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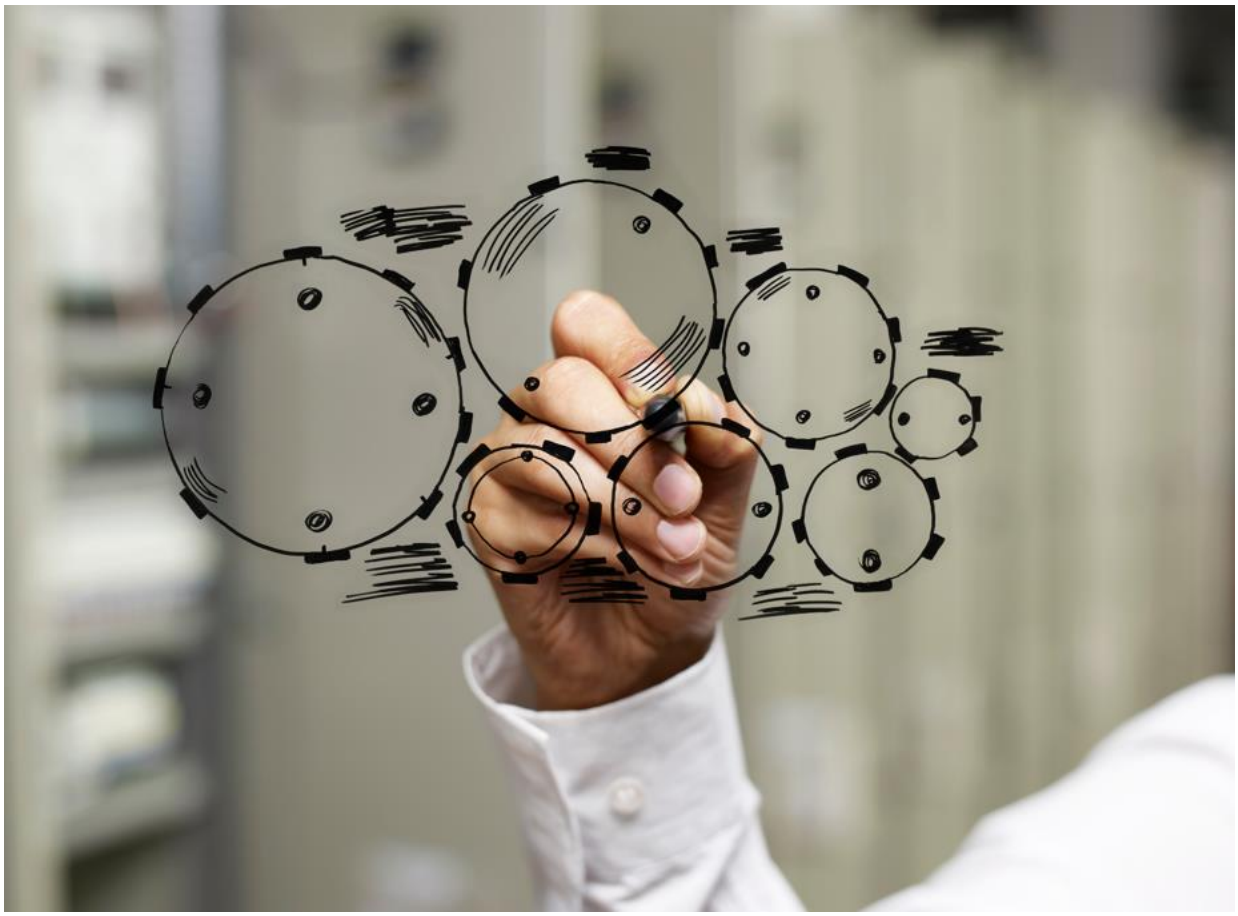
Ex-post evaluation of Ireland's Participation in the 7th EU Framework Programme

Final Report



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Ex-post evaluation of Ireland's Participation in the 7th EU Framework Programme

Final Report

technopolis |group| June, 2016

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Technopolis has also conducted the "Interim evaluation of Ireland's participation in Horizon 2020", which is published as a separate report.

The study addresses twenty-one evaluation questions across four areas:

- Participation and Performance (including participation in strategic initiatives and participation in consortia)
- Participant experience and outputs (including interaction with NCPs)
- Synergies with National RDI System
- Economic, scientific and societal impacts

Table 1 - Overview of Ireland's participation

High points		Low points	
150%	Ireland secured more than 150% of its original target for FP7 (and three times the FP6 drawdown)	**48%**	Ireland only managed to secure 48% of its target for the ERC
	Ireland ranks among the Top 10 countries in terms of SME participation (drawdown), accounting for the number of SMEs that operate in the country)		Project coordination was highly dominated by HEIs, in contrast with pattern of participation from other countries where there is more active participation from companies
	The ICT programme and Marie Curie Actions are the two main successes in FP7 (with a drawdown of €113M and €126M respectively). Ireland secured almost 10% of total Commission funding for Marie Curie co-fund actions.		

Participation and performance

Participation and targets

Ireland performed well against its targets for FP7, with a drawdown of around €625M, which was more than three times the drawdown realised in FP6 and more than 150% of its original target for FP7. Ireland also recorded a strong performance in comparison with other member states: its drawdown per researcher was the third highest of all EU member states, behind the Netherlands and Belgium.

Moreover, Ireland performed well across large parts of FP7, meeting or exceeding its targets in 13 out of the 20 FP7 specific programmes and thematic areas.

Within the Cooperation Specific Programme, it performed particularly well in ICT, Nanotechnology and Security. However, it fell short of its targets in Energy, Space and Transport. It also performed well in the Capacities (research for the benefit of SMEs) and People Specific Programmes. Ireland performed less well than expected in the 'Ideas' pillar (ERC) where its successful applications were only around half of the target.

Partnerships and collaborations

Ireland performed strongly in terms of its leadership of FP7 actions, with Ireland hosting the project coordinator in around 30% of all of its participations. Ireland matches the project coordination activity and income levels achieved among our four selected comparator countries, and is substantially ahead of the average figures for all EU member states (EU 15 and EU28).

The strong performance is less marked for the Cooperation Specific Programme, where Ireland provided the project coordinator for around 16% of all its Cooperation Programme projects. This is broadly in line with the selection of comparator countries, and around five percentage points ahead of the EU average. Ireland's universities have dominated the project coordination statistics.

Participation in strategic initiatives

Ireland performed strongly within the FP7 **Marie Curie COFUND** actions, securing eight COFUND programmes in total and €21.5M in EU contributions, which is approaching 10% of the total Commission funding for the scheme overall. This was a new initiative in FP7, and the level of Ireland's engagement is a good indication of the country's ability to identify and respond to new opportunities.

Irish participation in the **Joint Technology Initiatives** (JTI) was limited, with a level of engagement that was considerably below what has been achieved for FP7 overall (0.6% versus 1.4% of EC Contribution secured by Irish organisations over the total funding available). Ireland was most actively engaged within the ENIAC nanoelectronics JTI. Key stakeholders argued that these initiatives continue to be of strategic importance, and that Ireland needs to redouble its efforts in order to purse engagement at a more appropriate scale within Horizon 2020.

Ireland's government departments and research funders were partners in eight of the 31 **ERA-NET** projects funded through FP7, covering a range of different themes, from the economic viability of the rural economy (RURAGRI and the AFDA) to environmental health (ERA-ENVHEALTH and the EPA) to migration in Europe (NORFACE Plus and Irish Research Council for the Humanities and Social Sciences). In most cases, the focus of these FP7 ERA-NET projects is closely linked with the Irish organisation's policy and research priorities, which is a very positive outcome.

The ERA-NET instrument has also provided a platform for Ireland's science funders, to pool and leverage, with EU funds, the funds available nationally for basic science (e.g. SFI and nanoscience through NanoSci-EPlus. Taken together, those eight ERA-NETs have produced around 35 participations, with around 31% in the area of 'Food, Agriculture and Biotechnology', where Teagasc has had an active participation.

Participant experience

Motivations and satisfaction

For universities and research institutes, access to funding is the most widely reported driver for participation in FP7, which is in line with results from past evaluations. Other widely reported motivations are improved access to international scientific networks and enhanced reputation (in the case of HEIs and research organisations).

Businesses cite a cross-section of motivations, with a similarly broad endorsement of four or five distinct ambitions, ranging from support for developing a specific innovation through to progressing a strategic goal or developing in-house capability.

Engagement with national contact points

Ireland's FP7 applicants made good use of the country's network of National Contact Points (NCPs), with around two thirds of all applicants that responded to our survey having made use of the support on offer. Even allowing for some degree of positive bias, this suggests that a majority of FP7 applicants were in receipt of support.

Our feedback shows that the applicant base made most extensive use of the NCP network's signposting functions and proposal writing advice. Moreover, a significant minority made use of various more involved activities such as assistance in searching for partners.

The community perceives great advantages of engaging with NCPs, mostly related to understanding critical success factors for applications and raising their awareness of the strategic relevance of the programme. Given the positive differential performance of assisted applications, as compared with non-assisted bids, there would be benefit in exploring ways in which to increase the proportion of all applicants that have had some level of guidance and advice from the NCP network.

Main outcomes and benefits

Main benefits

FP7 has delivered a series of benefits to participant organisations that range from enhanced access to international scientific networks; to improvements in technological capacity and investments; to improvements in an organisation's ability to attract researchers; and tangible results in terms of commercialisation of research outcomes and improved national and international competitiveness.

Findings emerging from our ICT case study (but that are likely to be relevant across thematic areas) show that:

- Research organisations and SMEs that strongly depend on competitive funding for their sustainability indicate reputation building as a major benefit.
- Several of the ICT research centres that have knowledge transfer to local industry as part of their mission consider success in the FP critical to reaching their objectives.
- Participation in the FP provides research organisations and large enterprises with knowledge and expertise that allows them to broaden fields of activity and/or to develop new technologies, thus creating business opportunities.
- Research actors and SMEs in the field of ICT services that strive for a presence on the international market emphasise the opportunity the FP offers in developing an international brand, to be recognised for doing 'state-of-the-art' research and to set up relationships with potential customers outside Ireland.
- For SMEs a major benefit from FP participation is the development of relationships with customers and the development of client knowledge.

Research commercialisation

Participation in FP7 has produced tangible research commercialisation outputs. We estimate that circa 228 patents have been generated from FP7 that are specific to Ireland. This is equivalent to 0.2 patents and 0.1 license agreements per project.

According to calculations made by Knowledge Transfer Ireland a total of 20 licenses and a total of 13 spin-outs had a EU-funding component (not necessary all related to FP7). The estimations looks at the EU funded spinouts and licenses from 2008-2015 (1 year post start of FP7 and 2 years post end of FP7, to allow for a time lag at either end).

Career mobility

Ireland was fully engaged with Marie Curie, and benefited from substantial numbers of incoming early career researchers, bringing to Ireland their particular scientific experience and international networks. Ireland has also seen quite large numbers of its own researchers taking advantage of the scheme, as a means by which to progress their own careers and broaden their horizons internationally. Our survey confirmed the substantial benefits gained by FP7 MC Fellows in terms of mobility, career progression, promotion and reinsertion. Moreover, the greatest benefits derived from the fellows working with leading overseas research groups and the extension of their international scientific networks.

Synergies with National RDI System

Effects of domestic and international environment

Pressures within the domestic environment did have an effect on Ireland's applications to FP7, with the economic crisis placing a downward pressure on many national budgets, thereby encouraging organisations to make applications where they might otherwise have looked for national support. This applies especially to the public sector.

Links between national R&D supports and FP7

We found a number of positive links between national R&D and FP7, beginning with a view from HEIs and public research organisations in particular that national programmes provide a valuable underpinning for subsequent success within the European RTD Framework Programme. There are also examples of research fields that sit outside national research priorities where FP7 has provided access to funding that would not have been available locally.

Links between the funding opportunities in FP7 and the Irish R&D

We identify an important pool of EI and IDA client companies that have not taken part in FP7. Those companies (circa 1,600 in total) represent an untapped potential in terms of prospective applicants and participants in future FPs.

Survey responses provide a strong suggestion of the complementarity and additionality of Framework Programmes with the funding available at national level for Irish-based companies. FP7 provided opportunities for Irish-based companies to secure much larger sums than were available nationally and to secure funding covering many more areas of industrial applied research than were available nationally, which indicates that FP7 provided good complementarity to national resources.

Added value of FP7

The survey analyse provides further evidence of the added value of FP7 funding as the majority of respondents state that they would have to stop their projects had they not received FP7 funding. This result is probably explained by the fact that, in several cases, the research project addressed an issue or

area that lay outside national research priorities or that the project addressed a problem that was European in nature.

Findings emerging from our ICT case study (but that are likely to be relevant across different industries) show that:

- Research collaboration with leaders in Europe that have a level of expertise that is not available nationally is a key benefit also for the large enterprises;
- These organisations also point out that the FP provides a platform to do research that otherwise could not have been done: only by doing R&D at a European level one can explore, develop and demonstrate solutions that have a potential application beyond the national level. A topic of importance in this context is also the development of international standards; to be part of the development of standards is a huge advantage to obtain future uptake of research results.

Impact

It has been difficult to fully capture the impacts of FP7, due to issues such as lack of data and the relatively short timeframe since the programme conclusion. In this context, the evidence primarily relies on estimates and indicators of impacts.

Economic

The majority of survey participants from companies state that participation in FP7 has led to positive economic outcomes in terms of increased employment (73%), increased turnover (6%) and increased productivity (64%).

Based on ratios calculated in the context of prior evaluations of FP7 we estimate a EC contribution of €625M would lead to (i) a total investment of €1.1bn (i.e. a leverage of €0.46bn), (ii) a total contribution to Ireland's GDP of €6.5bn over 21 years (2007-2028), i.e. equivalent to an annual GDP growth of ~€300M, (iii) a total of ~42,000 jobs created in Ireland over 21 years (2007-2028), i.e. equivalent to ~2,000 jobs created per year.

Scientific

Many research related impacts are already documented in the analysis of main benefits. Further analysis shows that FP7 not only provide sizeable additional resources in Ireland dedicated to R&D activities, it also served as an opportunity for Irish researchers to improve their publication records and improve their visibility and profile in so far those publications are done in collaboration with high profile institutions / researchers and were likely to have high citations levels.

The Framework Programme was also valuable as a means to wider networks, and as a way to have scientific and research results disseminated to a broader audience than would otherwise be possible.

Societal

Irish organisations have taken part in projects that could have tangible societal impacts. Understanding those impacts would require the conducting of individual case studies at project level (which was out of the scope of this study). However, an overview of a selection of projects and their final reports shows that FP7 has funded research that could help Ireland to address societal challenges (including those related to public health and climate change) and also to improve public engagement in science and science education.

1 Introduction

1.1 This study

This report presents the "Ex-post evaluation of Ireland's participation in the Seventh Framework Programme for Research and Technological development (FP7)", conducted by Technopolis in the period December 2015-March 2016, and commissioned by the Department of Jobs, Enterprise and Innovation in Ireland (DJEI).

Technopolis has also conducted the "Mid-term evaluation of Ireland's participation in Horizon 2020" which is presented as a separate report.

1.2 This report

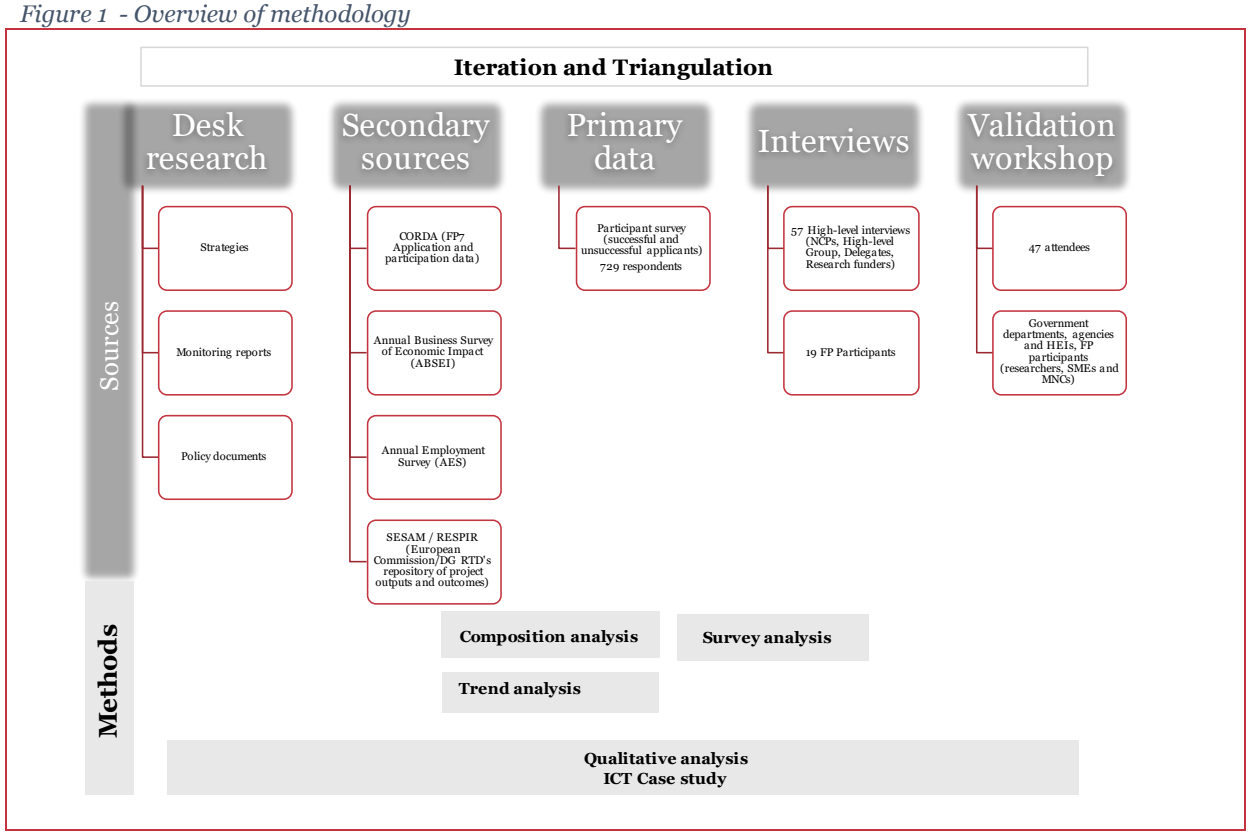
The study addresses twenty-one evaluation questions across four areas (as stated in the Invitation to Tender), which has guided the structure for this report:

- Participation and Performance (including participation in strategic initiatives and participation in consortia) (Sections 2, 3 and 4)
- Participant experience and outputs (including interaction with NCPs) (Sections 5 and 6)
- Synergies with National RDI System (Section 7)
- Impacts (Section 8)

Additionally, the report includes a case study on the ICT sector (Section 9) that focuses on the issues of synergies with National RDI System (as requested in the ITT) but was placed in a different section as it also presents findings concerning participations and benefits. Finally, Section 10 includes some concluding remarks.

The methodology followed for this study (and for the Mid-term evaluation of Horizon 2020) is shown in Appendix A and is summarised in the figure below. The remaining of this section provides an overview of FP7 and its strategic importance to Ireland.

Figure 1 - Overview of methodology



1.3 7th EU Framework Programme (FP7)

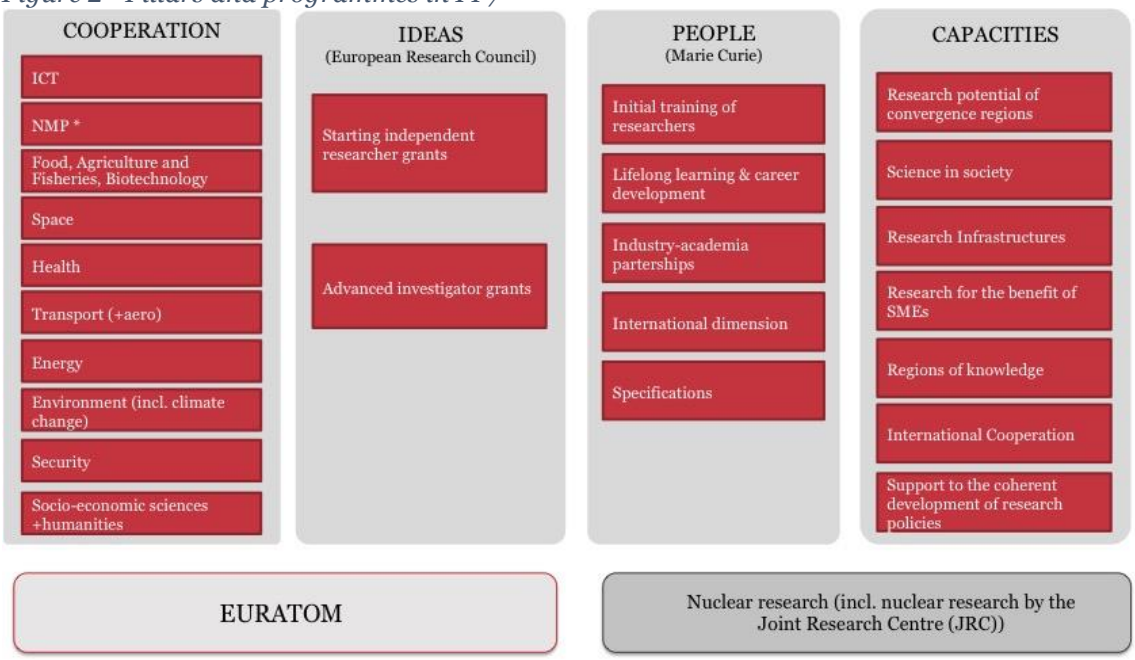
The EU's multi-annual RTD Framework Programmes represent the main instrument for funding and supporting research and investment at a European level. They provide funding support to promote the achievement of the following objectives (now at the core of Horizon 2020):

- Strengthening Europe's position in global science, through support for top level research
- Reinforcing industrial leadership in innovation, including major investment in key technologies, greater access to capital and support for SMEs
- Helping to address major societal challenges such as climate change, developing sustainable transport and mobility, making renewable energy more affordable, ensuring food safety and security, or coping with the challenge of an ageing population

FP7 (2007-2013) had a budget of €50.5 billion, which represented a significant increase (41% at 2004 prices, 63% at 2007 prices) compared with FP6. Up to July 2013, FP7 was organised around four pillars as shown in Figure 2. Additionally, in 2007 the EC introduced the Joint Technology Initiatives (JTIs). This marked the first time that public-private partnerships, involving industry, the research community and public authorities, were proposed at European level to pursue ambitious common research objectives. Six JTIs were funded under FP7 in the areas of innovative medicines (IMI), aeronautics (Clean Sky), embedded computing systems (ARTEMIS), nanoelectronics (ENIAC), hydrogen fuel cells (FCH) and space (GMES).[1] FP7 was also 'adopted' by the Europe 2020 strategy (2010) as a key instrument in the pursuit of a smart, sustainable and inclusive economy, and this growth agenda has been rather influential in shaping the evolution from FP7 to Horizon 2020.

[1] GMES was not implemented as a JTI in a strict sense, but rather through a delegated agreement with ESA, which co-financed 60% of the GMES space component, with the Commission delegating c. €750M of FP7 funds to ESA for the design, development and implementation of the Sentinels earth observation satellites.

Figure 2 - Pillars and programmes in FP7



FP7 – as with prior framework programmes – had a very high strategic importance for Ireland and there was the expectation that the programme would complement "national initiatives and programmes designed to strengthen research capacity in industry, in higher education institutions and in other parts of the public sector"[2].

The programme was expected to provide enterprise, academic and other public sector researchers with:

- "Access to research networks and opportunities to collaborate with leading research teams throughout Europe – this opens up collaborative opportunities well beyond the scale and scope of anything that can be achieved in a purely national context;
- Access to a pool of talented researchers throughout Europe who can come to work in Irish research institutions and Irish companies and contribute to the research goals of these organisations;
- Access to specialist research infrastructures throughout Europe including infrastructures that could never be provided in a purely national context;
- Opportunities for Irish researchers to take up positions in other countries with benefits for them personally (in terms of career advancement) and for Ireland in the longer-term (in terms of skills they bring back on their return)". [3]

The programme was also seen as an opportunity to showcase Ireland's scientific capabilities and to foster the commercialisation of research outputs.

