test the use of simulation services running on a High Performance Computing cloud

[111] ICF consultation with the University of Edinburgh

infrastructure. For the majority of the SMEs involved, benefits mainly include: optimised products and services and greater efficiency (especially in the form of time and cost savings).

Table A3.1 Selection of experiments and their results

Area of application	Intended use(s) of cloud-based HPC	Key output(s)	Realised benefit(s)
Original experiments: HPC-cloud-based …			
… simulation of light-aircraft aerodynamics	■ To perform simulations of the flow of air over aircrafts which are sufficiently detailed to model real physical effects accurately	■ Cloud-based HPC simulations that closely model real-world behaviour and give accurate information on how aircrafts would behave in flight	■ Cloud-based HPC simulations are 10 times cheaper to use ■ Cloud-based HPC simulations give more and better data ■ Considerable savings, worth €270,000, of using HPC simulation as opposed to in-house systems
… simulation of continuous/steel casting	■ To develop an effective, automated system for ladle-slag monitoring the field of continuous casting	■ Dedicated HPC-based simulations, followed by case experimental validation, have provided key insights into different ladle-emptying mechanisms ■ Development of an innovative slag monitoring technology based on vibrational analysis	■ Better occupational safety ■ Greater productivity of steel plants ■ Significant reduction in time to market and improved product design
… design of high-pressure vessels	■ To develop a model for the simulation of composite materials and to implement it on an HPC system	■ Development of a computer model to design composite laminates and simulate their properties using an open-source software package, Octave	■ Reduction in the amount of computation time and the number of physical tests required in the design of composite laminates There is evidence that parallel computation on an HPC system can help reduce composite-design time by about 30% and testing time by about 10%
… simulation of flange tightening	■ To simulate and optimise the tightening of flanges	■ Development of a of a computer model for simulating the tightening process and a front-end application to control simulations in order to improve the design of the tightening process	■ Evidence of a 33% time saving per flange as regards the tightening process ■ Evidence of a saving of approximately €180k per tightening to the end-user

Area of application	Intended use(s) of cloud-based HPC	Key output(s)	Realised benefit(s)
… prediction of air quality	■ To demonstrate the use of cloud-based-HPC services to investigate air-quality at the scale of cities (this experiment used case study used the SME's existing software: ADMS-Urban)	■ ADMS-Urban was adapted to run on a cloud-based HPC system ■ The results of the simulations were then made available via a familiar workstation environment	■ If the average percentage of use of an internal server falls below 40%, a pay-on- demand cloud service becomes economically viable compared with the costs to acquire and maintain that server ■ Better pricing options to customers

Source: Fortissimo-project.eu

A3.4.6 Impacts of the project

Given that Fortissimo had not yet reached completion at the time of the present study, it is difficult to assess its full impacts. Interviewees were however confident that Fortissimo will achieve almost all of its objectives, in particular those related to promoting cloud-based HPC solutions among SMEs as a means to solving their business challenges.

[…] I think I can say that Fortissimo will certainly achieve its objective of running the 58 experiments and making the SMEs happy, at least the majority of them. I think the most difficult part has been creating the marketplace [...]. So I think we would have easily achieved 90% of our objectives by the end.

[University of Edinburgh].

The commercial impacts of the Fortissimo project are uncertain, given that the 'Marketplace' has not been fully developed yet. However, available quantitative evidence indicates that investment in HPC infrastructure can have significant positive impacts. As such, each dollar invested in HPC is estimated to return, on average, $356 in revenue and $38 in profits or cost savings[112]

A3.4.7 Future

The consortium has received an additional €11 million (of which €10 million in EU funding) to launch the second phase of Fortissimo – Fortissimo 2.

Fortissimo 2 kicked off in November 2015. The project focuses on the adoption of next-generation ICT advances in the manufacturing domain.

At the core of Fortissimo 2 are three tranches of 'application experiments' (approximately 35 in total). An initial set was included in the proposal and two further sets will be obtained through open calls for proposals. These experiments will be driven by the requirements of first-time users (predominately SMEs) and will bring together actors from across the value chain, from cycle providers to domain experts via the 'Fortissimo Marketplace.' This will enable the development of innovative solutions to manufacturing challenges, leading to new and improved design processes, products and services. In addition to traditional HPC modelling and simulation, Fortissimo 2 will also focus on the application of High Performance Data Analytics to the business challenges faced by SMEs.

[112] Fortissimo, 2014. *Fortissimo – Enabling Manufacturing SMEs to Benefit from HPC*

A3.5 SILVER – Supporting Independent Living for the Elderly through Robotics

SILVER is a development program into new robotic-based technologies that could help the elderly to continue to live at home even if they have physical or cognitive disabilities. SILVER is the first pan-European initiative that searches for new, innovative ways to acquire public sector health services by using a Pre-Commercial Procurement (PCP) process designed for optimally matching R&D with procurers' needs.