In addition to the benefits outlined above there was also the understanding that the programme could act as an important source of funding for research in Ireland, beyond the exchequer. "The funding secured by Irish researchers and Irish industry is also an important and tangible indicator of their success in participating in international research networks and their ability to leverage the significant investment, taking place nationally in research and development in both the public and the private sectors" [4].

[2] Recommendations for a Support Structure, Forfás (2009)

[3] Idem

[4] Idem

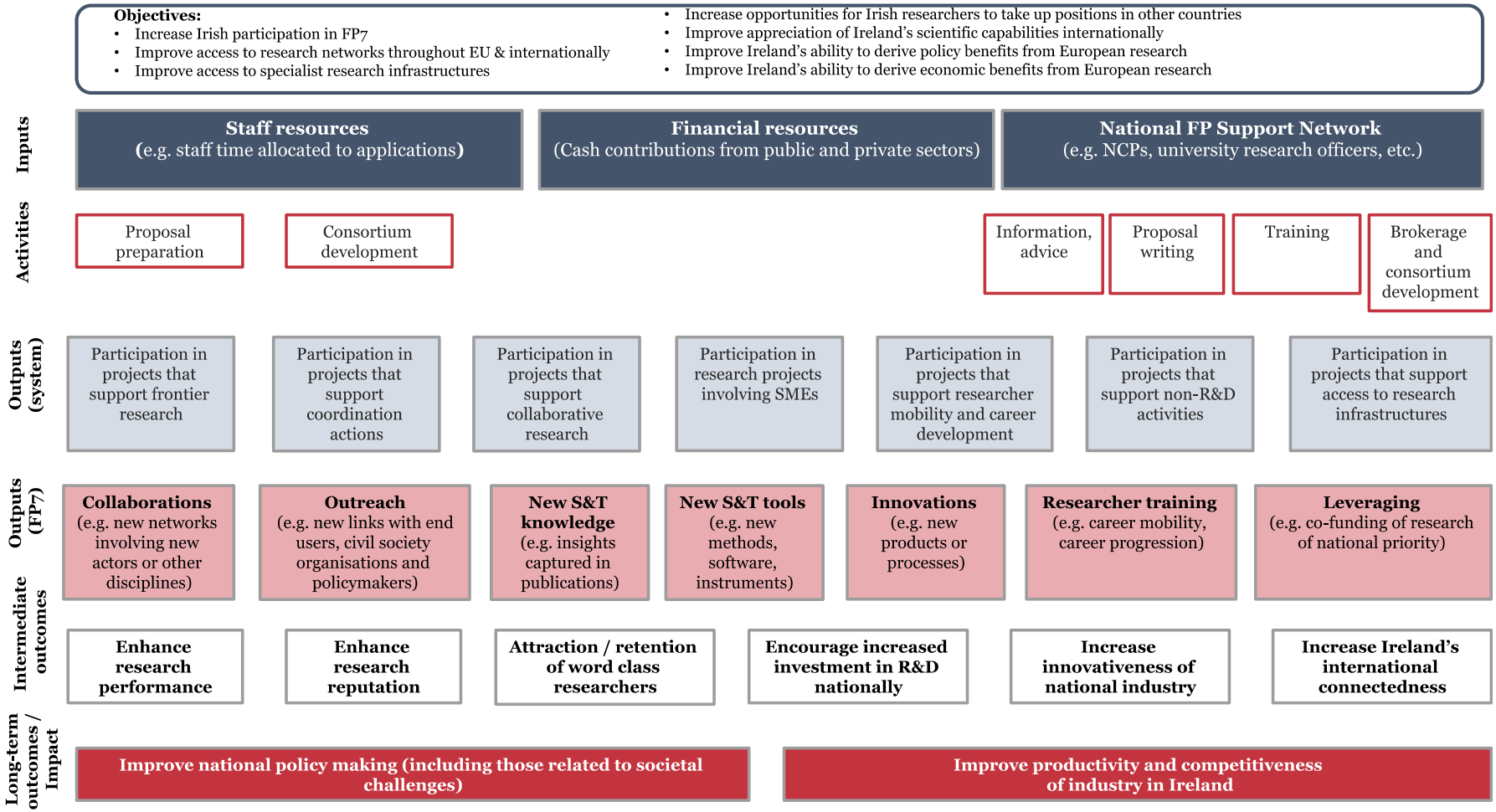
Figure 3 below shows an intervention Logic Model (LM) for Ireland's participation in FP7. The LM has been prepared by the study team based on documentation provided by DJEI, including the Strategy for Science, Technology and Innovation (2006-2013) and Forfás' Recommendations for a Support Structure report (2009).

The LM intends to capture the links between Ireland's objectives for participation in FP7 with the inputs and activities set up by the national system to engage with the programme. The outputs of the LM are divided between (i) the outputs emerging from the national support system and applicants own efforts, mainly participation in the different types of FP7 specific programmes, and (ii) the outputs emerging from participation in those FP7 programmes and actions.

The study team has collected information for many of the indicators shown in the LM (e.g. participation in research involving SMEs), but by no means all (e.g. total effort devoted to preparation of proposals by applicants). However, given that this LM is new and was only created as part of our desk research, the main guidance for the evaluation has been the 21 questions set out in the study specification (and described in each of the chapters). There is a reasonable degree of overlap, but the study has not had the time or resources to detail all aspects and in particular we have been able to make only limited progress with programme outcomes and impacts.

Notwithstanding this limitation, the construction of the LM for FP7 does lead us to conclude that it would be helpful for Ireland to prepare a LM for Horizon 2020, ideally an overarching logic model that connects national investments with the drawdown of EU contributions and improvements in research, innovation and policy. The overarching LM could be supported by a series of subsidiary LMs, one for each of the main pillars and possibly also a LM for the related, strategic initiatives. These more specific LMs would differ from each other not only in terms of expected impacts but also in terms of the various inputs and activities put in place to achieve the targets set up across the different programmes and instruments, and would be part of a series of nested strategies that build up in to the overarching LM.

Figure 3 – Intervention Logic Model of Irish participation in FP7



2 Participation and performance

Evaluation questions

- How did Ireland perform or underperform under FP7, including relative to the EU average and our main competitors?
- What was the profile and results of Irish participation in FP7 relative to our ambition for participation and priorities for national Science, Technology and Innovation policy?
- What was the scale of participation from industry, including by SMEs and multinationals?
- What were the reasons for success or failure in the application process?

2.1 Introduction

In this section, we present:

- An overview of proposals, level of activity and quality and success rate for Irish organisations and in comparison with comparator countries
- An analysis of project participation
- A profile of participant organisations

The terminology used to describe participation in FP7 is described below in Box 1.

Box 1: Terminology

- Proposals – project proposals submitted to FP7
- Applicants – organisations that take part in proposals
- Applications – applicants involved in research proposals, i.e. refer to participations in proposals
- Projects – approved/funded projects research proposals
- Participants – organisations that take part in approved/funded projects
- Participations – participants involved in approved/funded projects
- EC contribution – corresponds to the financial resources allocated to (funded) projects. Throughout the text we use the 'EC Contribution' term to refer to drawdown from FP7. This term **does not** refer to 'juste retour'.
- Quality threshold - corresponds to the minimum score that proposals need to pass in order to become eligible for approval. Not all proposals that pass the quality threshold are funded

2.2 Success rate and quality of applications

2.2.1 Overview

Ireland's success rate for FP7 overall matched the EU average and was substantially better than the EU average for the two largest specific programmes: Cooperation and Capacities. This strong performance was evident for both the number of successful applications and the value of those proposals. The proportion of applications of good quality (i.e. that passed the quality threshold set by the Commission) was also higher than the average for all member states, in both of these programmes, which confirms

Ireland had strength in depth in the areas relating to these elements of FP7. Ireland performed less well in the Ideas and People specific programmes, recording success rates, in terms of numbers and value of applications, some way behind the EU average.

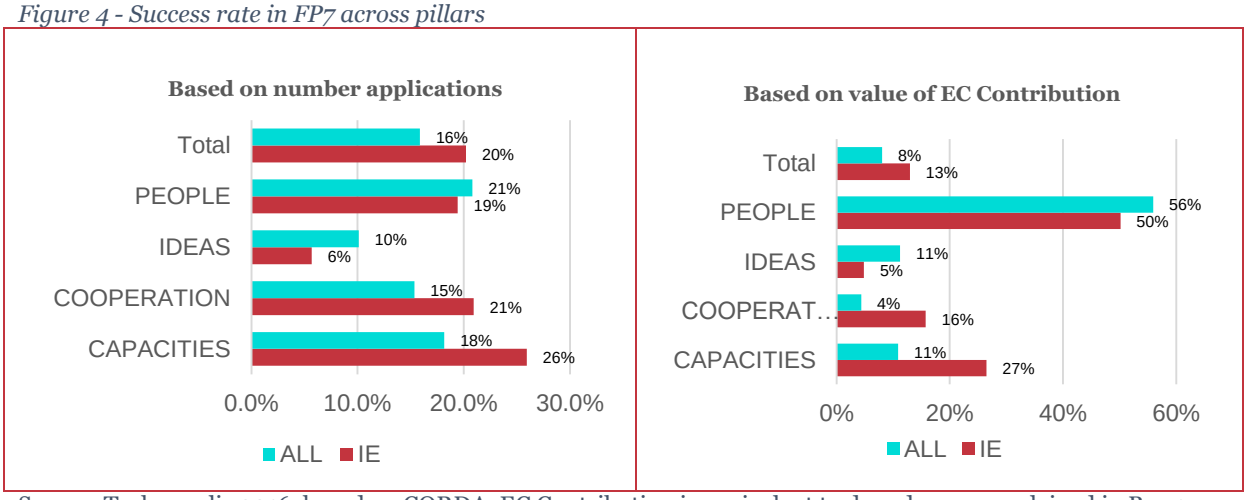
Irish organisations submitted a total of 7,440 proposals to FP7. The majority of proposals were submitted to the Cooperation Specific Programme (57%), followed by People (21%), Capacities (12%) and Ideas (9%).

The success rate of all applications involving Irish participation was 20.2% in FP7, which is in line with the average for all EU Member States (20.1%).

Figure 4 shows the degree of success of proposals that include Irish participation in terms of number of proposals applications (left) and value of EC contribution requested (right), across the four pillars of FP7. The different panels in the figure show that Ireland has had a higher success rate in the Capacities (7% of all Irish proposals) and the Cooperation programme (31% of all Irish proposals) in comparison to their success rate in other pillars.

Irish applicant organisations also rank higher as compared to other applicants, particularly in the case of 'Capacities' (where 344 out of 1,327 applications were approved and received funding, equivalent to a success rate of 26% as shown in the figure below). The success rate among Irish participants was close to the general average for the 'People' pillar (i.e. Marie Curie Actions, MCA), but was considerably lower in the case of the 'Ideas' pillar (i.e. ERC). However, the latter only represents 9% of all Irish proposals.

Figure 4 - Success rate in FP7 across pillars

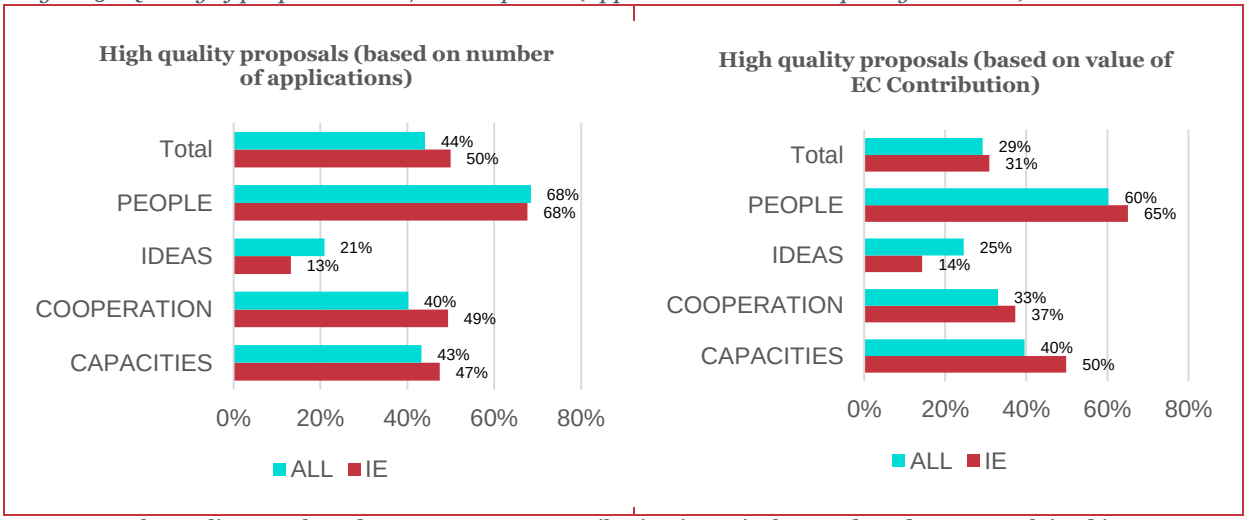


Source: Technopolis 2016, based on CORDA. EC Contribution is equivalent to drawdown as explained in Box 1.

In terms of quality of the applications, Figure 5 below shows that Irish organisations perform above the average across two pillars (Cooperation and Capacities), showing a relatively high percentage of applications (in terms of number and value) that score above the quality threshold and are then eligible for funding. It also performs above the average in terms of quality of the applications based on EC contribution for the People pillar.

Eligible applications are approved for funding based on availability of resources and a large proportion of them do not get funded (60% in the case of proposals with Irish participation, and 64% for all proposals). This is the main reason for the discrepancy between the success rates shown above and the percentage of eligible proposals shown in the two panels of Figure 5.

Figure 5 - Quality of proposals in FP7 across pillars (applications above the quality threshold)



Source: Technopolis 2016, based on CORDA. EC Contribution is equivalent to drawdown as explained in Box 1.

2.2.2 *Comparison with other selected EU member states*

Ireland performed strongly in terms of its FP7 activity levels, in comparison with a selection of four other small and medium-sized advanced European economies. Ireland submitted substantially more applications to FP7, per thousand researchers, than Austria, Denmark and Finland. Its activity levels were broadly in line with that of the fourth comparator country, The Netherlands, which has a large and rather mature science and technology base. Ireland also performed equally well against the first three of these comparator countries in terms of the numbers and value (EC Contribution requested) of applications per thousand researchers that scored above the quality threshold. It fell a little short of the Netherlands' performance on these dimensions, however, it comfortably exceeded the averages for the EU overall.

To draw a comparison we follow a similar to that approach used for the 2015 "Ex-post evaluation of the 7th EU Framework Programme (2007-2013)"[5], prepared by the High Level Expert Group. This report relies on three indicators based on applications:

- Activity indicator, measured as the total number of applications (i.e. participations in proposals) from a given country as a percentage of the total number of applications. This indicator shows how 'active' countries are in comparison with activity (participation) across the entire framework programme
- Quality indicator, measured as the number of applications from a given country that scored above the threshold (i.e. minimum) quality, as a percentage of the total number of applications that also a scored above the threshold. This indicator shows the extent to which activity was concentrated or not towards proposals of high quality
- (Modified) Quality indicator, measured as the value of the EC contribution (requested) in applications that scored above the quality threshold (i.e. minimum required score), as a percentage of the total EC contribution (requested) in applications that also a scored above the threshold. This indicator is very similar to the quality indicator but allows accounting for the size of the applications (in terms of value)

We have selected four comparator countries for our analysis (Austria, Denmark, the Netherlands and Finland) as they comprise a set of countries with similar characteristics to Ireland (in terms of size) but

[5] http://ec.europa.eu/research/evaluations/pdf/fp7_final_evaluation_expert_group_report.pdf#view=fit&pagemode=none

are also countries that have an active and strong presence in FP7. As such they provide an upper / high benchmark for Ireland.

The analysis shows that Ireland has a relatively low level of activity in comparison with the basket of selected comparator countries. Ireland accounts for 1.5% of all applications, which is below the EU28 and EU15 averages (3.1% and 4.6% respectively) and below the share for each of the four comparator countries.

It also shows Ireland tends to participate in high quality proposals (or, at least, that participation is not biased towards low quality proposals), but to a lesser extent in comparison with four countries included in the analysis (see Table 2, Panel A).

Denmark and the Netherlands have a relatively high participation in proposals of good quality and on relatively large proposals of good quality (i.e. proposals that pass the quality threshold as explained in Box 1).

A more positive outcome for Ireland is revealed when accounting for the size of the research base (see Table 2, Panel B). In this case, Ireland outperforms all the four comparator countries (as well as the EU28 and EU15 averages) regarding both activity and quality.

For example, Ireland has 647 participations for every thousand researchers working in-country, in comparison with 564 in the Netherlands (as shown in Table 2, Panel B). This metric suggests that the Irish research base was more actively engaged with FP7 than was the case for each of these four comparator countries, including the Netherlands, which was itself far more highly engaged with FP7 than the average for all EU member states.

In terms of value of proposals (EC contribution requested) above threshold (modified quality indicator), Ireland is outperformed by the Netherlands and Denmark. This means that Irish researchers are more prolific at submitting high quality applications (as indicated above) but they place their effort on smaller project proposals (or proposals in which they have a relatively small share), in comparison with the other countries.

These findings are in line with some views captured in our stakeholder interviews, where it was stated that Ireland and Irish researchers could be more ambitious in pursuing large-scale projects (or a higher share of funding in projects in which they participate) and in taking up the coordination role more often.

Table 2 - Activity and quality indicators (base: total participations and EC contribution across all applicants)

	Panel A			**Panel B**		
	Activity indicator	**Quality indicator**	**(*Modified*) Quality indicator**	**Activity indicator**	**Quality indicator**	**(*Modified*) Quality indicator**
	% Of applications	% of applications ***above threshold***	% EC contribution in applications ***above threshold***	Applications per thousand researchers	Applications ***above threshold*** per thousand researchers	EC contribution requested in proposals ***above threshold*** (€M) per thousand researchers
Ireland	1.5%	1.5%	1.3%	646.7	323.2	92.1
Austria	2.5%	2.5%	3.4%	449.2	230.5	90.9
Denmark	1.8%	2.0%	2.6%	325.5	181.1	96.3
Finland	2.0%	2.0%	2.0%	331.2	161.0	59.1

	Panel A			Panel B		
	Activity indicator	**Quality indicator**	**(*Modified*) Quality indicator**	**Activity indicator**	**Quality indicator**	**(*Modified*) Quality indicator**
	% Of applications	% of applications ***above threshold***	% EC contribution in applications ***above threshold***	Applications per thousand researchers	Applications ***above threshold*** per thousand researchers	EC contribution requested in proposals ***above threshold*** (€M) per thousand researchers
Netherlands	5.1%	5.7%	5.5%	563.6	320.5	124.3
EU28 (Average)	3.1%	3.1%	2.9%	356.3	177.6	63.8
EU15 (Average)	4.6%	4.6%	4.5%	303.3	82.4	57.6

Source: Technopolis 2016, based on CORDA. Number of researchers is based on Eurostat (Number of researchers, all performing sectors, full-time equivalent [rd_p_persocc]). The number of researchers is based on the average numbers for the period (2007-2013).

The indicators discussed above show the share of participation in the programme by each country. Further analysis shows light on the comparison between Irish organisations' success rates and of other comparator countries. Table 3 indicates that 50% of Irish applications pass the quality criteria and this is in line with the EU28 and EU15 averages, as well as the results for Finland, but below the results for Austria, Denmark and the Netherlands. A slightly different pattern is observed when looking at the EC contribution requested, where the share of the value that passed the quality criteria is lower for Ireland, in comparison with EU28 and EU15 averages and all other comparator countries.

*Table 3 - Activity, quality and success (base: applications logged and EC contribution requested by **each country**)*

	Eligible rate		Success rate	
	% Of applications above threshold	% Of value of EC contribution requested among proposals above threshold	% Of applications funded	% Of value of EC contribution requested among proposals funded
Ireland	50%	34%	20%	13%
Austria	51%	46%	22%	16%
Denmark	56%	52%	23%	16%
Finland	49%	35%	20%	13%
Netherlands	57%	44%	25%	20%
EU28	50%	39%	21%	16%
EU15	50%	40%	25%	19%

Source: Technopolis 2016, based on CORDA

As mentioned before circa 40% of applications that pass the quality criteria get funded (20% over 50%), but this percentage is slightly higher (46%) when looking at the value of the applications (in

terms of EC contribution), instead of the number of applications. This means that Ireland was able to retain a higher share of applications in terms of value, in comparison with the three comparator countries (Austria, Denmark and Finland), which is a very positive outcome.

2.3 Projects and participations

2.3.1 Overview and comparison with other countries

Ireland performed well against its targets for FP7, with a drawdown of around €625M, which was more than three times the drawdown realised in FP6 and more than 150% of its original target for FP7. Ireland also recorded a strong performance in comparison with other member states: its drawdown per researcher was the third highest of all EU member states, behind the Netherlands and Belgium.

Ireland has taken part in 1,465 projects and drawdown **€**625M (in comparison with **€**199M in FP6). This is 56% more than the original target of €400M (set in Strategy for Science, Technology and Innovation) and 4% more that the revised (and official) target of €600M.

The initial target was set in Strategy for Science, Technology and Innovation (SSTI) before the final structure and budgets for the programme had been finalised. The final target was set-up after a bottom up exercise with national delegates and NCPs combined with an ambition of achieving 1.25 per cent of activity generally (e.g. share of participations, share of Irish-led projects and share of Community funding secured).

Table 4 - Drawdown and target

	Initial target	Revised target	Final drawdown
EC Contribution	€400M	€600M	€625M
% Of total EC Contribution	0.9%	1.3%	1.4%

Source: Technopolis 2016, based on CORDA and SSTI

In total, 433 different organisations have taken part in the programme accounting for a total of 1,960 participations. These 433 organisations include 25 Higher Education Institutions and 52 public organisations and research organisations. A total of 332 companies (including 249 SMEs) have taken part in FP7 (see Section 2.4 for more information on profile of participant organisations).

A relatively small number of projects (23%) included more than one Irish organisation (the average participation per project was 1.3) (see Section 3.3 for more information on 'local collaborations' enabled by FP7).

In terms of regional participation, 53% of the total drawdown has been allocated in the Dublin region (NUTS3 code IE021) and 11% has been allocated in the West Region (NUTS3 code IE013), which is mostly driven by the drawdown of the National University of Ireland, Galway. The concentration of resources in the Dublin region is mostly driven by the Higher Education Institutions and the Public Research organisations for which 57% of the total drawdown is concentrated in the Dublin region according to CORDA.

Countries such as Finland and Denmark have performed slightly better in FP7 in comparison with Ireland, as is shown in Table 5. They have had higher drawdowns not only as a result of taking part in more projects but also of taking a slightly bigger share of those projects in comparison with Ireland. Additionally, a large pool of different Finish and Danish organisations have taken part if FP7 projects (almost 600 in Denmark in comparison with 433 in Ireland).

Table 5 also shows the (average) results for the EU28 and E15 countries. These statistics are dominated by countries with a high volume of projects, including the UK (10,372) Germany (8,805), France (7,201), Spain (6,327) and Italy (6,233).

Table 5 – Overview of Irish participation and international comparison

Pillar	Number of projects	Total EC contribution (In € M)	Average EC contribution per project (In € M)	Number of unique orgs.	Number of participations	Average participation per project
Ireland	1,465	625.2	0.4	433	1,960	1.3
Austria	2,440	1,188.1	0.5	747	3,543	1.5
Denmark	2,021	1,072.3	0.5	596	2,786	1.4
Finland	1,784	877.4	0.5	533	2,731	1.5
Netherlands	5,047	3,393.5	0.7	1,524	*8,251*	*1.6*
EU-28 (Average)	2,544	1,447.9	0.6	880	4,225	1.7
EU-15 (Average)	4,189	2,575.3	0.6	1,426	7,167	1.7

Source: Technopolis 2016, based on CORDA.

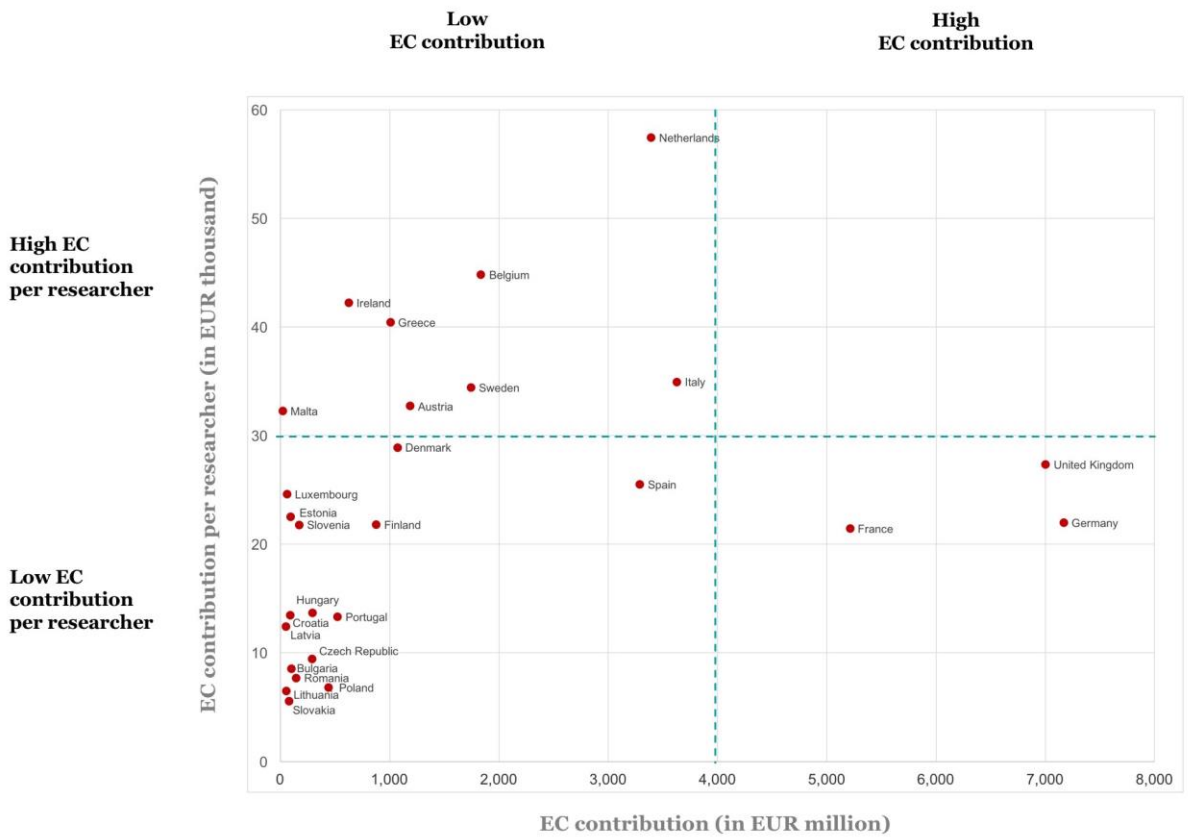
Even though Ireland secured a relative low volume of EC contributions from FP7, in absolute terms, and in comparison with our four-comparator countries, its drawdown looks very much stronger once we account for the size of its research base. Figure 6 shows this analysis.

The horizontal dimension of the graph shows EU countries ranked according to their EC contribution (note that EC Contribution is equivalent to drawdown as explained in Box 1 - €625m in the case of Ireland). Countries with a high EC contribution are placed at the right hand side of the vertical line (set at the middle point of the EC contribution range). The vertical dimension of the graph shows EU countries ranked according to their EC contribution *per researcher*. Countries with a high EC contribution *per researcher* are placed above the horizontal line (set at the middle point of the EC contribution per researcher range).

The figure below shows that even though Ireland is located in the area of low total EC contribution (along with other countries with a total EC contribution of €4bn or less) it places relatively high in terms of its EC contribution per researcher (over €42,000), ahead of countries such as the UK, France and Germany (ranging between approximately €21,000 to €29,000 drawdown per researcher).

The same group (low EC contribution - high EC contribution per researcher) includes Netherlands and Austria. Denmark and Finland feature in the lower quadrant (low EC contribution- low EC contribution per researcher) meaning that even though they have higher drawdowns in comparison with Ireland, this is relatively low in relation to the size of their research base (i.e. number of researchers).

Figure 6 - Comparison between total EC contribution and EC contribution per researcher



Source: Technopolis 2016, based on CORDA. Number of researchers is based on Eurostat (Number of researchers, all performing sectors, full-time equivalent [rd_p_persocc]). The number of researchers is based on the average value for the period (2007-2013). EC Contribution is equivalent to drawdown as explained in Box 1.

2.3.2 Participation and targets

Ireland performed well across large parts of FP7, meeting or exceeding its targets in 13 out of the 20 FP7 specific programmes and thematic areas. Within the Cooperation Specific Programme, it performed particularly well in ICT, Nanotechnology and Security. However, it fell short of its targets in Energy, Space and Transport. It also performed well in the Capacities (research for the benefit of SMEs) and People Specific Programmes. Ireland performed less well than expected in the 'Ideas' pillar (ERC) where its successful applications were only around half of the target.

The Cooperation programme (in particular ICT and Health) and People/Marie Curie programme account for most of FP7 funding drawdown by Irish organisations. The specific programmes ICT, Marie Curie and Health account for 51% of the total EC contribution allocated to Irish organisations (€317M).

Table 6 – Overview, per pillar

Pillar	Number of projects with Irish participation	Total EC contribution (Irish participants) (In € M)	Average EC contribution per project (In € M)	Number of Irish participants (unique orgs.)	Number of Irish participations	Average participation per project
Cooperation	887	398.1	0.4	294	1,204	1.4
People	305	112.7	0.4	63	357	1.2
Capacities	229	63.5	0.3	173	352	1.5
Ideas	42	50.5	1.2	9	45	1.1
Euratom	2	0.4	0.2	2	2	1.0
Total	1,465	625.2	0.4	433*	1,960	1.3

Source: Technopolis 2016, based on CORDA. * Since one organisation can take part in different pillars, the total number of unique organisations (433) across all pillars is different from adding up the number of unique organisations per pillar (541).

Ireland has superseded its expectations in 13 of 20 thematic areas (marked in dark and light green in the tables below). Irish organisations have done especially well in Security, NMP and Research for SMEs specific programmes. (Note that the official target set by Ireland on its official policy documents- €600M- is a rounded figure based on its own targets across specific programmes which actually adds up to €615M, as shown in Table 7).

Areas of the cooperation programmes such as ICT and Health had the highest expected target (within that pillar) achieved 115% and 105% of their set target, respectively. Ireland has also farewell in People/Marie-Curie programme, where Irish organisations (mainly universities and companies) have achieved almost 20% more than what was originally planned.

Table 7 - Targets and participation

FP7 Area	Total Budget (in € M)	Budget Available for Calls (in € M)	Proposed Target for Irish Share of Activity (in € M)	Target for Funding to Irish Participants (in € M)	% Target achieved
Cooperation					
Health	6,100	5,946	1.25%	74	105%
Food, Agriculture and Biotech	1,935	1,886	2.00%	38	108%
ICT	9,050	8,822	1.25%	110	115%
Nanotechnology	3,475	3,388	1.25%	42	130%
Energy	2,350	2,291	1.25%	29	68%
Environment	1,890	1,842	0.80%	15	121%
Transport	4,160	4,055	1.00%	41	39%
Space	1,430	600	0.80%	5	68%

FP7 Area	Total Budget (in € M)	Budget Available for Calls (in € M)	Proposed Target for Irish Share of Activity (in € M)	Target for Funding to Irish Participants (in € M)	% Target achieved
Security	1,400	1,365	0.80%	11	255%
Social Sciences and Humanities	623	623	0.80%	5	106%
Ideas	7,510	7,510	1.40%	105	48%
People	4,750	4,750	2.00%	95	119%
Capacities					
Research Infrastructures	1,715	1,515	0.80%	12	131%
Research for Benefit of SMEs	1,336	1,336	1.60%	21	170%
Regions of Knowledge	126	126	1.60%	2	140%
Research Potential	340	340	0.00%	0	(0.6M)
Science in Society	330	330	1.00%	3	275%
Development of policies	70	70	1.00%	1	10%
INCO	180	180	1.00%	2	18%
Non-nuclear Activities of JRC	1,751	0	0.00%	0	--
Total EC	**50,521**	**46,976**	**1.30%**	**611**	102%
Euratom	2,751	2,230	0.20%	4	10%
Total EC and Euratom	**53,272**	**49,206**	**1.25%**	**615**	**104% (of official target, €600M)**

Source: Ireland's Participation in FP7, Revised Indicators and Targets (October, 2007)

Appendix B provides detailed statistics of Irish participation in each pillar including number of projects, participations and EC contribution.

2.3.3 Alignment with research priority areas

Ireland's 14 Research Priority Areas (identified in the 2012 National Research Prioritisation Exercise, NRPE) align well with the thematic focus of the FP7 specific programmes and calls for proposals. However, our analysis suggests that around 60% of Ireland's drawdown from FP7 has gone to support work in areas that sit outside the 14 national priorities. As such, FP7 has provided substantial financial support for research in Ireland both within the national priority areas and in areas that fall outside those priority fields.

The National Research Prioritisation Exercise was launched in early 2012. As such, the analysis on alignment between those areas and FP7 should be taken as a **baseline**, which will serve to analyse the change in alignment between the research priority areas and future framework programmes (e.g. Horizon 2020).

The NRPE was undertaken to focus national expenditure on a number of science and technology research areas, targeting resources in areas with the greatest potential for economic and social return, particularly in terms of job creation. In this way, the exercise explicitly couples scientific excellence with realising social and economic returns, identifying areas of existing strength and potential in the Irish research system. The exercise was supported and implemented by a specially convened Prioritisation Action Group (PAG). The PAG was chaired by the Minister for Research and Innovation, and included the members of the Inter-Departmental Committee on Science, Technology and Innovation as well as the funding agencies under the remit of those Departments.

The analysis is based on composition analysis of all FP7 calls in which an Irish organisation participated, taking into account the objective of the call and its alignment with each Irish research priority area. We found that a total of €180M (from the Cooperation and Capacities Programmes) was allocated to projects with a strong connection to the 14 Research Priorities areas, which represents 40% of the total EC Contribution to Irish organisations in those two pillars. Our results are consistent with estimates of government investment. DJEI estimates that approximately 40% of Government Investment in research (GBOARD basis) falls within the scope of Research Prioritisation.

The analysis is a 'first approximation' of the distribution FP7 projects (and thematic areas) across Irish research priority areas given the challenges in arriving to a concordance between those two areas (mainly due to the multidisciplinary nature of the research conducted under the framework programmes).

As an example, the strongest alignment is found in the NMP thematic area, which supports projects that fit well with the 'Processing Technologies & Novel Materials' research priority area. The largest project in this box corresponds to Namdiatream, a €12M project to develop a nanotechnology-based toolkit for multi-modal detection of biomarkers of most common cancer types and cancer metastases. The project includes the participation of researchers from Trinity College Dublin, Celix Limited, Radissen Diagnostics and University College Dublin (with a combined EC contribution of €3.8M among them).

As expected the ICT programme aligns well with the areas of Data Analytics, Management, Security & Privacy; Digital Platforms, Content & Application; and Future Networks & Communications, but also with the areas of Connected Health & Independent Living and Smart Grids and Cities where projects related to the use of biosensors and chips for disease monitoring and management, and to the implementation of ICT-based solutions for energy distribution have been supported under the ICT thematic area.

There is also a good alignment between the Health thematic area of the Cooperation programme and health-related priority areas such as Therapeutics; Connected Health & Independent Living; Medical Devices; and Diagnostics.

Finally, there is also a good alignment between the Capacities programme, in the area of Research Infrastructures, where the largest projects (in terms of EC contribution to Irish organisations) again related to the area of nanotechnology, the project, 'Quality Nano', a four year project that integrates 28 European analytical & experimental facilities in nanotechnology, medicine and natural sciences to develop and implement best practice all aspects of nanosafety assessment. The project included the participation of Trinity College Dublin and University College Dublin (with a combined EC contribution of €2M among them).

The fact that 40% of the budget aligns with the 14 Research Priority Areas is an indication that FP7 has been a source of funding for other areas not included in the prioritisation exercise. This demonstrates that Ireland has strong research capabilities outside those 14 priority areas and the FPs will (likely) continue to be an important source to maintain capabilities outside those 14 priorities. In future iterations of the programme (e.g. Horizon 2020) the information on alignment could be taken into account to feed into the potential revisions of the NRPE, as again, this analysis reveals areas of research strengths (where Ireland performs rather well in a highly competitive programme) that could be include within its national priorities.

Table 8 - Participation in Fp7 and alignment with research priority areas

	Cooperation								Capa-cities
	ICT	Security	Health	Energy	Food, Agriculture and Biotech	Nanotechnology	Social Sciences and Humanities	TPT	Research Infrastructures
Data Analytics, Management, Security & Privacy	1.6	2.7			0.7				4.4
Digital Platforms, Content & Application	16.0	1.1			0.0		0.1		
Future Networks & Communications	27.1								2.6
Therapeutics			13.0						
Connected Health & Independent Living	6.4		6.2						
Medical Devices			5.6						
Diagnostics			11.5						
Food for Health					5.2				
Sustainable Food Production & Processing					9.7				
Innovation in Services and Business Processes						0.7		0.0	
Manufacturing Competitiveness	0.9					3.0		0.4	
Marine Renewable Energy				5.2					0.8
Smart Grids & Smart Cities	4.3								
Processing Technologies & Novel Material					1.5	46.1		3.1	
Total (in EUR Million)	**56.4**	**3.8**	**36.3**	**5.2**	**17.2**	**49.8**	**0.1**	**3.5**	**7.8**
As % of total EC contribution for Ireland	**45%**	**13%**	**47%**	**26%**	**42%**	**91%**	**1%**	**22%**	**50%**

Source: Technopolis 2016, based on CORDA and Research Prioritisation Exercise.

2.4 Profile of participant organisations

2.4.1 Overview

Ireland's Higher Education Institutions (HEIs) dominate the drawdown figures, accounting for around 65% of the total EC Contribution, with Ireland's companies accounting for around 25%. The universities and colleges also dominate Ireland's project coordinators, accounting for around 86% of all of the country's coordinators. The distributions look a little different at the level of the specific programmes, with, for example, an inversion of position of universities and companies within the Capacities Specific Programme, where Ireland's companies dominate participations and drawdown (because of the Research for the Benefit of SMEs scheme within the Capacities Programme). Additionally, Irish SMEs had a strong participation in FP7 in comparison with other countries, which is revealed when their drawdown is compared against the number of SMEs operating in the country.

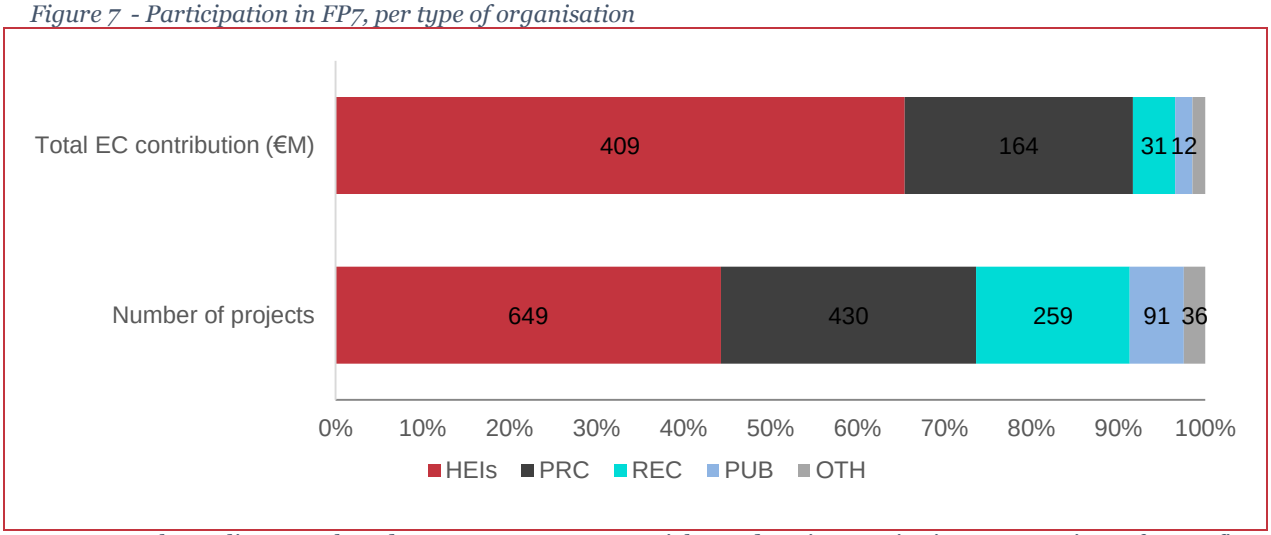
HEIs account for 44% of the total projects awarded to Irish organisations (649 projects) and 65% of the total EC contribution (€409M) (see Figure 7). Furthermore, HEIs have 1.5 more projects in

comparison with 'Private for profit organisations' (PRC) (a category that mainly includes companies), but have managed to drawdown 2.5 more in term of EC funding. This means that HEIs are taking part in bigger projects (see Figure 7).

HEIs took the coordination role 86% of the times (379 out of 443 projects in which an Irish organisation was the Project Coordinator), which is considerably higher than the participation of HEIs as project coordinators across the programme (57%). The difference is even more pronounced in the case of the Cooperation programme. HEIs take up the coordination role 84% of the times, while these types of organisations take up the coordination role 37% of the times across the programme. Further discussion on activity around coordination role is presented in Section 3.

Companies (PRCs) participate in projects for a value of 26% of the EC contribution and have a relatively high presence in the Capacities programme, mainly due to the use of the 'Research for the benefit of SMEs' instrument (where the largest participation come from Innopharma Labs Limited, Ultra High Vacuum Solutions and Sigmoid Pharma, all with projects for a total of +€1M).

Figure 7 - Participation in FP7, per type of organisation



Source: Technopolis 2016, based on CORDA. *HEIs= Higher Education Institution, PRC=Private for Profit organisation, PUB=Public Research Organisation, REC=research organisation.

Table 9 - Participation in FP7, per type of organisation and across pillars (based on EC contribution)

Type of organisation	CAPACITIES	COOPERATION	IDEAS	PEOPLE	Euratom	Total
Higher Education Institutions (HEIs)	31%	62%	100%	81%	88%	65%
Private for profit (excluding education) (PRC)	57%	29%	0%	11%	0%	26%
Public body (excluding research and education) (PUB)	3%	2%	0%	2%	12%	2%
Research organisations (REC)	6%	5%	0%	6%	0%	5%
Other (OTH)	3%	2%	0%	0%	0%	1%
Total	100%	100%	100%	100%	100%	100%

Source: Technopolis 2016, based on CORDA

The sub-sections below show an overview of the main players from each type of stakeholder and further analysis on the participation of companies and SMEs. Additional statistics per type of participation per type stakeholder can be found in Appendix D.

2.4.1.1 Higher Education Institutions

Almost two thirds of the funding drawdown by HEIs corresponds to the Cooperation programme. ERC represents a relatively small percentage of projects and EC contribution (27% and 22% respectively), however, it also this includes large scale projects with participations of +€1M. Ten HEIs account for 97% of all the funding drawdown by HEIs. Furthermore, Trinity College Dublin (TCD) and University College Dublin (UCD) together account for 42% of the total funding drawdown by HEIs in FP7 (see Table 10).

Table 10 - Top 10 HEIs, based on EC contribution

Rank	Name	EC contribution (in € M)
1	Trinity College Dublin	84
2	University College Dublin, National University Of Ireland, Dublin	79
3	University College Cork, National University Of Ireland, Cork	77
4	National University Of Ireland, Galway	46
5	Dublin City University	32
6	University Of Limerick	21
7	Waterford Institute Of Technology	17
8	Royal College Of Surgeons In Ireland	15
9	An Tudaras Um Ard Oideachas	14
10	National University Of Ireland Maynooth	10
	Total	***395***
	(% Of total HEIs drawdown)	***97%***

Source: Technopolis 2016, based on CORDA. An Tudaras Um Ard Oideachas is the Higher Education Authority (Irish Research Council) and should have been classified under Public Organisations within the CORDA data. The Commission has been notified and has corrected this so all future downloads from CORDA relating to Horizon 2020 and beyond will capture this classification.

2.4.1.2 Research Organisations

TEAGASC accounts for almost 40% of the funding drawdown by Research organisations and top ten organisations for 89% of all the funding drawdown by Research organisations. TEAGASC has been active in the "Food, Agriculture and Fisheries, Biotechnology" thematic area of the Cooperation programme, including the Food related ERA-NETs (see *Table 11*).

Table 11 - Top 10 Research Organisations, based on EC contribution

Rank	Name	EC contribution (in € M)
1	Teagasc - Agriculture And Food Development Authority	10.6
2	Marine Institute	4.1
3	Respect Limited	3.5
4	National Institute For Bioprocessing Research And Training Ltd	3.2
5	Economic And Social Research Institute	1.6

Rank	Name	EC contribution (in € M)
6	Bord Ospideil Naoimh Sheamuis	1.4
7	TobaccoFree Research Institute Ireland LBG	0.9
8	National Suicide Research Foundation	0.8
9	Irish Universities Association	0.6
10	Forfás	0.6
	Total	***27.3***
	(% Of total REC drawdown)	***89%***

Source: Technopolis 2016, based on CORDA

2.4.1.3 Public Organisations

Public body organisations had a small participation in FP7 and across all pillars. Marie Curie represents a relatively small percentage of projects in which Irish public organisations took part (5%) but it represents a higher share in terms of EC contribution (17%), as they included two large-scale projects with participations of ~€1M:

- HRB/Marie Curie Post-doctoral Mobility Fellowship Scheme, led by The Health Research Board with an EC contribution of €0.8M (total cost: €2.1M)
- Starting Investigator Research Grant lead by SFI with an EC contribution of €1.3M (total cost: €3.1M).

The top ten organisations account for 81% of all the funding drawdown by public body organisations (see Table 12).

Table 12 - Top 10 Public Organisations, based on EC contribution

Rank	Name	EC contribution (in € M)
1	Electricity Supply Board	2.4
2	Science Foundation Ireland SFI	1.9
3	Enterprise Ireland	1.7
4	The Health Research Board	1.4
5	Dublin City Council	0.9
6	An Comhairle Oidhreachta-The Heritage Council Hc	0.4
7	Department Of Communications, Energy And Natural Resources	0.4
8	The Sustainable Energy Authority Of Ireland	0.3
9	National Gallery Of Ireland	0.3
10	National Cancer Registry Board	0.3
	Total	9.9
	(% Of total PUB drawdown)	81%

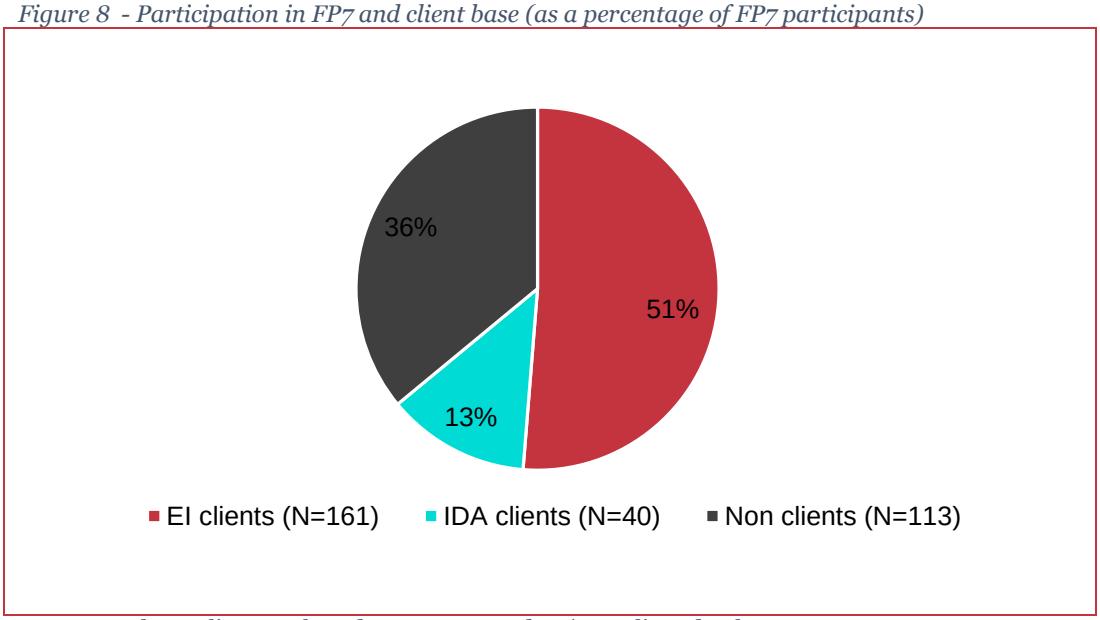
Source: Technopolis 2016, based on CORDA. See note to Table 10 above, in respect of the Higher Education Authority (Irish Research Council).