A3.5.1 Overview

Total project costs	€ 4.2 million
EU funding	€ 2.6 million
Project coordinator	Innovate UK (formerly Technology Strategy Board), United Kingdom
Number of partners involved	13 (of which two are UK-based: Innovate UK and City of Stockport)
Project start date	January 1st 2012
Project end date	August 31st 2016
Type of project	Combined Collaborative Project and Coordination and Support Action (CPCSA)

Source: ICF consultation with Innovate UK (project coordinator); CORDIS database

A3.5.2 Project description

A3.5.2.1 Key objectives

PCP is the procurement of research and development of new innovative solutions before they are commercially available.

The SILVER project was established in view of developing new robotic technologies to assist elderly people in their everyday lives or support their independent living at home even if they have physical or cognitive disabilities. The new technologies and solutions are sought by using a Pre-Commercial Procurement (PCP) process.

SILVER has two concrete primary objectives:

- To establish and execute an agreed PCP process to run a cross-border 'PCP call for tender.'
- To use the PCP process in identifying new technologies and services to support the independent living of the elderly.

A3.5.2.2 Business model

SILVER is the first European-based PCP initiative that involves multiple countries[113]. The main actors in the process are:

- **'Public procurers'** in the participating countries – i.e. Denmark, Finland, the Netherlands, Sweden and the United Kingdom – who run / manage the PCP call for tender in order to identify precise technologies needed while encouraging innovation. In the UK, the designated public procurer is City of Stockport.
- **'Developers'** – including small-and-medium –sized research enterprises and larger research centres – who engage in competitive tendering and, if selected, can expect "to receive 100% of the funding required […] to undertake the R&D work[114]."
- **'End-users'** who test first-end products in real-world environments.

PCP was chosen over traditional procurement routes in order "to get procurement in the public sector to be more open to innovation." Additionally, the PCP's 'phased' approach allows "procurers, the public sector and developers to control or balance the risks that may be involved in R&D[115]".

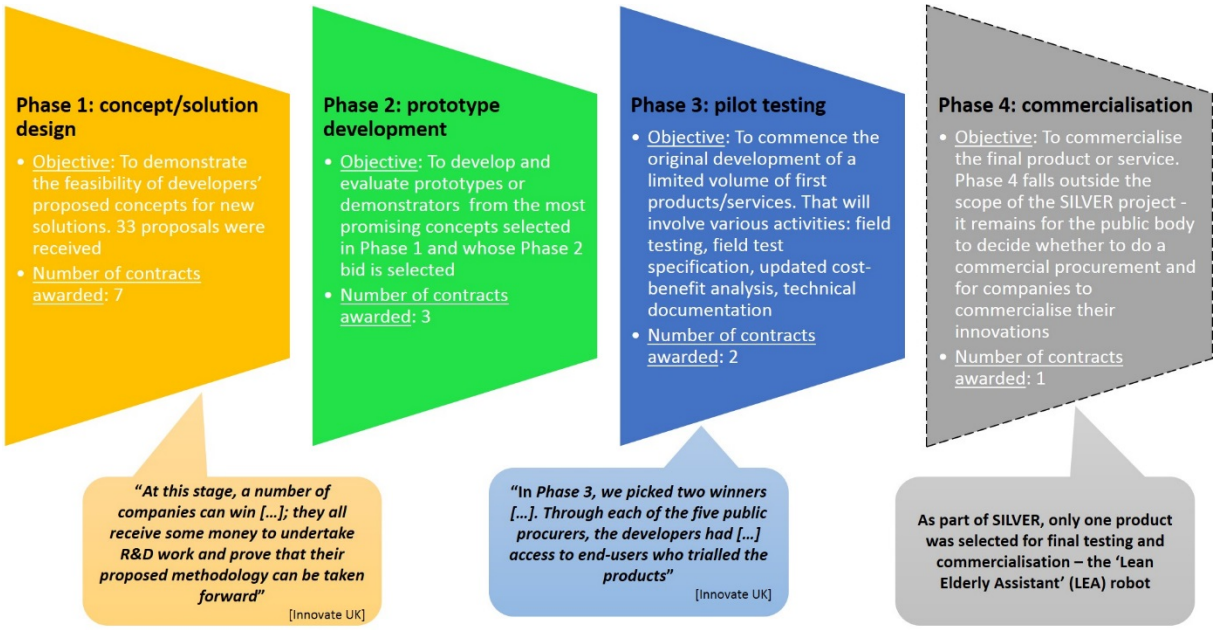
[113] ICF consultation with Innovate UK
[114] ICF consultation with Innovate UK
[115] ICF consultation with Innovate UK

A3.5.2.3 Phases of the PCP process

Figure A3.1 SILVER is based on a three-phased PCP approach. It is currently in the third stage of the process. Key stages of the PCP process

Figure A3.2 below illustrates the different PCP stages.

Figure A3.2 Key stages of the PCP process



Source: ICF (adapted from ICF stakeholder consultation; the SILVER website)

A3.5.3 The project consortium

A3.5.3.1 Key partners

The Consortium comprises a total of 13 key partners, including innovation agencies, local / national contracting authorities, academic institutions and private research companies. In the UK, key partners include: Innovate UK, which coordinates the project, and City of Stockport – the national contracting authority.