2.4.1.4 Companies

Irish-based companies (PRCs) had 617 participations and a total drawdown of €164M in FP7. Two thirds of participant companies are either Enterprise Ireland (51%) or IDA clients (13%). Interestingly, 113 of the companies were successful in FP7 are not part of the client databases of either EI or IDA (see Figure 8), which suggests there may be significant numbers of FP-capable firms that are not being

addressed directly by Ireland's national support system (although some of them could be Údarás na Gaeltachta or Local Enterprise Office clients).

Figure 8 - Participation in FP7 and client base (as a percentage of FP7 participants)



Source: Technopolis 2016, based on CORDA and EI/IDA client database

In contrast to the HEIs and public research organisations, FP participation is far less concentrated within the industry sector. The Top 10 companies account for only 24% of the total company drawdown. Within these companies there are 2 MNCs (Intel and UTRC), 7 high potential SMEs and 1 FP7 project management company (Pintail). Intel is the top participant and the only Irish-based organisation among the Eurocomms Top 50 participant organisations across the entire FP7. OncoMark Ltd (a UCD spin-out) was second to Intel in the number of successful applications and drawdown. The top 10 company participants are primarily from the ICT / software / biotech sectors, reflecting Ireland's particular strengths in industrial technology and its primary focus for science and innovation in the period since 2001.

Table 13 - Top 10 Companies, based on EC contribution

Rank	Name	EC contribution (in € M)
1	Intel Research and Innovation Ireland limited	12.7
2	Oncomark Limited	4.7
3	Wavebob Ltd	3.6
4	Skytek Limited	3.3
5	Orbsen Therapeutics Limited	2.9
6	Pintail Ltd	2.8
7	Vornia Limited	2.6
8	United Technologies Research Centre Ireland Limited	2.5
9	Luxcel Biosciences Ltd	2.5
10	Innopharma Labs Limited	2.4
	Total	***40.1***
	(% Of total Companies drawdown)	***24%***

Source: Technopolis 2016, based on CORDA

SME participation

SMEs drew down €118.5M (in terms of EC Contribution) (see Table 14) equivalent to 72% of the total drawdown by industry (PRC) and 19% of the total drawdown for Ireland[6].

SMEs were mostly active in the "Research for the benefit of SMEs" scheme within the Capacities programme, with 123 participations and a total of €27.1M. The programme supported "small groups of innovative SMEs in solving technological problems and acquiring technological know-how"[7]. This included a variety of topics, from 'developing innovative and sustainable systems combining automatic milking and precision grazing' to 'novel methods for improving the vacuum cooling of cooked meats'.

Two other important areas were the Health (44 participations, €18.6M drawdown) and the ICT thematic programmes (61 participations, €18.4M drawdown) within the Cooperation Programme, again reflecting Ireland's particular industrial strengths.

Table 14 - Overview of SME participation

Pillar	Number of Irish participations	Total EC contribution (Irish participants) (In € M)	Percentage of Irish participations	Percentage of EC contribution	Average EC contribution per participation
CAPACITIES	132	28.5	30%	24%	0.2
COOPERATION	275	81.5	64%	69%	0.3
PEOPLE	26	8.5	6%	7%	0.3
Total	433	118.5	100%	100%	0.3

Source: Technopolis 2016, based on CORDA

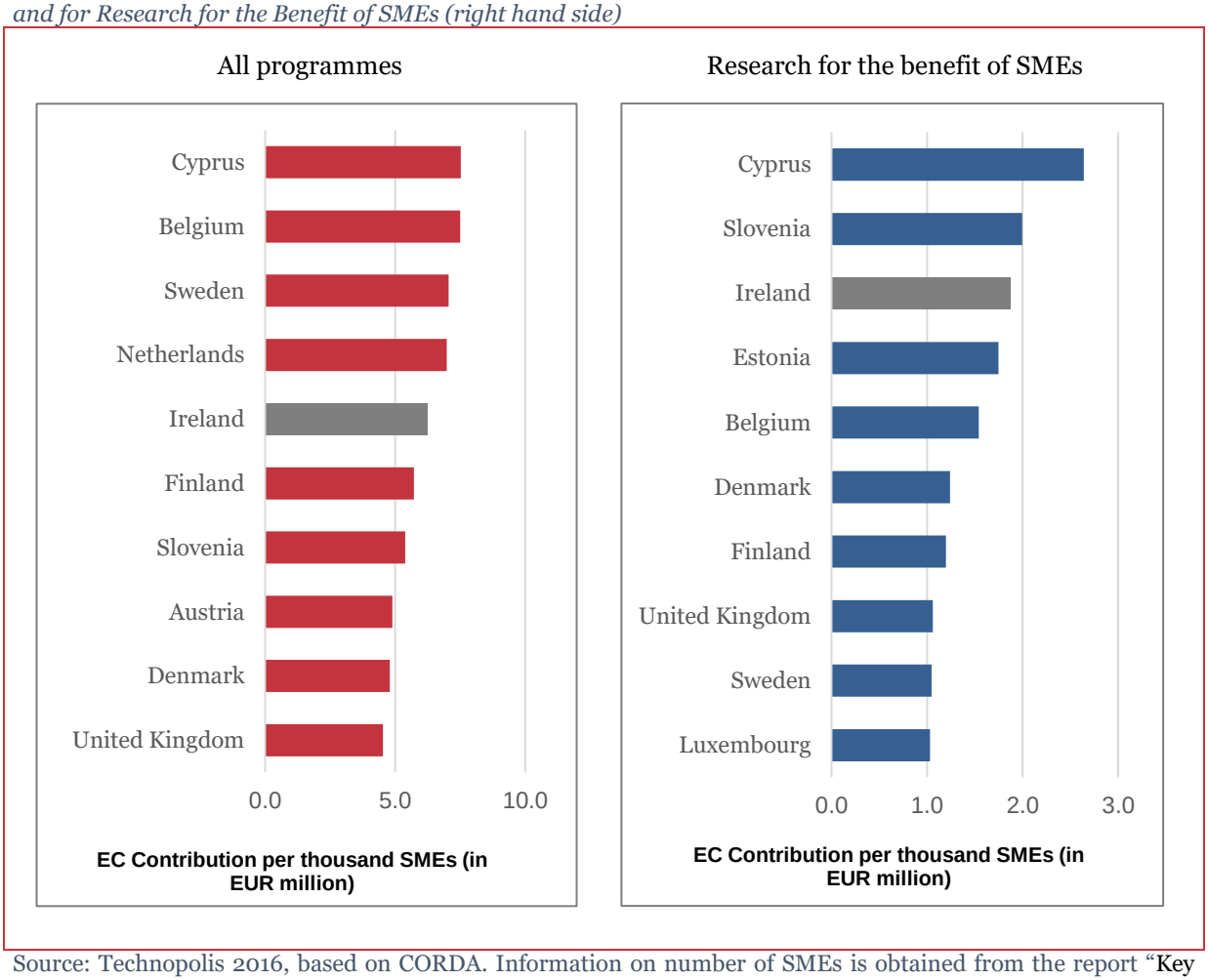
Irish SMEs had a strong participation in FP7 in comparison with other countries. Ireland ranks among the Top 10 countries based on their drawdown (value of EC Contribution), once this value is indexed against the number of SMEs that operate in the country. Figure 9 presents this analysis. It shows that Ireland ranks in the 5th place based on the EC contribution drawn down by SMEs -per thousand SMEs- across all programmes and it ranks 3rd based on the same indicator but only looking at the 'Research for the benefit of SMEs' specific programme.

Additionally, Ireland has drawdown 2.9% of the total EC contribution allocated to the 'Research for the benefit of SMEs' specific programme (€36M out of €1,250), which is considerably higher in comparison with the overall participation of Ireland in the entire FP7 programme (equivalent to 1.4%).

[6] This analysis is based on CORDA classification of SMEs, which includes those companies that have declared themselves as SMEs and that have been validated by the EU Commission as such. There are companies such as Innopharma Labs Limited that have not been classified as SMEs in CORDA and consequently SME participation could be even higher. Even though this introduces a level of measurement error into the analysis we have used the CORDA classification as this allows benchmarking the results against other countries.

[7] ftp://ftp.cordis.europa.eu/pub/fp7/docs/research_smes_en.pdf. Accessed: 19/03/16

Figure 9 - TOP 10 countries, based on EC contribution for SMEs (per thousand SMEs) for all FP7 (left hand side) and for Research for the Benefit of SMEs (right hand side)



Source: Technopolis 2016, based on CORDA. Information on number of SMEs is obtained from the report "Key figures on European business with a special feature on SMEs" (2011), which contains information for 2008.

Foreign-owned multi-national companies participation

Ireland has pursued a successful programme of FDI over the past 25 years, and now has a very substantial base of foreign-owned multi-national companies (MNCs), many of which are part of major technology players. As an illustration of this, a study commissioned by the American Chamber of Commerce Ireland estimated that there were 700 US affiliates based in Ireland, employing 130,000 people. The expanding group of foreign-owned MNCs had limited participation in FP7, however, possibly reflecting the dominance of production and back office functions within Ireland, and the resulting small amount of research and technology capacity maintained locally. However, the American Chamber of Commerce in Ireland (2015) study suggests this widely held view (that there is little or no R&D capacity in the great majority of foreign-owned MNCs in Ireland) may be somewhat wide of the mark, when it concluded that US affiliates' R&D expenditure in Ireland had more than doubled between 2000 and 2012 from $465 million to $1.5 billion.

It may be that their research interests are rather operational in focus, and that FP7's priorities and focus was of very much less interest. There may also be awareness issues, with MNCs falling within the bailiwick of IDA, which did not have any dedicated roles (or budget) assigned to promote FP7.

There is also a perception that the sub-set of blue chip firms (e.g. Intel and IBM) with a strong R&D capacity would only be interested in projects in which they lead or are prime movers and that many MNCs lacks the resources to deal with the resulting administrative overhead. However, our interviews with Intel and IBM revealed that these companies prefer not to take the coordination role as, in their

view, this leads to a costly (in terms of time at least) and complex process, which does not necessarily yield larger benefits (in comparison with participation as partner). There are, however, notable examples of large companies such as IBM who had limited participation in FP7 and have now taken up a more active role in Horizon 2020.

Summary of findings and conclusions

- The analysis shows a strong participation from Ireland across different dimensions:
  - Ireland's success rate for FP7 overall matched the EU average and was substantially better than the EU average for the two largest specific programmes: Cooperation and Capacity.
  - Moreover, Ireland performed strongly in terms of its FP7 activity levels (i.e. application submission), in comparison with a selection of four other small and medium-sized advanced European economies. Ireland submitted substantially more applications to FP7, per thousand researchers, as compared with Austria, Denmark and Finland. Its activity levels were broadly in line with that of the fourth comparator country, The Netherlands, which has a large and rather mature science and technology base.
  - Ireland performed well against its targets for FP7, with a drawdown of around €625M, which was more than three times the drawdown realised in FP6 and more than 150% of its original target for FP7. Ireland also recorded a strong performance in comparison with other member states: its drawdown per researcher was the third highest of all EU member states, behind the Netherlands and Belgium.
  - Furthermore, Ireland met or exceeded its targets 13 out of the 20 FP7 specific programmes and thematic areas. Within the Cooperation Specific Programme, it performed particularly well in ICT, Nanotechnology and Security.
- In terms of profile of participant organisations, we found that Ireland's Higher Education Institutions (HEIs) dominate the drawdown figures, accounting for around 65% of total EC Contribution, with Ireland's companies accounting for around 25%. The universities and institutes of technology also dominate Ireland's project coordinators, accounting for around 86% of all of the country's coordinators. This result contrasts with the pattern of participation from other countries, where companies tend to take the leadership role more frequently and suggests that Irish companies could be encouraged to be more active in this role given that this would likely lead to stronger, more intense participation in projects, not only in terms of drawdown but also in terms of intensity of involvement overall.
- Additionally, Irish SMEs had a strong participation in FP7 in comparison with other countries, which is revealed when their drawdown is compared against the number of SMEs operating in the country.
- Finally, we found that Ireland's 14 Research Priority Areas align well with the thematic focus of the FP7 specific programmes and calls for proposals. However, our analysis suggests that around 60% of Ireland's drawdown from FP7 has gone to support work in areas that sit outside the 14 national priorities. As such, FP7 has provided substantial financial support for research in Ireland both within the national priority areas and in areas that fall outside those priority fields.

3 Partnerships and collaborations

Evaluation questions

- What does Ireland's participation in consortia look like? Did we perform well compared to other Member States?

3.1 Overview

Ireland performed strongly in terms of its leadership of FP7 actions, with Ireland hosting the project coordinator in around 30% of all of its participations. Ireland matches the project coordination activity and income levels achieved among our four selected comparator countries, and is substantially ahead of the average figures for all EU member states (EU 15 and EU28). The strong performance is less marked for the Cooperation Specific Programme, where Ireland provided the project coordinator for around 16% of all its Cooperation Programme projects. This is broadly in line with the selection of comparator countries, and around five percentage points ahead of the EU average. Ireland's universities have dominated the project coordination statistics.

Irish organisations take part in projects with similar consortia size in comparison with our four comparator countries and with the EU28 and EU15 averages. This holds true across all programmes but also when looking only at the Cooperation programme (this is a relevant split as the averages across all programmes may be influenced by participation in the Marie Curie or ERC which are generally led by a small team or even a single principal researcher) (see Table 15).

In terms of taking a lead role, a third of projects involving Irish participation had an Irish organisation as the Project Coordinator, which is higher than the comparator countries, but also higher in comparison with the EU28 and EU15 average. This share declines when looking at the Cooperation programme (which removes the bias introduced by including ERC projects in the analysis, which tend to be single-person projects) at which point it remains higher than the comparator countries and groups, with the exception of Austria and the Netherlands (see Table 15).

Finally, Ireland takes a relatively high share of EC contribution across all projects in which it participates, in comparison with the comparator countries and groups (21% across all programmes and 10% in the case of the Cooperation programme).

Table 15 - Partnerships and collaborations

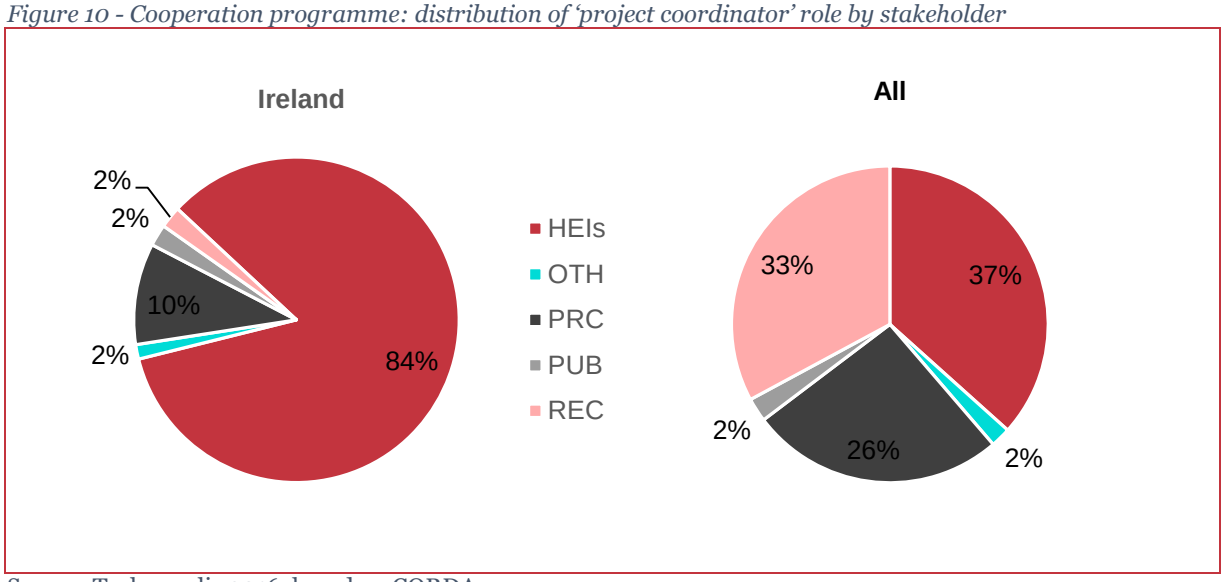
	All FP7			Cooperation programme		
	Size of consortia	Percentage of projects taking role of project coordinator	Percentage share of EC total contribution	Size of consortia	Percentage of projects taking role of project coordinator	Percentage share of EC total contribution
Ireland	12.1	30.2%	20.9%	15.0	15.7%	10.1%
Austria	12.7	27.7%	17.7%	14.9	17.3%	9.5%
Denmark	12.8	25.0%	19.2%	15.7	11.4%	8.9%
Finland	14.2	19.8%	13.7%	15.7	13.6%	8.5%
Netherlands	11.5	32.4%	19.3%	14.3	19.0%	9.6%

	All FP7			Cooperation programme		
	Size of consortia	Percentage of projects taking role of project coordinator	Percentage share of EC total contribution	Size of consortia	Percentage of projects taking role of project coordinator	Percentage share of EC total contribution
EU28 (Average)	14.1	19.0%	18.7%	16.7	9.5%	9.1%
EU15 (Average)	14.0	20.0%	19.4%	16.7	10.2%	9.4%

Source: Technopolis 2016, based on CORDA

In terms of stakeholder participation as Project Coordinators, Higher Education Institutions take the this role 89% of the times, across all programmes and 86% of the times in the case of the Cooperation programme. Companies take up this role 9% and 10% of the times respectively. This is goes in sharp contrast with the general average for the Cooperation programme -as shown in Figure 10- where there are more instances in which public research organisations (PUB) or private organisations (PRC), including companies, take up the coordination role (33% and 26% of the times, respectively).

Figure 10 - Cooperation programme: distribution of 'project coordinator' role by stakeholder



Source: Technopolis 2016, based on CORDA

3.2 Partnerships with Member States and other countries

The pattern of Ireland's FP7 collaborations with EU MS and third countries is similar to the patterns observed among the four comparator countries, with a heavy focus on partnerships with other member states. The geographical composition of Ireland's partnerships within the EU is dominated by the larger participants in FP7 (e.g. Germany, UK). The profile is similar when an Irish organisation leads, in comparison with when they take part as partners, although the latter gives them the opportunity to work in projects with Third countries in South America and South East Asia (and consequently access to a wider and more diverse network and knowledge). Finally, network analysis conducted by Fraunhofer ISI and Oxford Research shows that Ireland has become more attractive as a partner in FP7 (in comparison with FP6).

Table 16 shows that 91.4% of the members of the consortia in which Irish organisations take part are located in one or other EU Member States (EU28), which is very similar to the profile of collaboration for the four comparator countries and for the EU overall.

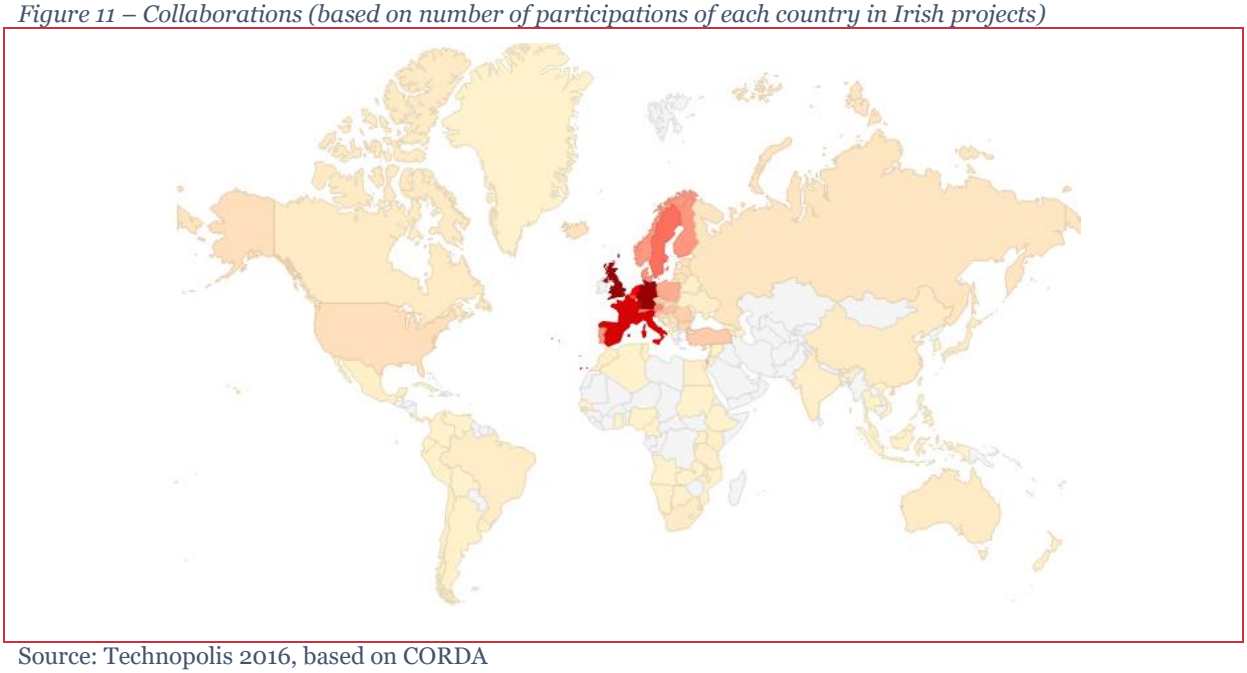
Germany, UK, Spain, France and Italy are the countries with which Irish organisations collaborate the most, but this is mostly capturing the fact that those are the countries with most participations in FP7. The map below also shows that collaborations with other countries (such as US, Japan, China, Australia) are rather small, while Figure 11 shows the list of Top 10 collaborators.

Table 16 - Collaborations with Member States and other countries

	Collaboration with Member States (percentage of consortia members based in EU28 countries)	**Collaboration with Candidate and Associate countries and Third countries (percentage of consortia based outside EU28)**
Ireland	91.4%	8.5%
Austria	91.1%	8.6%
Denmark	90.7%	9.0%
Finland	91.2%	8.5%
Netherlands	91.5%	8.3%
EU28 (Average)	94.4%	8.5%
EU15 (Average)	94.3%	8.4%

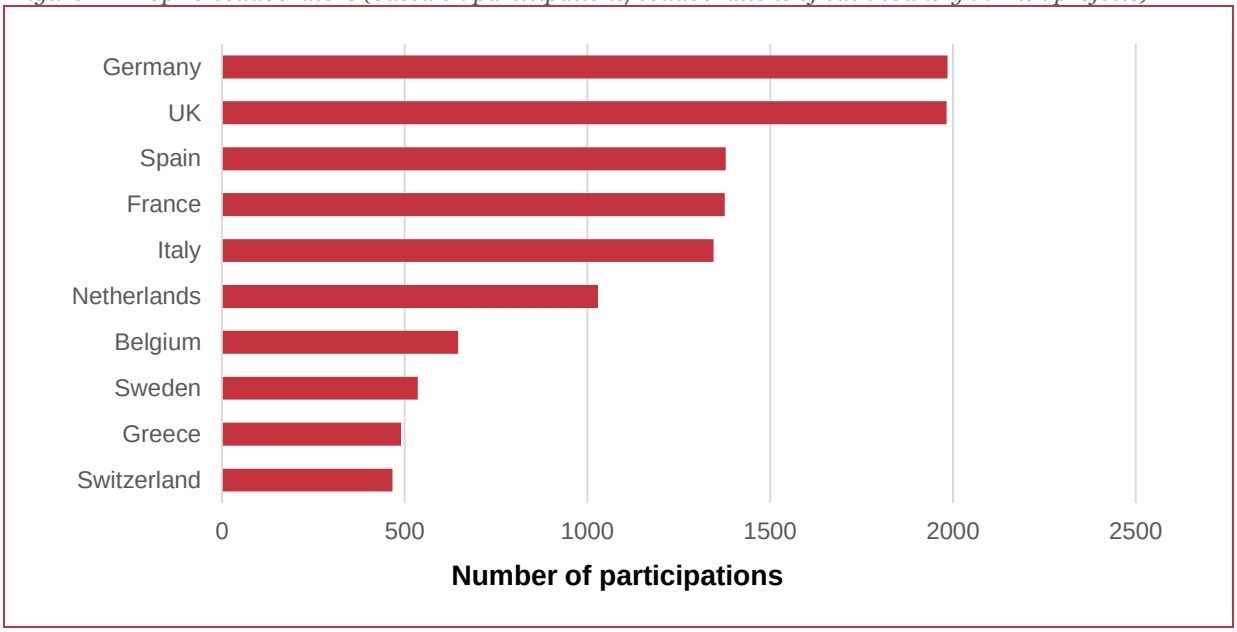
Source: Technopolis 2016, based on CORDA *The two columns do not add to 100% as there are some projects done in collaboration with organisations classified as "EU", and consequently are not allocated to EU28 or non-EU28 countries.

Figure 11 – Collaborations (based on number of participations of each country in Irish projects)



Source: Technopolis 2016, based on CORDA

Figure 12 - Top 10 collaborators (based on participations/collaborations of each country in Irish projects)

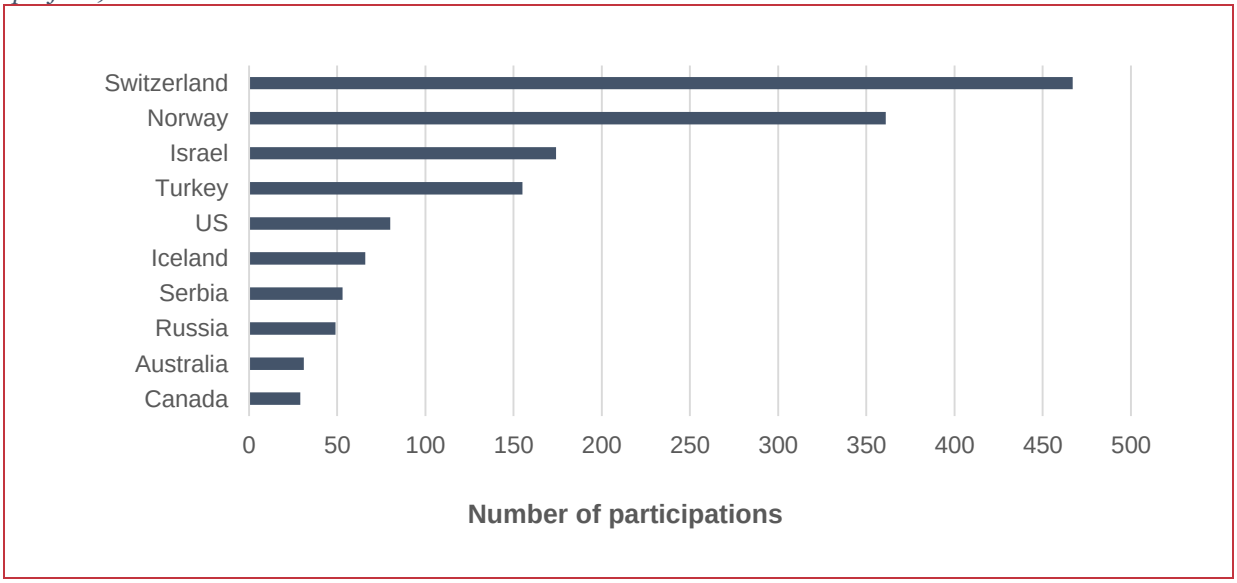


Source: Technopolis 2016, based on CORDA

If we drill down to interactions with non-Member States (i.e. Candidate and Associated countries and Third countries) we find that Switzerland (CH), Norway (NO) and Israel (IL) are the three countries with whom Ireland collaborates the most. Regarding major areas of collaboration, the most important collaborations (in terms of EC contribution to Irish organisations) were in the following areas:

- Switzerland: ICT (€28.2M), NMP (€22.9M), Marie Curie (€16.4M), Health (€14.7M) and Food, Agriculture, and Biotechnology ((€13.9M)
- Norway: Food, Agriculture, and Biotechnology (€12.3M) and Information and Communication Technologies (€10.4M)
- Israel: Information and Communication Technologies (€16.7M)

Figure 13 - Top 10 international collaborators (based on participations/collaborations of each country in Irish projects)



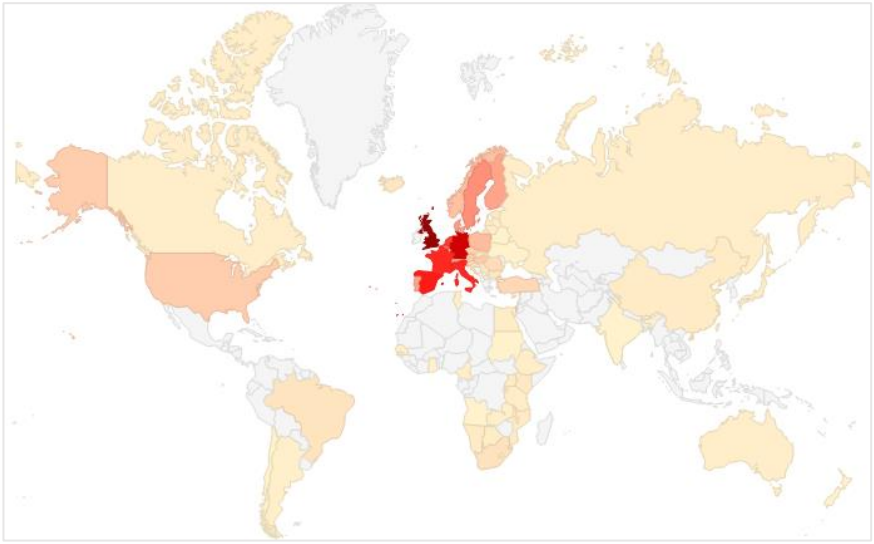
Source: Technopolis 2016, based on CORDA

The profile of collaboration looks similar when comparing projects that had an Irish coordinator (Figure 14) and projects that had only Irish participation (Figure 15). In both cases, the UK, Germany, Spain, Italy and France are the top five partners. Albeit, projects with an Irish coordinator have a slightly narrower reach in terms of Third countries (in South and Central America, Africa and East Asia), which indicates that those partnerships are established via collaboration with other countries rather than through direct links with Irish researchers.

Additional statistical analysis reveals that projects that have Ireland as a coordinator tend to have more Irish participants in the project, but the difference is negligible (0.25 more, on average).

Figure 14 – Collaborations (based on number of participations of each country in Irish projects)

Projects with Irish coordinator

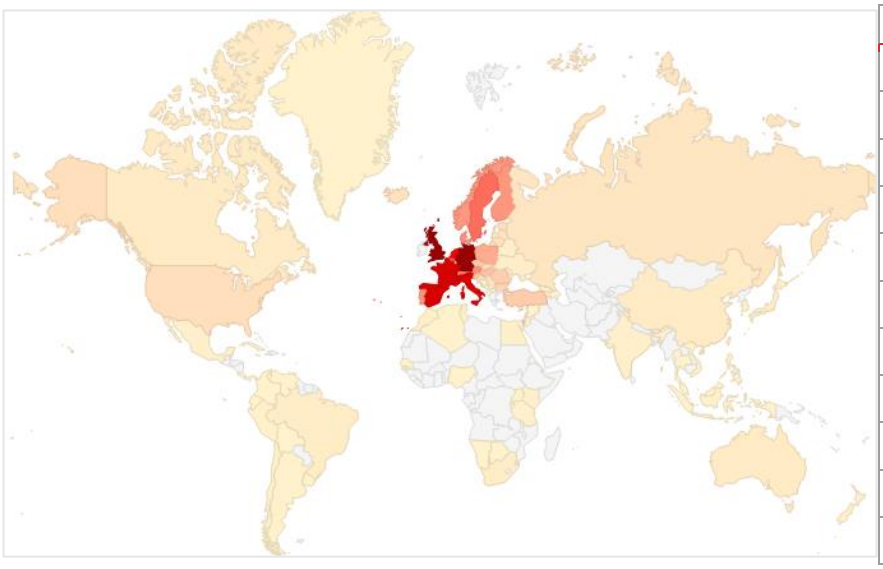


Top 10	
Country	**Participations**
UK	201
Germany	162
Spain	117
France	110
Italy	96
Netherlands	65
Belgium	38
Greece	38
Switzerland	29
Sweden	27

Source: Technopolis 2016, based on CORDA

Figure 15 - Collaborations (based on number of participations of each country in Irish projects)

Projects with Irish partner



Top 10	
Country	**Participations**
UK	1,782
Germany	1,823
Spain	1,261
France	1,266
Italy	1,249
Netherlands	964
Belgium	608
Greece	452
Switzerland	438
Sweden	509

Source: Technopolis 2016, based on CORDA

Network analysis conducted by Fraunhofer ISI & Oxford Research (2015)[8] reveals that Ireland has become more involved as a partner. The authors use an affinity index as a proxy for involvement in partnerships.

There are two steps involved in this analysis. The authors first estimate the level of 'affinity' of each country in FP6 and FP7. The level of affinity is measured by looking at the number of times a country collaborates with another (in comparison with their overall participation) and by aggregating the results across all partners. Box 2 below provides further methodological description on how the authors measure 'affinity'.

Second, the authors estimate the changes in the level of 'affinity' of all participant countries across FPs, to identify which countries became more preferred as collaborators in FP7 compared to where they stood in FP6.

Figure 16 presents their results. It shows that Ireland had become more attractive in FP7 in comparison with FP6, and that the increase (in affinity) is higher in comparison with our four comparator countries (Finland, Denmark, Austria and Netherlands).

The figure also shows that newer member states (such as Macedonia, Serbia and Croatia) have considerably increased their 'attractiveness' and this is in part due to their integration to the European Research Area (ERA).

Box 2: Probabilistic 'affinity index'

The authors calculate a 'probabilistic affinity index' (PAI), which compares the number of co-participations between any two countries to their 'expected number of co-participations'. The 'expected number of co-participations' is based on each country's share of participation in the programme.

A score above one indicates that two countries preferentially partner with one another, whereas a score below one means the opposite. Note that the scores are transformed so that they are symmetrically distributed between -1 (maximal negative affinity) and +1 (maximal positive affinity).

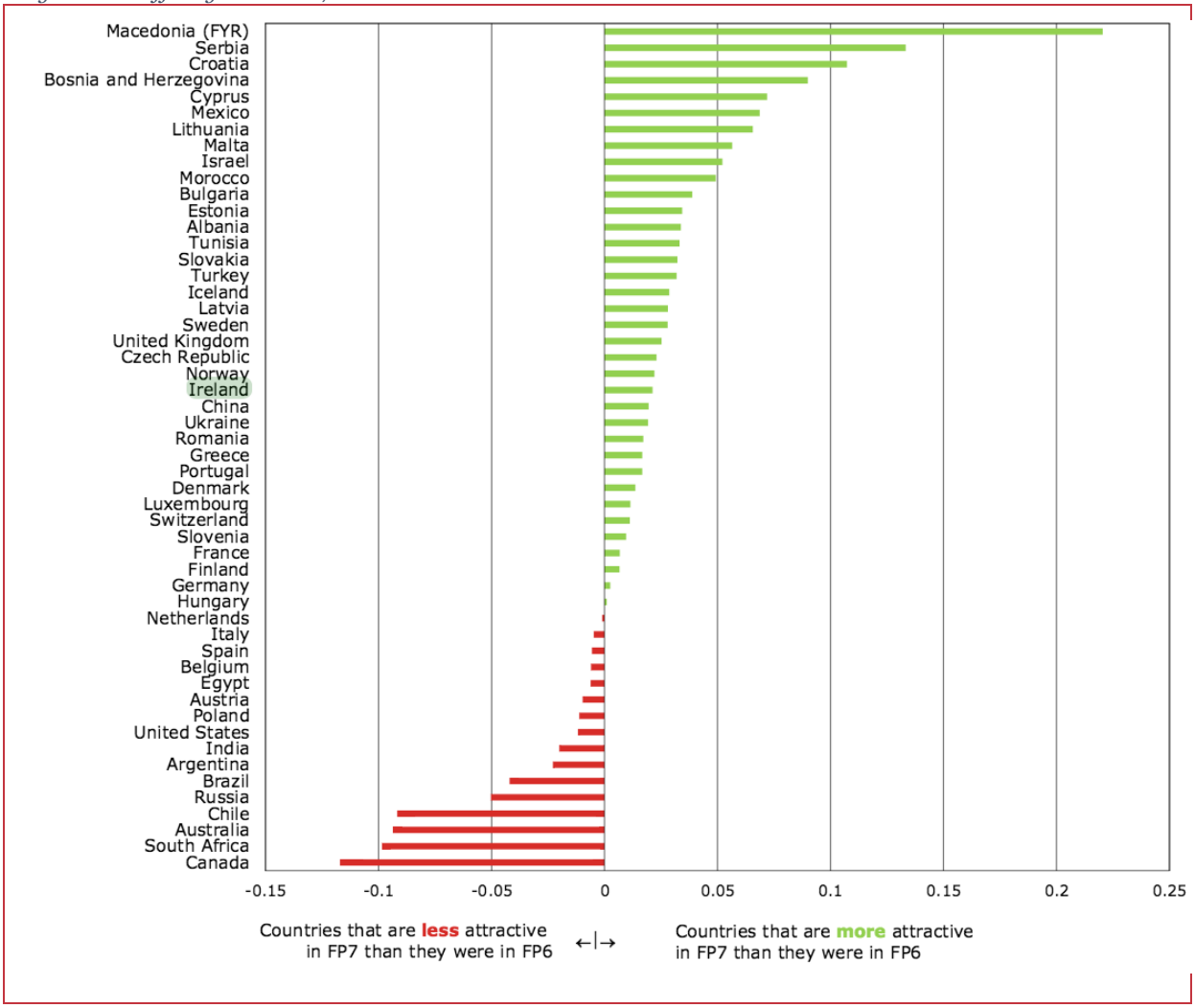
The main advantage of this index is that it takes into account the size effect, which drives the relative importance of big players and their position within a network of collaborators (i.e., the fact that countries such as UK, France, and Germany feature prominently in any analysis or metric of collaboration given the size of their participation in the FPs).

By looking at how the affinities of a country (i.e. its affinities for each of the other countries in the 'network') changed from FP6 to FP7, it is also possible to appreciate whether it became a more prominent actor in the network taking account of its size (i.e. its number of participations).

Source: Fraunhofer ISI & Oxford Research (2015) based on CORDA

[8] Fraunhofer ISI and Oxford Research (2015) "Study on Network Analysis of the 7th Framework Programme Participation" (p101)https://ec.europa.eu/research/evaluations/pdf/archive/other_reports_studies_and_documents/network_analysis_of_fp7_participation_-_final_report.pdf (p101)

Figure 16 - Affinity index: FP7 versus FP6



Source: Fraunhofer ISI & Oxford Research (2015) based on CORDA.

3.3 Local collaborations

FP7 provided a platform for research and innovation collaboration among national organisations, albeit to a limited extent, as well as across Europe and internationally.

FP7 did provide a platform for collaboration among national organisations, with a total of 338 projects (23% of the total number of 'Irish' projects) including two or more organisations located in Ireland.

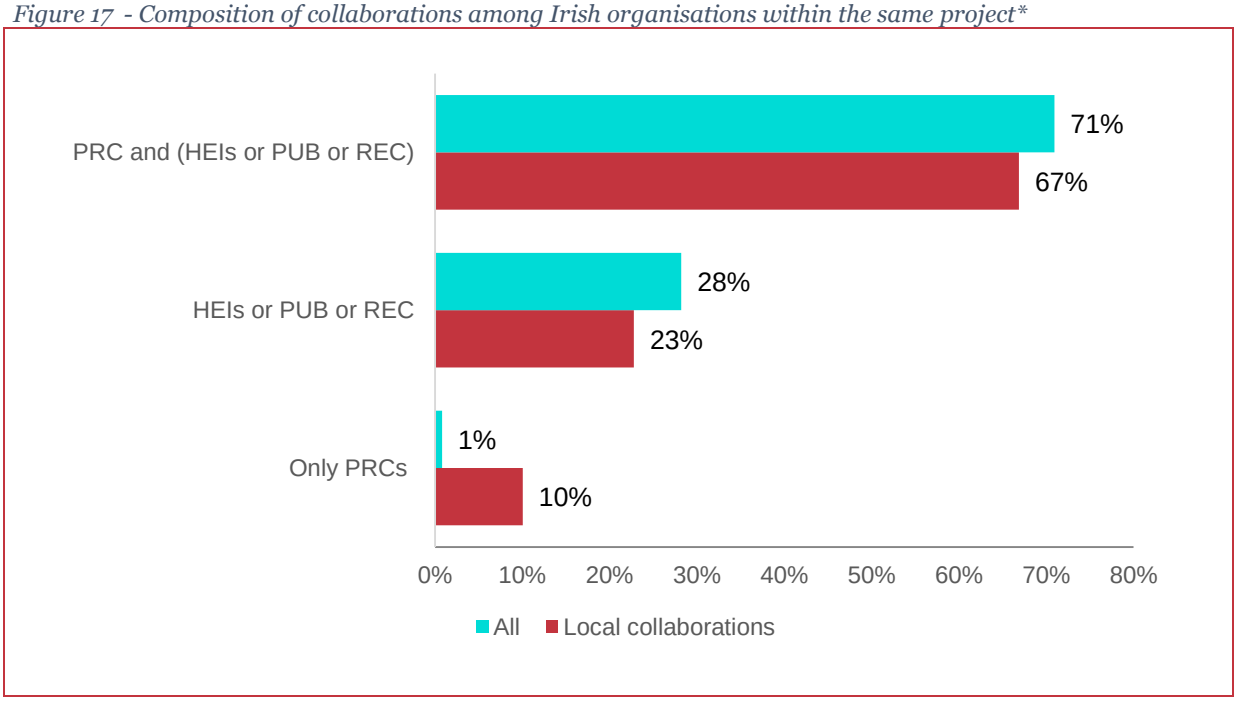
The majority of the collaborations in those 338 projects (71%) include an Irish company and either an Irish university, or public organisation or research organisation (226 projects, 15% of the 1,465 projects awarded to Irish organisations). A similar share is observed across all projects with participation of an Irish organisation (see Figure 17), which shows that such composition of stakeholders is common across all projects. There are considerably less instances of two or more public sector organisations within the same project and only 30 or so examples of projects with two or more Ireland-based companies. This analysis suggests university-company collaborations may be easier to construct, however, the figures show this is also a feasible platform for business-to-business links.

Of those 338 projects, 134 (40%) were led by an Irish organisation and included an additional 233 participations from other Irish organisations. It is reasonable to assume that in those instances the collaboration between Irish organisations has been stronger and has led to more tangible knowledge

transfer experiences (as opposed to taking part in projects where those organisations had been only partners in (usually) large consortia where they may have less opportunity to work closely).

The collaboration between Adama Innovations (a spinout company based at CRANN, the nanoscience institute in Trinity College) and Crospon, (a medical device manufacturer based in Galway) is a good example of one of the business-to-business collaborations within FP7. The project FaBiMed was set up to develop new manufacturing techniques, based on micromoulding, for biomedical microdevices. The project included the participation of nine additional partners from Germany, UK, Spain, and Portugal. The two Irish firms secured a combined drawdown of €0.6M (in terms of EC Contribution).

*Figure 17 - Composition of collaborations among Irish organisations within the same project**



Source: Technopolis 2016, based on CORDA. *HEIs= Higher Education Institution, PRC=Private for Profit organisation, PUB=Public Research Organisation, REC=research organisation.

Further analysis reveals that local collaborations create a space for stronger company participation. Out of total 833 participations, which had local collaborations, 370 are by companies (44%) (see Table 17). This compares to just 247 participations by companies out of the 1,127 participations in which there was no local collaboration (22%) (data not shown). This indicates that companies are more likely to have participations in projects when there is a local collaboration (e.g. by another company or HEI).

Furthermore, when HEIs take the co-ordination role, 66% of local participations are by companies (119 out of 180 in total) (see Table 17). This indicates that when HEIs take the co-ordination role, there is a relatively higher level of collaboration by Irish companies.

Table 17 - Distribution of participations in local collaborations, by type of organisation

Number of participations	HEIs	OTH	PRC	PUB	REC	Total
As Coordinator	81%	1%	15%	0%	4%	100%
As participant in a project coordinated by an Irish HEIs organisation	**20%**	**2%**	**66%**	**5%**	**7%**	**100%**

As participant in a project coordinated by other Irish organisation (Not A HEIs)	38%	6%	53%	2%	2%	100%
As participant in a project coordinated by other Non-Irish organisation	41%	5%	44%	5%	7%	100%
Total	**42%**	**3%**	**44%**	**4%**	**6%**	**100%**

Source: Technopolis 2016, based on CORDA

Summary of findings and conclusions

- Ireland performed strongly in terms of its leadership of FP7 actions, with Ireland hosting the project coordinator in around 30% of all of its participations. Ireland matches the project coordination activity and income levels achieved among our four selected comparator countries, and is substantially ahead of the average figures for all EU member states (EU 15 and EU28).
- The strong performance is less marked for the Cooperation Specific Programme, where Ireland provided the project coordinator for around 16% of all its Cooperation Programme projects. This is broadly in line with the selection of comparator countries, and around five percentage points ahead of the EU average. Ireland's universities have dominated the project coordination statistics.
- The pattern of Ireland's FP7 collaborations with EU MS and third countries is similar to the patterns observed among the four comparator countries, with a heavy focus on partnerships with other member states (90/10). The profile is similar when an Irish organisation leads, in comparison with when they take part as partners, although the latter gives them the opportunity to work in projects with Third countries in South America and South East Asia (and consequently access to a wider and more diverse network and knowledge).
- Compositional analysis of collaborations data indicates that 23 percent of Irish projects had local collaboration involving two or more Irish participants and that local collaboration seem to be an important driver for stronger levels of company participation in the Framework Programme overall.
- Finally, network analysis conducted by Fraunhofer ISI and Oxford Research shows that Ireland has become more attractive as a partner in FP7 (in comparison with FP6).

4 Participation in strategic initiatives

Evaluation questions

- What strategic initiatives did Ireland participate in (e.g. ERA-Nets, Joint Programme Initiatives)? How were they selected? To what extent? To what benefit? Are they being continued?

The following sub-sections describe Ireland's participation in three strategic initiatives:

- Marie Curie COFUND
- The Joint Technology Initiatives
- ERA-Nets

4.1.1 Marie Curie COFUND

Ireland performed strongly within the FP7 Marie Curie COFUND actions, securing eight COFUND programmes in total and €21.5M in EU contributions, which is approaching 10% of the total Commission funding for the scheme overall. This was a new initiative in FP7, and the level of Ireland's engagement is a good indication of the country's ability to identify and respond to new opportunities.