Specific work packages assigned to UK partners

SILVER comprises six work packages, each one having a responsible leader. Work Packages 1, 5 and 6 provide a support function to help run the project while the remaining Work Packages (2, 3 and 4) interact to generate the PCP call.

As the project coordinator, Innovate UK leads Work PackagesWP1 project management and WP4 administration of the competition and monitoring pilots, with support from the City of Stockport. Along with public procurers in the participating countries, the City of Stockport also supports WP6 dissemination and exploitation of project results.

A3.5.3.2 Pathways to FP7 participation

The decision of launching SILVER through the FP7 'Combined Collaborative Project and Coordination and Support Action' programme constituted a collective effort among multiple actors with a common interest: that of identifying, trialling and adopting innovative healthcare technologies to assist elderly people in their everyday lives through a Pre-Commercial Procurement (PCP) process; the latter designed "to stimulate innovation by allowing public authorities to identify promising technologies early and steer the final development of these technologies towards their own specific requirements[116]."

The decision to bid for FP7 funding was largely driven by the project coordinator, owing to their experience in the preparation of PCP calls at a local level.

"[…] Given that we had already implemented PCP in the UK under the Small Business Research Initiative (SBRI), we felt we had valuable experience and could use it to help others learn about the PCP process and how to run it in practice."

[Innovate UK]

A3.5.3.3 Project outputs and results

The main contribution of the SILVER project is the LEA (Lean Elderly Assistant) robot, developed to enable the elderly to live independently in their own home. LEA is the sole product to have met the minimum threshold in Phase 3 of the PCP call and therefore selected for real-life testing and commercialisation.

LEA's primary function is to assist elderly people in their daily routines and housekeeping, for instance, by[117]: (1) offering support when walking, sitting down

[116] CORDIS, 2016. *Helping public authorities drive healthcare R&D forward*
[117] CORDIS, 2016. *Helping public authorities drive healthcare R&D forward*

and/or standing up; (2) picking up heavy objects; (3) remembering and recognising objects, faces and places, through its cognitive software; and (4) monitoring daily routines like eating, sleeping and exercising, through its recognition of actions and protocols.

SILVER healthcare and robotics experts have tested the product and provided the contractor, Robot Care Systems[118], with detailed feedback on how to improve it further. Final tests are due to take place during the spring and summer of 2016 in all of the SILVER municipalities (i.e. Denmark, Finland, the Netherlands, Sweden and the United Kingdom).

A3.5.4 Impacts of the project

Given that SILVER had not reached completion at the time of the present study and the final product has not been commercialised on a wider scale yet, it is difficult to assess its full impacts.

"It is too early to say if SILVER has been successful. The real success will be that the contractor commercialises the product fully and sells it in the market and, hopefully, the procurers buy it and it helps elderly people at home. Initial signs are looking good though."

[Innovate UK]

In spite of prevailing uncertainties, SILVER is expected to deliver important benefits to the homecare sector. The promotion of innovative solutions in the sector is expected to foster the creation of new markets for assisted-living tools. The advanced solutions can in turn achieve significant cost savings, notably through increased resource efficiency[119]. As such, by 2020, it is expected that new solutions implemented in elderly care will allow for 10% more care recipients with the same number of care providers / personnel.

"The project is due to finish at the end of August. It looks like we have a good product and something procurers would [...] buy. Something to bear in mind, though, is that the work undertaken by the developers through SILVER is mainly R&D work. So, even when the contract finishes in August, the applicant will continue to develop the product and commercialise it but probably won't start selling it until after 2017. The goal of the SILVER competition was to launch a new product by 2020. So, it appears we are in line with our initial target."

[Innovate UK]

In addition, SILVER is pioneering a new and more cost-effective procurement technique – the Pre-Commercial Procurement approach – which can be easily transferred. As such, by the completion of the project, a fully documented PCP process will be made available. Together with the process, supporting artefacts will

[118] http://www.robotcaresystems.com/

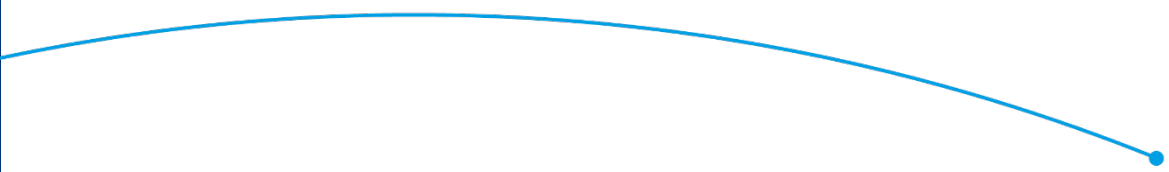
[119] CORDIS, 2016. *Helping public authorities drive healthcare R&D forward*

be provided, including application forms and document templates, which can be used by other procurers interested in running a PCP call in the future.

A3.5.5 Future

The R&D work stimulated through SILVER is expected to continue, principally by the developers themselves. If the LEA robot is commercialised successfully, more developers are likely to enter the market and further the work in healthcare robotics.

The success of SILVER may also influence EU/national policy, especially as regards the use of PCP as a means of procuring R&D services.



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