The Marie Curie COFUND action was introduced in FP7, as a new component of the broader Marie Curie programme. The COFUND action was introduced as a means by which to strengthen member states' existing or planned fellowship programmes by providing those funders or research performers with the funding needed to open up or provide for transnational mobility. The Marie Curie COFUND was intended to improve the career development qualities of national and regional programmes through this greater openness transnationally.

Ireland is among the top 10 countries that have made most use of the COFUND mechanisms in terms of both number of programmes and EC contributions. A total of €21.5M in EC contributions was secured and matched with €32.2M of national funding (40:60).

The following eight Irish programmes received FP7 COFUND awards, which are notable in part for the diversity of fields covered, from energy to health to autism and for the number of organisations that would not normally be associated with international fellowship programmes:

- ELEVATE, Irish Research Council International Career Development Fellowships, operated by the Irish Research Council. (EC Contribution: €5.4M)
- INSPIRE, IRCSET International Mobility Fellowships in Science Engineering and Technology, operated by the Irish Research Council. (EC Contribution: €5M)
- ASSISTID, Assistive Technologies in Autism and Intellectual Disability, operated by Respect (a charitable organisation financed by the Daughters of Charity Ireland). (EC Contribution: €3.5M)
- CARA Postdoctoral Mobility Fellowships in the Humanities and Social Sciences, operated by the Irish Research Council. (EC Contribution: €2.7M)
- Energy 21, UCD ENERGY 21 International Training and Career Development Programme, operated by University College Dublin. (EC Contribution: €1.8M)
- Starting Investigator Research Grant, operated by Science Foundation Ireland. (EC Contribution: €1.3M)
- The NBIPI Career Enhancement Mobility Programme, operated by the National Bio-photonics Imaging Platform, managed by the Royal College of Surgeons in Ireland partnering with a range of Irish and European research organisations. (EC Contribution: €1M)

- HRB/Marie Curie Post-Doctoral Mobility Fellowship Scheme, operated by the Health Research Board (HRB). (EC Contribution: €0.8M)

A study commissioned by the EU shows that host organisations of Marie Curie COFUND grants believe the new scheme provides valuable financial leverage –for both the Commission and member states – and offers the opportunity to inject an international dimension within regional or national needs in a manner that one cannot easily replicate through MCA Individual Fellowships[9]. According to the study, the COFUND programmes represent a more structured approach to funding researchers than that of the Individual Fellowships and grants, which are open to all fields of research. This means that in addition to access to EU resources to help fund a national career development programme, the COFUND action helps more researchers strengthen their international networks.

Our own interviews confirmed this view of the added value of the COFUND actions, which is to say access to finance (expanding volume of fellowships) and enhanced international engagement. However, relatively few of our interviewees had direct experience of the Marie Curie COFUND scheme, with most contributors simply noting that fellowships were not a focus for them, due to the remit of their agency or department.

The Irish Research Council was one of the few organisations consulted that had a formal target to secure co-funds, with a goal of winning grants for two programmes. In thematic areas, actors in both health and environment stated that they had either considered using co-funds themselves, or had been encouraging and advocating others to use them. Under Horizon 2020, we heard that the Strategic Research Proposals Group had been advocating greater use of such instruments to underpin plans to build a national position in areas of strategic interest to Ireland, and that such was underway in personalised medicine.

4.1.2 Joint Technology Initiatives and Public-Private Partnerships

Irish participation in the Joint Technology Initiatives (JTI) was limited, with a level of engagement that was considerably below what has been achieved for FP7 overall (0.6% versus 1.4% of EC Contribution secured by Irish organisations over the total funding available). Ireland was most actively engaged within the ENIAC nanoelectronics JTI. Key stakeholders argued that these initiatives continue to be of strategic importance, and that Ireland needs to redouble its efforts in order to purse engagement at a more appropriate scale within Horizon 2020.

Joint Technology Initiatives (JTIs) were new mechanisms introduced in FP7 as a way of realising more efficient investment by bringing together public-private partnerships at the European level.[10] This instrument combines private sector investment and/or national and European public funding, including grant funding from the FP and loan finance from the European Investment Bank (EIB).

The JTIs were proposed as a means to implement the Strategic Research Agendas (SRAs) of a limited number of European Technology Platforms (ETPs) where the scale and scope of the objectives was such that loose co-ordination through ETPs and support through the regular instruments of the FP were not sufficient. Furthermore, the European Commission set specific criteria to identify the areas where JTIs should be set up, specifically: the strategic importance of the topic; existence of market failure; concrete evidence of Community value added; evidence of substantial, long-term industry commitment; and inadequacy of existing Community instruments[11].

The process for the funding of projects was in some ways similar to the standard FP procedure, but there were two major differences for potential participants:

[9] FP7 Marie Curie Life-long Training and Career Development Evaluation: Individual Fellowships and Co-funding Mechanism, Ecorys, Final Report, February 2012

[10] CEC (2005), 'Report on European Technology Platforms and Joint Technology Initiatives: Fostering Public-Private R&D Partnerships to Boost Europe's Industrial Competitiveness', Commission Staff Working Document SEC (2005) 800, Brussels, 10.6.2005. https://ec.europa.eu/research/fp7/pdf/tp_report_council.pdf

[11] Idem.

- Participation involved two funding streams – a central JTI fund and national funding, with two separate grant agreements
- Not all EU Member States or Associated Countries were members of the JTI (variable geometry). While non-members could participate in calls, their potential funding was limited to the central funding portion only.

The five JTIs initiatives were:

- ARTEMIS: supporting research in the field of **embedded systems**, which is aimed at generating new and improved technologies and in applying them in products, processes or services
- ENIAC: a large scale, applied-research initiative mobilising all European efforts in the technology-intensive **electronics sector**. The main goal was to define the research and innovation priorities to ensure a truly competitive nanoelectronics industry in Europe. The focus was on industrial R&D in the 'More Moore' and More than Moore' domains, executed with a clear application focus. The ENIAC JTI also covered design, equipment and material R&D activities
- Clean SKY: a PPP between the European Commission and the European **aeronautics and air transport** industry aimed at developing breakthrough technologies at aircraft level and delivering in-flight demonstration of novel architectures and configurations enabling changes in environmental and economic performance
- **Innovative Medicines Initiative** (IMI): Europe's largest public-private initiative aiming to speed up the development of better and safer medicines for patients
- Fuel Cells and Hydrogen (FCH): supporting research, technological development and demonstration (RTD) activities in fuel cell and hydrogen energy technologies in Europe. Its aim is to accelerate the market introduction of these technologies.

There was a sixth JTI, "Global Monitoring for Environment and Security (GMES)," which was implemented through a different model, using a delegated agreement between the Commission and ESA, with the latter being co-financed to design and implement the space component of GMES and a related programme of research funded through the FP7 space research actions, which focused on the development of GMES-related services in application areas from emergency management to security.

Other PPPs include Factory of the Future (FoF); Energy-efficient Buildings (EeB); Sustainable Process Industry (SPIRE) and Future Internet (FI). The latter is dedicated to 'Internet innovation'. It is aimed at accelerating the development and adoption of Future Internet technologies, advancing the European market for smart infrastructures and increasing the effectiveness of business processes through the Internet. The 5-year programme is implemented via 3 phases and a number of projects. Phase 1 (2011-2012) and part of Phase 2 (2013-2014) took place in FP7. (https://www.fi-ppp.eu/)

Ireland has participated to a limited degree in four of the five JTIs (not in the Fuel Cells and Hydrogen JTI), having been involved in 29 JTI projects (13 in ENIAC) and amassing an EC Contribution of €6.8M (1.1% of Ireland's total drawdown from FP7), which represents 0.6% of the total available EC Contribution provided to the five JTIs through FP7. This is less than half the level of participation Ireland achieved across FP7 overall, which equated to around 1.4% of the total EC Contribution. Major participants in ENIAC include INTEL, UCD and Dublin City Council, while major participants in the IMI include EKF Diagnostics, Epidemico ltd, Hibernia College and UCD.

There were some significant participations in other PPPs, including the Factories of the Future (FoF); Energy-efficient Buildings (EeB); and the Future Internet (FI). For the latter, Ireland took 3% of the total EC Contribution available, which is higher than the average for its entire participation in the programme (1.4%).

Table 18 - Irish participation in Join Technology Initiatives

Joint Technology Initiatives	Number of projects with Irish participation	Number of Irish participations	Total EC contribution (Irish participants) (in € M)	As percentage of total EC contribution to Ireland
Embedded Computing Systems (ARTEMIS)	5	7	0.4	0.3%
Aeronautics and Air Transport (CLEAN SKY)	5	5	1.2	0.6%
Nano-electronics Technologies 2020 (ENIAC)	13	24	2.2	0.5%
Innovative Medicines Initiative (IMI)	6	9	2.9	0.7%
Total	29	45	6.8	0.6%

Source: Technopolis 2016, based on CORDA

Table 19 - Irish participation in Private-Public partnerships

PPPs	Number of projects with Irish participation	Number of Irish participations	Total EC contribution (Irish participants) (In € M)	As percentage of total EC contribution to Ireland
Factory of the Future (FoF)	7	13	4.0	1.0%
Energy-efficient Buildings (EeB)	14	25	7.5	1.8%
Future of Internet (FI)	8	14	5.9	3%
Total	29	52	17.4	1.5%

Source: Technopolis 2016, based on CORDA

Our high-level interviews revealed that involvement in strategic initiatives under FP7 had not been pursued at an appropriate scale. There were strong views that structures such as Joint Technology Initiatives and Public-Private Partnerships are very important for the future of Ireland's Framework Programme participation, and that opportunities had been missed or left unfulfilled throughout FP7 by not resourcing interaction in them fully over the life of the Programme. This was often assigned to financial and resource issues, but the lack of readiness of some companies and research groups was also offered as a reason.

High-level interviewees acknowledge Ireland's participation in Energy-efficient Buildings (EeB) and Factories of the Future (FoF) highlight this. Stakeholders largely believe that Ireland performed well under EeB, largely in relation to the presence of ICT performers. Interview partners told us that there was a long lead in period for potential participants in Ireland to realise the benefits of these structures.

4.1.3 ERA-NETS

Ireland took part in eight of the 31 ERA-NET projects funded through FP7. In most cases, the focus of these FP7 ERA-NET projects is closely linked with the Irish organisation's policy and research priorities. The ERA-NET instrument has also provided a platform for Ireland's science funders, to pool and leverage, with EU funds, the funds available nationally for basic science.

The objective of the ERA-NET scheme was 'to develop and strengthen the coordination of national and regional research programmes' such that the volume of research funded by member states might be

effectively increased as a result of improved coherence and reduced duplication. FP7 support for ERA-NET actions built on substantial work in FP6, and provided support through two specific actions:

- 'ERA-NET actions' - providing a framework for actors implementing public research programmes to coordinate their activities e.g. by developing joint activities or by mutually supporting joint calls for trans-national proposals. The great majority of the FP7 ERA-NETs fell in this category
- 'ERA-NET Plus actions'- providing, in a limited number of cases with high European added value, additional EU financial support to facilitate joint calls for proposals between national and/or regional programmes."[12] NORFACE PLUS (migration) is an example of such a project, with high EAV and Involvement by Ireland through the Irish Research Council for the Humanities and Social Sciences)

Ireland's government departments and research funders were partners in eight of the 31 ERA-NET projects funded through FP7, covering a range of different themes, from the economic viability of the rural economy (RURAGRI and the AFDA) to environmental health (ERA-ENVHEALTH and the EPA) to migration in Europe (NORFACE Plus and Irish Research Council for the Humanities and Social Sciences). In most cases, the focus of these FP7 ERA-NET projects is closely linked with the Irish organisation's policy and research priorities. For example, WoodWisdom Net 2 is concerned to improve coordination in materials science and engineering of relevance to the forest-based industries, which is a priority area for the Department of Agriculture Fisheries and Food as is the case for ERA-NET ROAD II (ENR2), which is combining the research efforts of national road authorities across Europe, including Ireland's NRA, and looking at ways to improve the safe operation and maintenance of the road network. The ERA-NET instrument has also provided a platform for Ireland's science funders, to pool and leverage, with EU funds, the funds available nationally for basic science (e.g. SFI and nanoscience through NanoSci-EPlus. Taken together, those eight ERA-NETs have produced around 35 participations[13], with around 31% in the area of 'Food, Agriculture and Biotechnology', where Teagasc has had an active participation (see Figure 18).

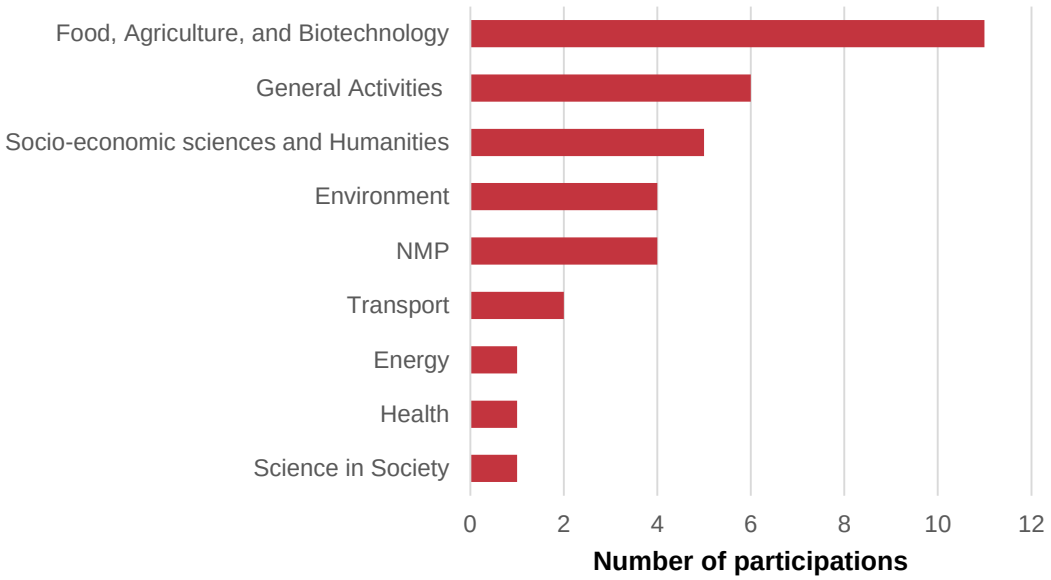
Involvement in ERA-NETs was a popular topic of discussion among interviewees. The great majority view them as very valuable, and as a worthwhile investment in boosting Ireland's strategic engagement and return from the Framework Programmes. The ERA-NETs also offer an opportunity to identify strategic opportunities and will continue to be springboard for projects in Horizon 2020.

There is a strong sense among interviewees that (in the future) Ireland could benefit from a more coordinated approach to participation in ERA-NETs. Coming together to strategically target specific opportunities, identifying specific agencies to undertake the engagement, and supporting this engagement through pooled funding could lead to important improvements.

[12] See http://cordis.europa.eu/fp7/coordination/about-era_en.html. Accessed on 26/05/16.

[13] This participation is higher than the overall participation in the programme: 2.2% (of the total participations in ERA-NETs) versus 1.5% (of the total participations in FP7)

Figure 18 - ERA-NETs, Cooperation programme (Irish participations)



Source: Technopolis 2016, based on CORDA

Summary of findings and conclusions

- Ireland performed strongly within the FP7 Marie Curie COFUND actions, securing eight COFUND programmes in total and €21.5M in EU contributions, which is approaching 10% of the total Commission funding for the scheme overall. This suggests that the country manage to make a good use of the resources made available through this new instrument.
- Irish participation in the Joint Technology Initiatives (JTI) was limited, with a level of engagement that was considerably below what has been achieved for FP7 overall (0.3% versus 1.4% of EC Contribution secured by Irish organisations over the total funding available).
- Ireland was most actively engaged within the ENIAC nanoelectronics JTI. Key stakeholders argued that these initiatives continue to be of strategic importance, and that Ireland needs to redouble its efforts in order to purse engagement at a more appropriate scale within Horizon 2020.
- Ireland took part in eight of the 31 ERA-NET projects funded through FP7. In most cases, the focus of these FP7 ERA-NET projects is closely linked with the Irish organisation's policy and research priorities. The ERA-NET instrument has also provided a platform for Ireland's science funders, to pool and leverage, with EU funds, the funds available nationally for basic science. Ireland could benefit from a more coordinated approach to participation in ERA-NETs. Coming together to strategically target specific opportunities, identifying specific agencies to undertake the engagement, and supporting this engagement through pooled funding could lead to important improvements.

5 Participant experience

Evaluation questions

- What was the participant experience of FP7?
- What were the drivers of and motives for participation?
- What was the level of satisfaction with the application process and administrative procedures?
- What was the benefit/impact of engagement with National Contact Points?

5.1 Participant's motivation and satisfaction

5.1.1 Motivation to participate

For universities and research institutes, access to funding is the most widely reported driver for participation in FP7, which is in line with results from past evaluations. This is closely followed by the intention to improve access to international scientific networks and enhance reputation (in the case of HEIs and research organisations). Businesses cite a cross-section of motivations, with a similarly broad endorsement of four or five distinct ambitions, ranging from support for developing a specific innovation through to progress a strategic goal or developing in-house capability.

We explored the different drivers that motivate applicants to engage with FP7 in our survey[14]. Looking across all survey respondents (including both successful and unsuccessful applicants) shows that the most widely reported driver to apply to FP7 was the potential access to funds. 81% of respondents stated that this was a significant driver (see Figure 19).

The access to financial resources was the most significant driver across all stakeholders (with the exception of 'other' participants), but this motivation was even stronger among HEIs and research organisations. Respectively 92% and 89% of respondents from those types of organisations stated that potential access to funds was a significant driver, encouraging them to apply to FP7 (see Table 20). In the case of companies, this is again a top driver but fewer respondents state it (61%). Also, this was deemed as equally important as the opportunity to progress the development of innovations (also reported as a significant driver by 61% of respondents from companies).

The potential access to financial funds has increased in importance among research organisations and companies in comparison with FP6. According to the Technopolis' evaluation (Forfás, 2009)[15] accessing research funding was the primary motive for the HEIs, but was only the fifth most important driver for research institutes and industry (and was ranked as less important by 'other' participants). That may indicate that research organisations and companies are struggling to find resources to fund R&D activities and more and more look at the framework programmes as a potential source of funding.

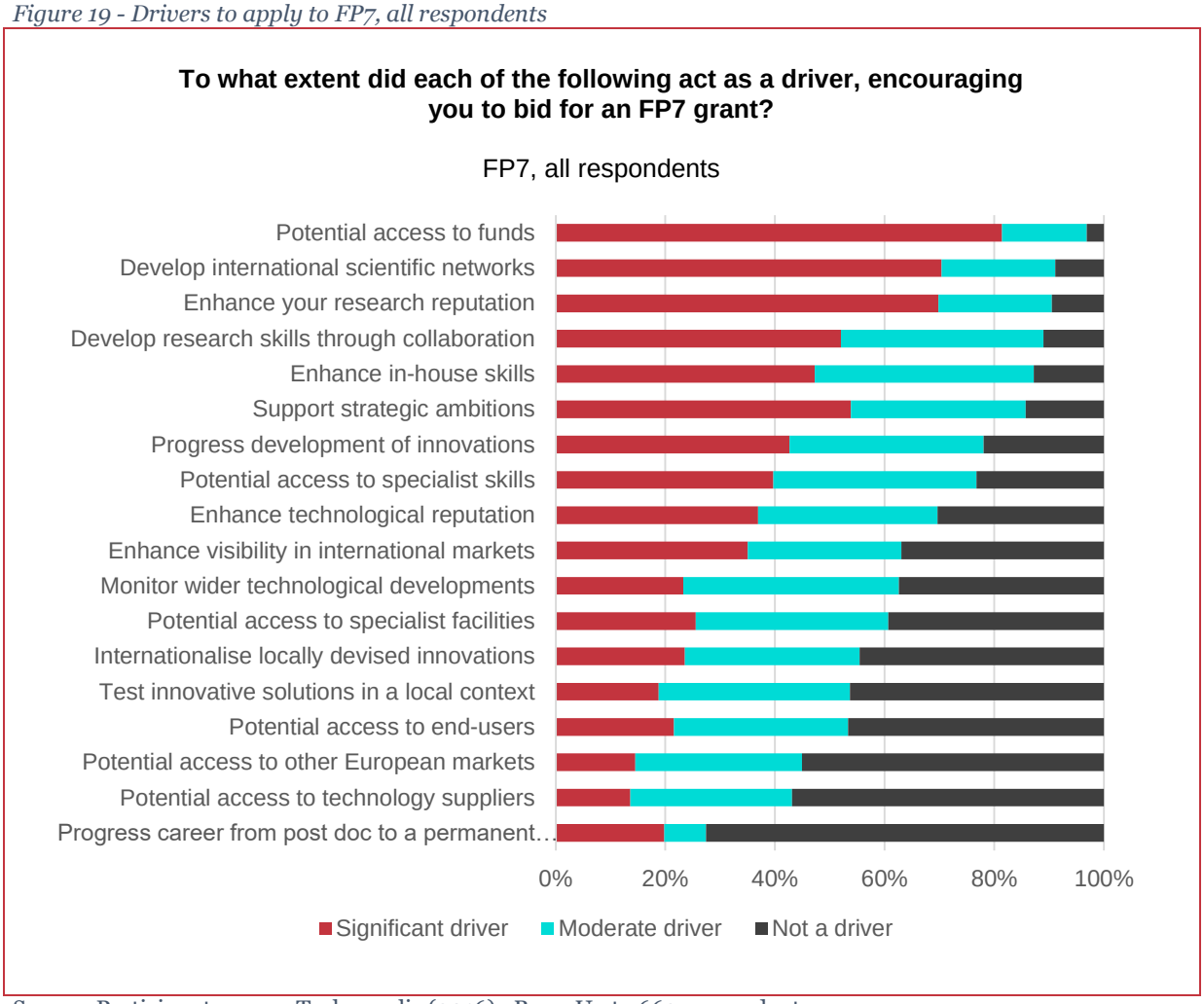
The second and third most widely reported drivers to apply to FP7 were the ambition to develop international scientific networks and to enhance research reputation. For each of these, 70% of respondents regarded them as significant drivers. These are the top 3 drivers from HEIs and research organisations as well. In the case of companies, the support of strategic ambitions and the desire to enhance in-house skills were a part of their top 3 drivers (see Table 20).

[14] A total of 729 individuals responded to the survey. The sample includes 276 FP7 successful applicants and 453 unsuccessful applicants, which represents a response rate of 25% and 10% respectively. Appendix A presents further description on the survey and response rates, while Appendix G presents the survey questionnaire.

[15] Forfás (2009) Evaluation of Ireland participation in FP6. Prepared by Technopolis.

Access to markets, end-users and technology suppliers appear at the bottom of the scale in Figure 19, however, between 53% and 43% of respondents consider it to be a moderate to significant driver for participation. This is higher among companies (between 63% and 66% report those issues as being significant or moderate drivers).

Figure 19 - Drivers to apply to FP7, all respondents



Source: Participant survey, Technopolis (2016). Base: Up to 662 respondents

Table 20 - Top 5 drivers across stakeholders (percentage of respondents that indicate that issue was a significant driver)

	HEIs	Research organisations	Companies	Other
Potential access to funds	92%	89%	61%	59%
Develop international scientific networks	79%	84%		61%
Enhance your research reputation	81%	78%		52%
Develop research skills through collaboration	56%	67%		
Enhance in-house skills		51%	57%	49%
Support strategic ambitions	53%		59%	53%

Progress development of innovations			61%	
Potential access to specialist skills			55%	

Source: Participant survey, Technopolis (2016). Base: Up to 662 respondents

5.1.2 Satisfaction

Participants recognise that the process of applying for and executing FP7 projects is quite challenging and time consuming, however, there is a consensus that this is a feature of the programme rather than a problem per se, and something any participant must adapt to.

The participant experience of FP7 has been described to us by our interview partners as being difficult but not unreasonable, with the expected criticisms of bureaucracy and workload generally offset by the benefits and learning of going through the process.

Each of the participants that we interviewed displayed similar attitudes. Regardless of which stakeholder group recipients belonged to, the consensus that emerged was that while the process of application was not easy, they had entered into it fully understanding the time commitments and standards of excellence necessary to succeed with an FP7 proposal. Several respondents stated that the rules of FP7 were comprehensive and relatively unambiguous.

Each of the participants described their learning processes when applying to FP7 as including knowledge exchange from an external expert, such as an NCP or a private consultant. This was noted as particularly important to understanding application sections on impact and management, as well as learning from best practice elsewhere. Several of our interview partners in this group also expressed an opinion that there should be more positive communication around FP7 to newcomers, to provide more balance to other pervasive, negative sentiments. Interview partners often expressed that positive communication, and concrete examples of success would better showcase what is possible through Framework Programme participation.

NCPs and those in positions within the support system reinforced the above, while adding that there had also been a lot of frustration with the application process. In particular, this group singled out the grant negotiation as having been the biggest area of complaint.

With respect to companies, and according to the opinions of our different interviewees, opinions tend to split three ways:

- Participants that are successful report a positive experience, which was very beneficial and has the potential to firm up their project plans in a way wouldn't have been reached otherwise
- Those who were unsuccessful but scored well are often buoyant enough to return to another application in the future.
- Those who were unsuccessful and scored poorly take a dim view of the Framework Programmes and rarely return.

A number of NCPs stated that there is an overarching correlation with the level of ability of the applicant, and their experiences, which is unsurprising.

Applicants from higher education institutions and research organisations were presented by NCPs and other stakeholders in the national system as being energetic and ambitious, but with a need to refine the approaches taken collectively as a country to understand how to leverage more success. In particular, we heard that there were often situations where academics and researchers would spread themselves too thinly, and not consider strategically or collectively which limited number of opportunities to pursue. This reportedly often resulted in lower levels of success and, occasionally, in direct competition between Irish partners.

In post-award scenarios, we heard that SMEs in particular found the funding system hard to understand under FP7, with some experiencing difficulties in getting money through the system due to complex consortium arrangements. Audits were often presented as having caused most difficulties, even following NCP-led training on procedures. The challenges faced by SMEs have been widely acknowledged by the Commission and a great deal of simplification has been implemented in Horizon 2020.

Within the academic community, we were told that grant management is difficult, due to having to balance this with existing teaching and research commitments. This is particularly pronounced in the Institute of Technology sector, where contracted teaching hours are up to 20 per week.

5.2 Engagement with National Contact Points

Ireland's FP7 applicants made good use of the country's network of National Contact Points (NCPs), with around two thirds of all applicants that responded to our survey having made use of the support on offer. Even allowing for some degree of positive bias, this suggests that a majority of FP7 applicants were in receipt of support. Our feedback shows that the applicant base made most extensive use of the NCP network's signposting functions and proposal writing advice. Moreover, a significant minority made use of various more involved activities such as assistance in searching for partners. The community perceive great advantages of engaging with NCPs, mostly related to understating critical success factors for applications and raising their awareness of the strategic importance of the programme. Given the positive differential performance of assisted applications, as compared with non-assisted bids (21% versus 12%), there would be benefit in exploring ways in which to increase the proportion of all applicants that have had some level of guidance and advice from the NCP network.

We investigated the engagement with NCPs through an assessment of the level of interaction - of both successful and unsuccessful applicants- across the different NCPs functions and an assessment of participant perceptions about the benefits that have emerged from that interaction.

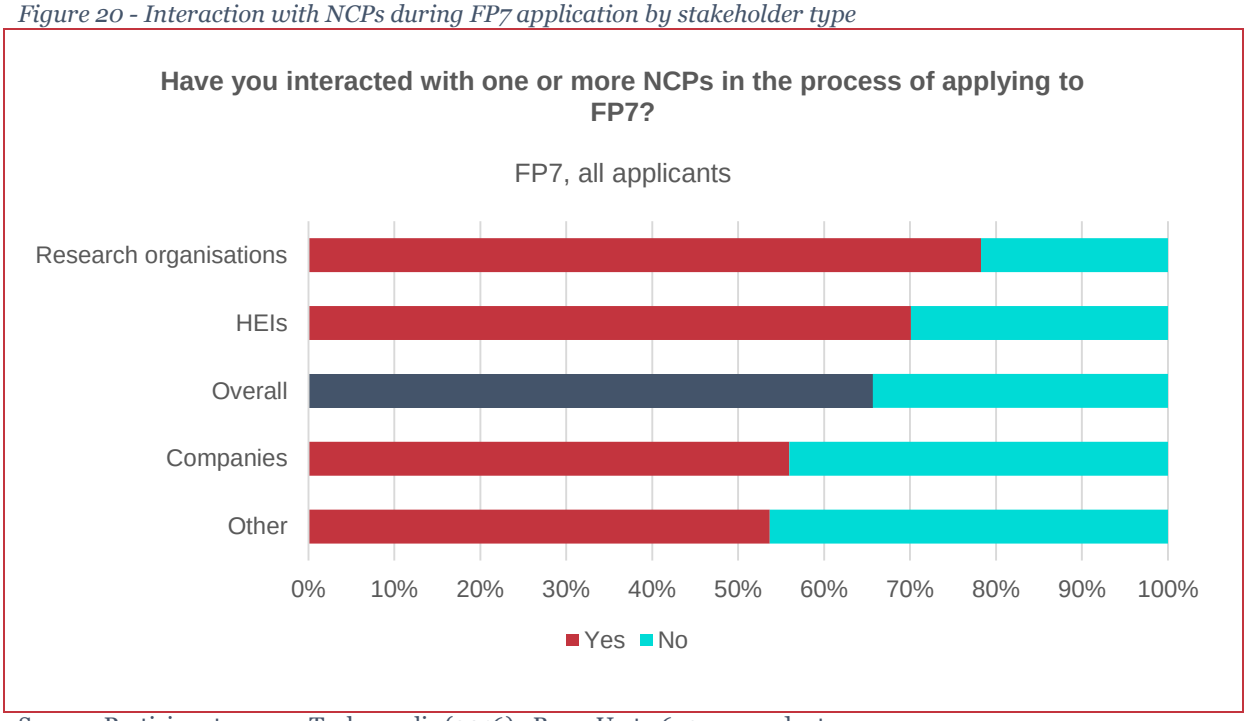
The National Contact Points have interacted with a majority of FP7 applicants. Overall, 66% of applicants that responded to our survey interacted with at least one NCP.

These results have to be taken with caution as applicants that did interact with the system support would have probably been more likely to answer our participant survey, as we assume that they would have felt more inclined to collaborate with our exercise. Consequently, the results regarding the relative number of applicants interacting with the NCPs could be overestimated. However, we do not expect any bias with respect to the level of applicants' interaction across functions or with respect to benefits obtained (once, of course, the distinction between successful and unsuccessful applicants is made).

Proportionally, research institutes were the group that interacted most with NCPs (78%). Higher education institutions were the next most active (70%) and companies third (56%). Organisations classed as 'other' use NCPs least, but this was also more than half of applicants in this group (54%).

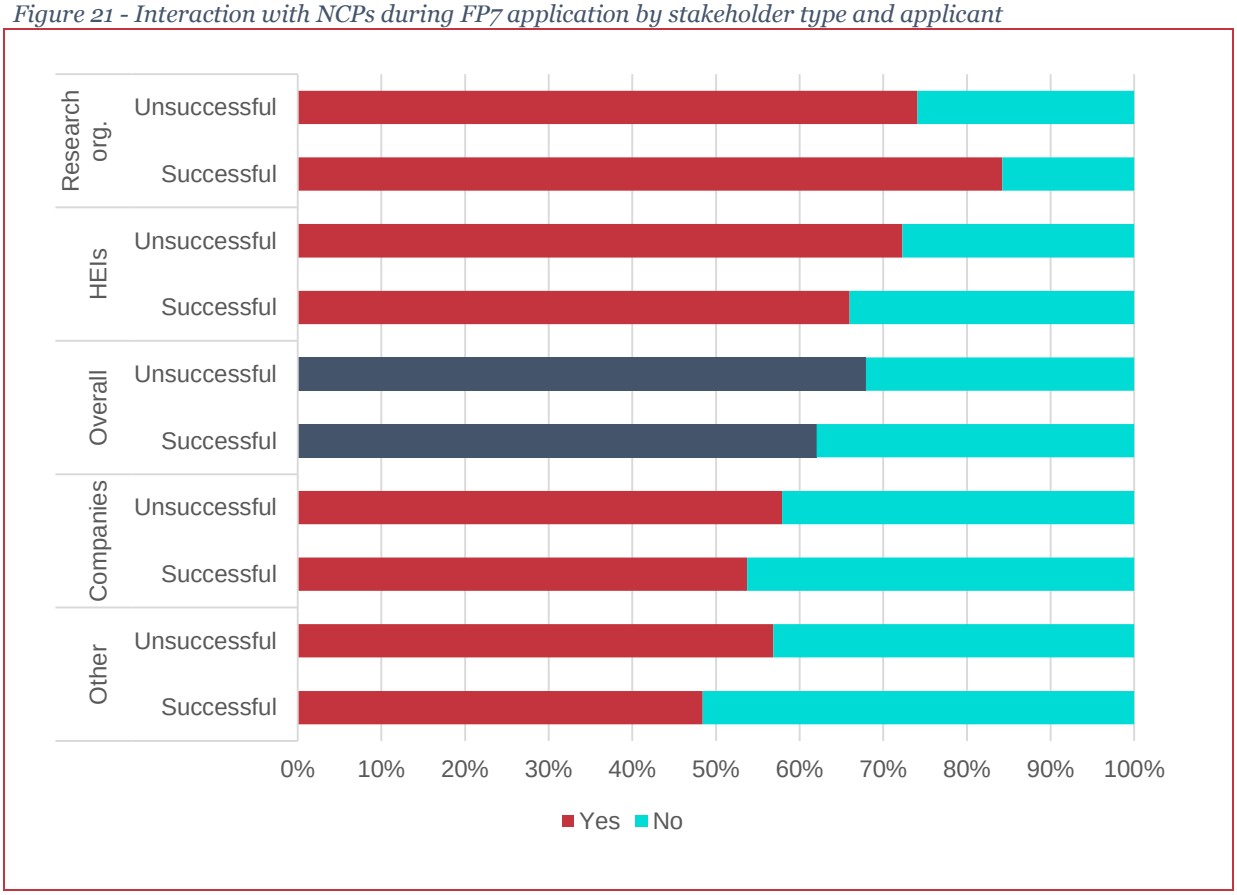
In terms of successful and unsuccessful applicants, we find that a relatively higher percentage of unsuccessful applicants report having interacted with NCPs, in comparison with successful applicants (68% and 62% respectively). This relative position remains true for all types of participants with the exemption of research organisations (see Figure 21). Given the size of the sample for unsuccessful applicants we cannot arrive to proper estimates of the success rate of applicants that have or have not interacted with the NCPs. Internal estimates prepared by the National Office suggest that success rate is considerably higher among those applicants that do interact with the NCPs (21-22% versus 12%).

Figure 20 - Interaction with NCPs during FP7 application by stakeholder type



Source: Participant survey, Technopolis (2016). Base: Up to 679 respondents

Figure 21 - Interaction with NCPs during FP7 application by stakeholder type and applicant



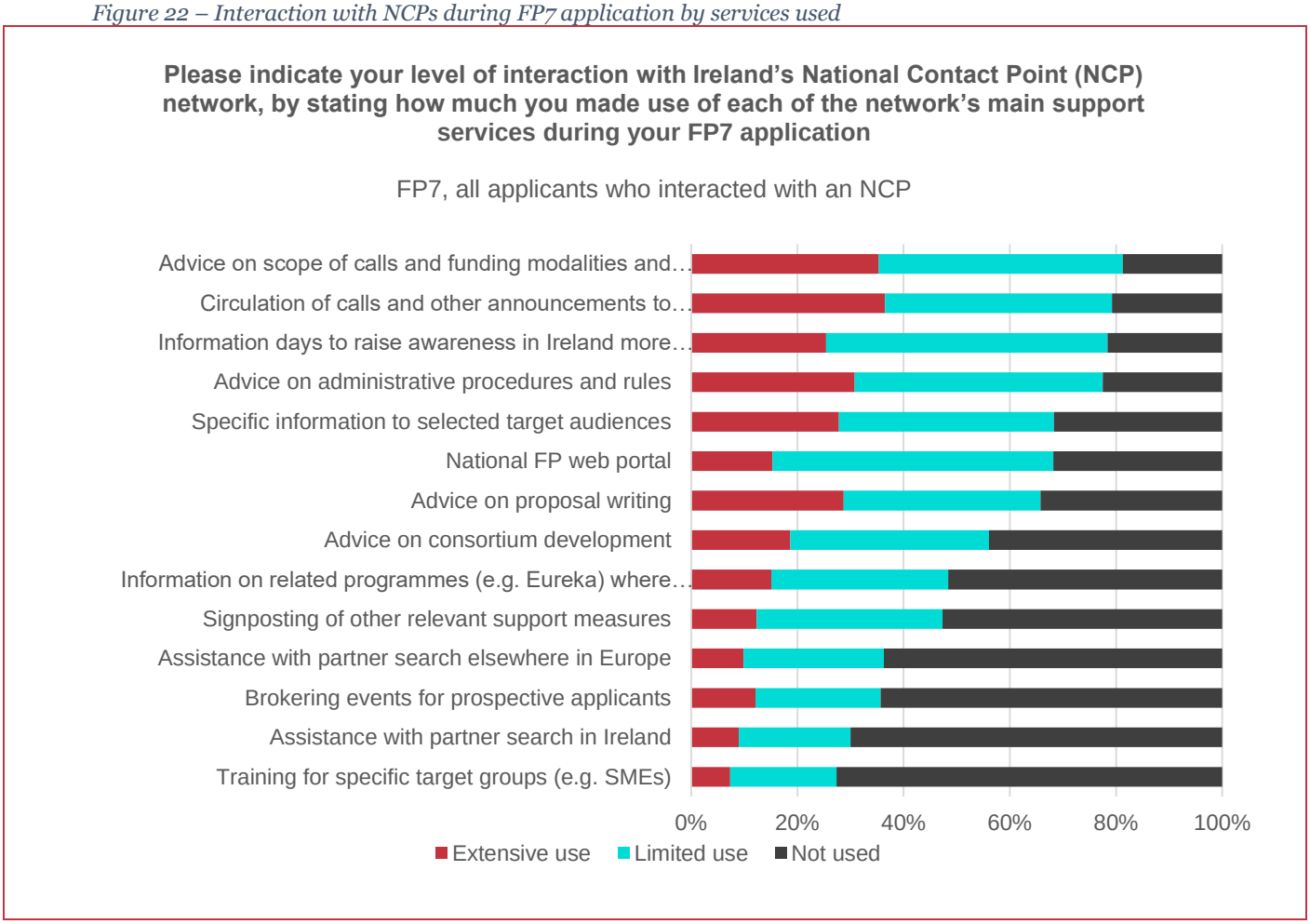
Source: Participant survey, Technopolis (2016). Base: Up to 679 respondents

Survey responses show that applicants to FP7 mostly used NCPs for advice and information. Advice on the scope of calls, funding modalities and instruments was the most widely used NCP service overall, with 84% of responding FP7 applicants stating either extensive or limited use. Circulation of calls and other announcements was next most widely used, by 79% of responding FP7 applicants (see Figure 22).

The least used NCP services was training for specific target groups (and apparently the least offered according to our participant interviews), with only 27% of respondents stating that they had used this service, and also the more involved activities such as assistance in searching for partners (inside or outside Ireland) or brokering events with prospective applicants.

This pattern of usage largely holds across all stakeholder types, though companies stated that they made more use of advice on administrative procedures and rules (78%) than other groups. There is little meaningful difference in the services used between successful applicants and unsuccessful applicants.

Figure 22 – Interaction with NCPs during FP7 application by services used



Source: Participant survey, Technopolis (2016). Base: Up to 422 respondents

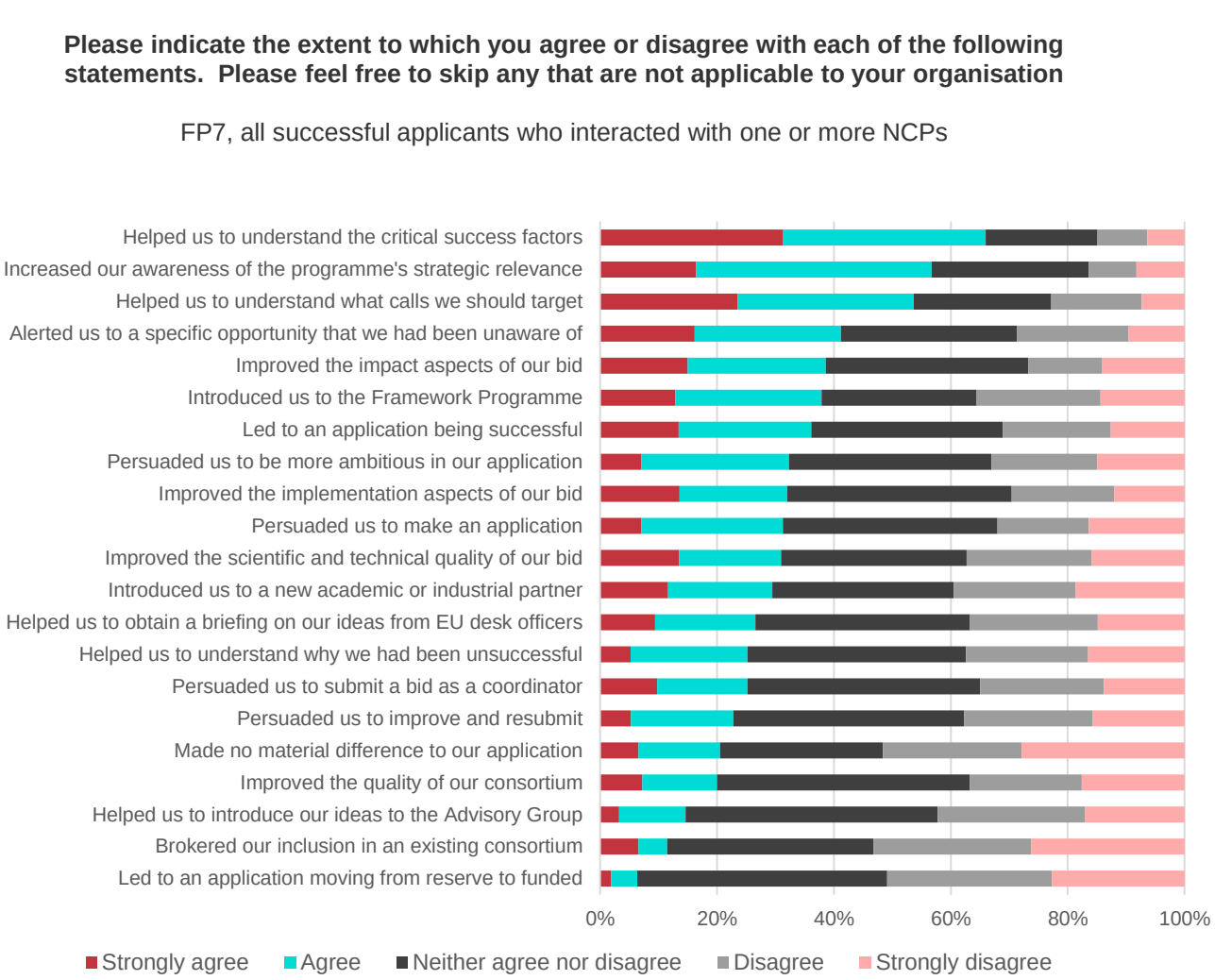
We asked successful applicants to indicate, in their view, what were the main benefits arising from the interaction with NCPs. Successful applicants were offered a menu of options in the form of statements and were asked to state whether or not they agreed or disagreed with each of them.

A large majority of the respondents stated that the interaction with one or more NCPs had helped them to understand critical success factors of writing an FP7 bid, where 66% strongly agreed or agreed with this statement.

A smaller, but still significant majority of respondents stated that the NCPs had helped them to understand the strategic relevance of FP7 (57%) and 54% of respondents stated that interaction with NCPs during their application to FP7 had helped them to understand which calls to target (see Figure 23).

36% of respondents agreed or strongly agreed that interaction with the NCP had improved the impact aspects of their bid to FP7. However, there are split views on this aspect as 36% state that they disagree or strongly disagree with the statement and 33% are neutral about it.

Figure 23 - Benefits of interaction with NCPs during FP7 application



Source: Participant survey, Technopolis (2016). Base: Up to 141 respondents

Looking across the different stakeholder groups reveals some interesting differences in the most widely reported benefits of NCP interaction. In order to facilitate the analysis we created scores allocating the value of 5 when the participant indicated that they strongly agree with the statement and 1 when they strongly disagree and using the distribution of responses as weights.

Based on these scores we identified the top 10 benefits for the overall sample and how the compare across the different stakeholders. The results are shown in Table 21. Highlighted in orange are the instances in which the majority indicated they agreed or strongly agreed with the statements, which equate to a score equal to 3.3 or higher. Scores for the 'other' type of participants are excluded as none of them were higher than 3.3.

This analysis shows that all different stakeholders agreed that NCPs had helped them to understand critical success factors and have increased their awareness of the strategic relevance of FP7. Additionally, the majority of HEIs and research organisations agreed or strongly agreed that NCP had helped them to understand what calls they should target, which would have presumably led to more strategic decisions.

Table 21 - Top 10 benefits (based on overall results), by type of stakeholder

Benefit of NCP interaction	Overall	Companies	HEIs	Research organisations
Helped us to understand the critical success factors	3.7	3.5	3.9	3.7
Increased our awareness of the programme's strategic relevance	3.4	3.4	3.4	3.7
Helped us to understand what calls we should target	3.4	3.2	3.5	3.7
Improved the impact aspects of our bid	3.0	3.1	3.1	2.8
Led to an application being successful	2.9	2.8	3.1	2.7
Improved the implementation aspects of our bid	2.9	2.9	3.1	2.6
Introduced us to the Framework Programme	2.9	2.8	2.9	2.8
Persuaded us to be more ambitious in our application	2.8	3.0	2.7	2.6
Improved the scientific and technical quality of our bid	2.8	2.9	2.8	2.6
Persuaded us to make an application	2.7	2.9	2.6	3.3

Source: Participant survey, Technopolis (2016). Base: Up to 141 respondents

Summary of findings and conclusions

- Regarding motivation to participate, access to funding is the most widely reported driver for participation in FP7 among universities and research institutes, which is in line with results from past evaluations. Other widely reported motivations are improved access to international scientific networks and enhanced reputation (in the case of HEIs and research organisations).
- Businesses cite a cross-section of motivations, with a similarly broad endorsement of four or five distinct ambitions, ranging from support for developing a specific innovation through to progress a strategic goal or developing in-house capability.
- Our analysis reveals that engagement with the National Contact Points (NCPs) has been strong. Ireland's FP7 applicants made good use of the country's network of National Contact Points (NCPs), with around two thirds of all applicants that responded to our survey having made use of the support on offer. Even allowing for some degree of positive bias, this suggests that a majority of FP7 applicants were in receipt of support.
- Our feedback shows that the applicant base made most extensive use of the NCP network's signposting functions and proposal writing advice. Moreover, a significant minority made use of various more involved activities such as assistance in searching for partners. The community

perceive great advantages of engaging with NCPs, mostly related to understanding critical success factors for applications and raising their awareness of the strategic importance of the programme.

- Given the positive differential performance of assisted applications, as compared with non-assisted bids, there would be benefit in exploring ways in which to increase the proportion of all applicants that have had some level of guidance and advice from the NCP network.

6 Main outcomes and benefits

Evaluation questions

- What were the benefits of participation? For individuals, for SMEs, multinationals, public research organisations?
- What were the outputs of research?
- Were there commercialisation outcomes?
- How did Marie Curie participation contribute towards career mobility for researchers?

6.1 Main benefits

FP7 has delivered a series of benefits to participant organisations that range from enhanced access to international scientific networks; to improvements in technological capacity and investments; to improvements in an organisation's ability to attract researchers; and tangible results in terms of commercialisation of research outcomes and improved national and international competitiveness.

We explored the main outcomes and benefits arising from FP7 through our participant survey, which have been categorised as described above.

Access to networks

As shown in Figure 24, 94% of FP7 participants that replied to our survey reported that participation in FP7 had a positive impact (from low to high) in terms of improving their international networks (85% stated that the impact has been high or moderate impact). Furthermore, 89% stated that the impact has been positive in terms of increasing access to international experts and in improving their international reputation (91%). Results are very similar when looking at the overall sample of participants and when isolating the results for companies (see Figure 25).

Research and technological capacity and investments

Virtually all respondents indicate that FP7 participation has had a positive impact in terms of increasing their understanding about the subject (97%) and on scientific capacity (89%) (see Figure 24).

In terms of R&D capacity and attitude, there is also a high percentage of participating organisations indicating that FP7 has increased their ability to collaborate on R&D projects and to participate in high risk R&D (85% and 70% respectively). Positive impact was also widely reported in terms of increased technological capacity. Again results are very similar when looking at the overall sample of participants and when isolating the results for companies (also in Figure 25).

Willingness to invest in R&D or in innovation projects was somewhat lower with 58% and 57% of respondents indicating that FP7 has had a positive impact on this aspect. This is markedly different among companies where 70% and 77% of respondents cite a positive impact on their willingness to invest in R&D and innovation projects, respectively, due to their participation in FP7.

Ability to attract researchers

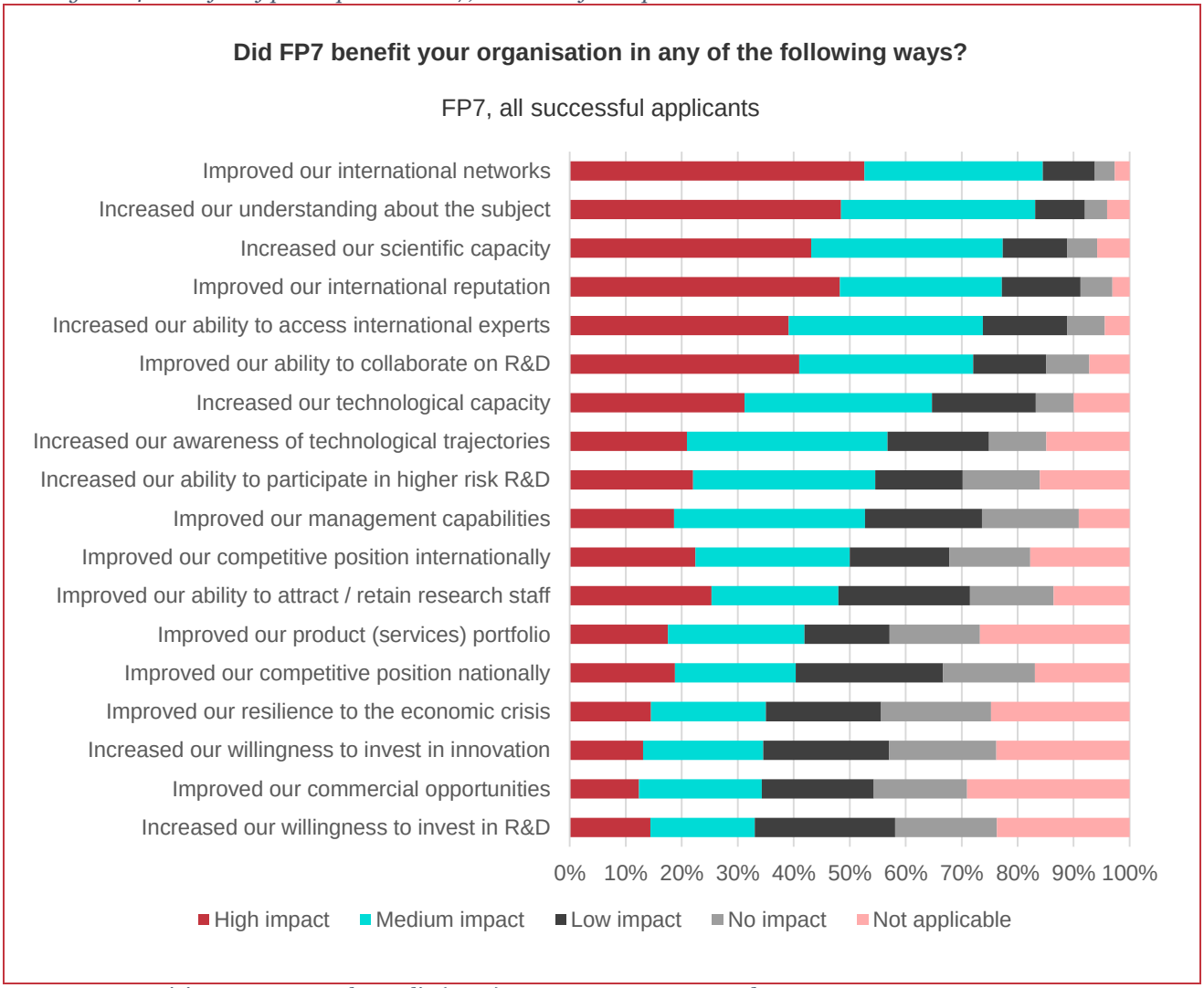
FP7 has also contributed to participant organisations' ability to attract and retain research staff, and this result is stronger for the overall sample (high impact=25%, medium impact=23%, low impact=24%) in comparison with the results for companies (high impact=21%, medium impact=11%, low impact=25%).

Commercialisation and competitiveness

More than half of respondents also stated that participation in FP7 has had a positive impact in terms of improving their portfolio of products/ services. These results are even stronger for companies where 75% stated that there has been a positive impact and 33% stated that the impact has been high (in comparison with 18% for the overall sample). Two thirds of companies also state that participation in FP7 has led to improving their competitive position internationally and 78% state that they have seen an increase in commercial opportunities due to their participation in FP7.

These results presented in this sub-section go in line with prior findings from the evaluation of Irish participation in FP6. In this report, Technopolis found that "the main positive benefits realised by FP6 participants come in the form of (i) improved relationships and networks, (ii) increased understanding and knowledge, (iii) enhanced reputation and image and (iv) increased scientific capabilities. The FP6 projects also bestow significant benefits in related areas such as increased technological capabilities, improved planning of research, improved ability / capacity to carry out research / training, and improved competitive position nationally and internationally"[16].

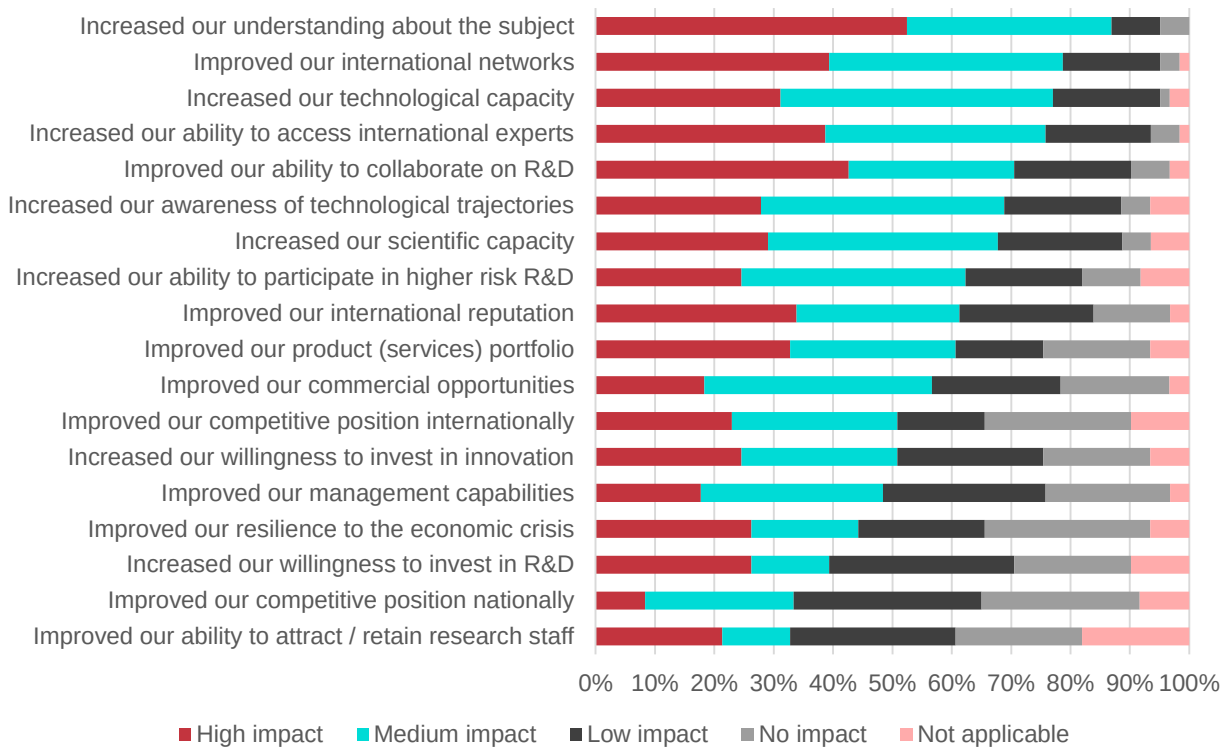
Figure 24 - Benefits of participation in FP7, all successful respondents



Source: Participant survey, Technopolis (2016). Base: Up to 228 respondents

[16] Forfás (2009) Evaluation of Ireland participation in FP6. Prepared by Technopolis.

Figure 25 - Benefits of participation in FP7, all successful respondents (companies)



Source: Participant survey, Technopolis (2016). Base: Up to 62 respondents

6.2 Research and commercialisation outcomes

Participation in FP7 has produced tangible research commercialisation outputs. We estimate that circa 228 patent applications and 196 license agreements have been generated from FP7 that are specific to Ireland. This is equivalent to 0.2 patents and 0.1 license agreements per project.

We asked survey respondents to report on the commercialisation outcomes that emerged from Fp7 and that were specific to Ireland, including patent applications, licence agreements and income, and spin-outs.

More than one third of (successful applicants) provided some information on these outcomes (59 out of 276 respondents), which we present in Table 22. We used these figures to 'gross-up' commercialisation outcomes for Ireland in FP7 overall. To do so, we take into account the value of the projects that correspond to the outcomes reported in the survey.

According to our analysis, those 59 responses (which account for 45 patent applications) correspond to a total of 76 projects with a combined value of €23.0M in EC Contribution. The remaining 217 responses correspond to 212 projects with a combined value of €70.4M in EC Contribution. Assuming the respondents that did not have a commercialisation outcome to report skipped this question, we can see that the 288 projects led to 45 patent applications, which is on average 0.2 patent applications per project; this also implies that €93.4M in EC contributions led to 45 patent applications or around 0.5 patent applications / €M EC contribution.

This patents / project estimate is in line with figures presented in the final FP7 Monitoring Report (2013),[17] which shows that a total of 1,291 patent applications were reported across 7,288 projects, which also equals to an average of 0.2 patent applications per project. Furthermore, according to Technopolis' evaluation of Irish participation in FP6 (Forfás, 2009), each project produced, on average, 0.1 patent applications, which suggests an overall improvement in commercialisation outcomes. This is only an indication, as the average project size has increased somewhat across the two programmes and there is a slight upward trend in patenting more generally (e.g. the European Patent Office saw the annual number of patent applications increase by around 8% across the 7-year programming period of FP7).

Based on those estimates and the total number of Irish projects (and of EC Contribution to Irish organisations) we produced gross estimates. We calculate that each € million of EC Contribution led to 0.4 patent applications (228 patent applications / €625M).

We also collected information on licence agreements and spin-outs through our survey as shown in Table 22. However, we do not provide grossed-up estimates, as it seems that the information provided by respondents could be slightly overestimated.

According to calculations made by Knowledge Transfer Ireland, a total of 20 licenses and a total of 13 spin-outs had a EU-funding component (not necessary all related to FP7). The estimations looks at the EU funded spinouts and licenses from 2008-2015 (1 year post start of FP7 and 2 years post end of FP7, to allow for a time lag at either end).

Table 22 - Commercialisation outcomes of FP7 projects

Output	Results based on survey responses	(Estimated) Total (Based on total projects and total drawdown*)	Outcome per € million (based on total drawdown)
Patents and licenses			
Number of patent applications made as a result of your participation in FP7	45	228	0.4 per €M
Number of license agreements made linked with FP-enabled patents or other IP	21		
Value of license income linked to your FP7 IP (in 2015)	€1.0m		
Spin-outs and external investments			
Combined value of external investments (e.g. angel, VC, IPO, etc.) secured followed participation in FP7	€9.8m	€50m	0.1 per €M
Number of spinout companies launched as a result of your participation in FP7	12		
Combined employment at those spinouts (at the end of 2015)	55 (25)		
Combined turnover of those spinouts (in 2015)	€6.2m		
Estimated combined value of those spinouts (in 2015)	€28.0m		

Source: Participant survey, Technopolis (2016). Base: Up to 59 respondents. *Total projects =1,460; total drawdown= €625M. ** Estimations are based on the report of 25 employees from 11 spinouts (i.e. it excludes company that reported 30 employees).

[17] https://ec.europa.eu/research/evaluations/pdf/archive/fp7_monitoring_reports/7th_fp7_monitoring_report.pdf#view=fit&pagemode=none, Access: 21/04/16

The box below showcases an example of a spinout that has emerged from FP7. The example reveals how FP7 funding allowed the development of the idea that led to the new company's formation but also how the development needed the support from the available national funding.

Box 3: fuseami

Fuseami is a good example of a product that was initially development under Fp7 support and was further advanced by national funding.

In 2009, TSSG (Telecommunications Software & Systems Group) - led by Kevin Doolin- secured funds from the €11M FP7 project 'SOCIETIES', which "dealt with discovering, connecting and organising people, resources and things across physical and digital spaces". The project included 16 partners from 10 countries, including UK, Norway, France, Greece among others. In Ireland, the project included the participation of TSSG but also Lake Communications and Intel.

Based on trials and feedback that took place during the project, TSSG (Mr. Doolin) applied for national funding in Ireland to commercialise 'the most powerful aspects of the SOCIETIES project'. They obtained a €400k grant from the Enterprise Ireland Commercialisation Fund programme.

The first product to be developed was the networking app, fuseami (https://fuseami.com/), which allows conference attendees to have a personalised conference agenda and allows people to discover and form communities of like-minded people.

The first phase of this funding was completed in October 2014 and developed the first iteration of the product. The second phase commenced in November 2014, and has run until September 2015.

Following this they have founded fuseami Ltd and spun the company out of TSSG. They have now secured further EU funding through the Fiware Accelerator. This has allowed them to hire a CEO and 2 key developers.

Source: Kevin Doolin

6.3 Career mobility

Ireland was fully engaged with Marie Curie, and benefited from substantial numbers of incoming early career researchers, bringing to Ireland their particular scientific experience and international networks. Ireland has also seen quite large numbers of its own researchers taking advantage of the scheme, as a means by which to progress their own careers and broaden their horizons internationally. Our survey confirmed the substantial benefits gained by FP7 MC Fellows in terms of mobility, career progression, promotion and reinsertion. Moreover, the greatest benefits derived from the fellows working with leading overseas research groups and the extension of their international scientific networks.

We explored the effect of Marie Curie awards in terms of career mobility through our participant survey. We asked respondents to indicate whether or not they were awarded a staff exchange, doctoral training and/or individual fellowship. For each type of awardee we provided a menu of relevant (potential) benefits and outcome. We have understood and tackled the issue of mobility from a broad perspective; going beyond geographical mobility and covering also issues of career progression and promotion, move from academia to industry (or vice-versa). We have also covered other potential benefits, including access to international networks and facilities.

A total of 76 respondents have been awarded at least one type of MCA award, distributed as follow: 16 staff exchange, 13 doctoral training and 47 individual fellowships. We have pulled them together and also grouped the different benefit categories offered to them, as shown in Table 23.

Figure 26 shows the analysis across all types of awardees using the grouped categories of benefit. Additional survey analysis can be found in Section C.1 .

The figure shows that – similarly to the benefits explored across other types of participants, access to international networks features prominently as the main type of impact, with 96% of respondents

stating that the MCA award allowed them to work with leading overseas research groups and improve their network of international contacts.

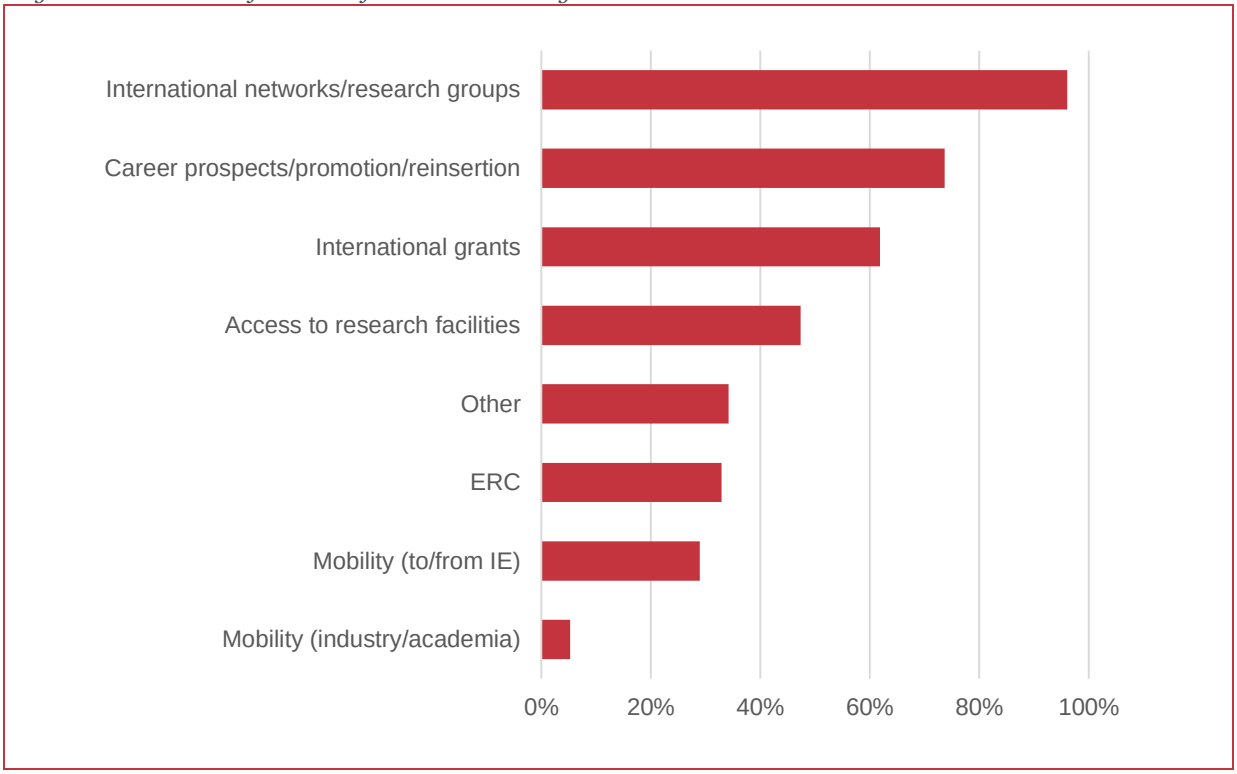
There were also effects in terms of career progression, with three quarters of respondents stating that the MCA has led to improvement in career prospects and/or to career promotions and even to the possibility of reinserting themselves in a research post after a career break. 60% also stated that the MCA award has improved their ability to win international research grants. One third also stated that the MCA award has been a stepping-stone to facilitate a subsequent ERC application.

A relatively small percentage of survey respondents (29%) state that the MCA award led them to take an appointment in Ireland or elsewhere in Europe or to move to Ireland from a post abroad. Only 5% stated that the MCA award led to a move from academia to industry (or vice-versa).

Table 23 - MCA: Type of benefits

Types of benefits	Issues covered
Career prospects/promotion/reinsertion	• Improved my career prospects • Brought forward my progression from post doc to academic • Brought forward my promotion • Brought forward my promotion to a higher academic grade • Helped me to restart my research career following a break • Helped me reintegrate within EU research returning from an international post
Mobility (to/from IE)	• Made possible my appointment to a post elsewhere in Europe • Made possible my appointment to a post in Ireland • Made it possible for me to move to Ireland from a post abroad
Mobility (industry/academia)	• Facilitated my move from academia to industry • Facilitated my move from industry to academia
International networks/research groups	• Allowed me to work with leading overseas research groups • Improved my international networks • Extended and improved my network of international contacts
Other	• Allowed me to access better doctoral training • Increased my level of interaction with non-academic partners
Access to research facilities	• Allowed me to work at major international research facilities
International grants	• Improved my ability to win international research grants
ERC	• Prepared me for making an ERC application

Figure 26 - Main benefits arisen from Marie Curie grants



Source: Participant survey, Technopolis (2016). Base: 76 respondents

According to the interviews conducted in the context of our ICT case study (Section 9) participant organisations perceive that MCA contributes to building their reputation and credibility:

- It is a tool for the institutions' postdocs to gain experience internationally (2 years mobility) and to strengthen their position in the community and networks. This also benefits their publication records and indirectly adds prestige to their 'mother' institute. There is also the element of knowledge transfer: when they return they share the gained knowledge and skills with the other postdocs in their institute.
- There is the benefit of staff exchange, which implies access to facilities that are not available in the 'mother' institute (e.g. data sources) to carry out research. It improves the credibility of the publications.
- Joint PhD programmes (i.e. co-supervision) increase the quality of the PhDs and the reputation of the institute.
- It is a tool to gain additional expertise (even if short term) for doing relevant research.

In line with our survey findings, interviewees stated MCA has limited effect on the ability to attract researchers from abroad. The research institutions seem to struggle in retaining their foreign PhD students, both those trained in the institution itself as well as the ones participating in the MCA. Interviewees considered that especially in the field of ICT, PhDs have most to gain from moving on and continuing their postdoc outside of the institution and especially in industry.

The relatively modest results in terms of geographical mobility also go in line the findings from a Marie Curie long-term evaluation report[18].

The report uses a researcher mobility index that combines different 'mobility-related' variables (i.e. across countries, disciplines and sectors). The index shows higher mobility among Eastern Europe

[18] Economist Associati (2014), "Marie Curie researchers and their long-term career development: a comparative study"

citizens (e.g. CZ, HU, PL etc.), as well as researchers from Iberian countries (ES and PT), and conversely lower mobility indexes in UK, IE, FR, NL, SE.

Summary of findings and conclusions

Main outcomes and benefits

- FP7 has had a series of positive benefits on participant organisations. Access to international networks as well as advancements in knowledge and scientific capacity are the top benefits that have emerged from participation in FP7.
- There have also been positive effects concerning research and technological capacity of participant organisations and in the willingness to invest in R&D and innovation projects.

Research commercialisation

- Participation in FP7 has had tangible research commercialisation outputs. We estimate that circa 228 patent applications have been generated in terms of commercialisation outcomes emerging from FP7 that are specific to Ireland. This is equivalent to 0.2 patents per project.
- Additionally, Knowledge Transfer Ireland estimates that a total of 20 licenses and 13 spin-outs have emerged in the period 2008-2015 and can be attributed to EU funding component (not necessary all related to FP7).

Career mobility

- Marie Curie Actions contribute towards career mobility for researchers in terms of career progression. MCA does not seem to have significant effects regarding mobility in terms of geography or sector, and this goes in line with prior findings for the Marie Curie long-term evaluation study.
- Marie Curie Actions are also a good platform for fellows to get access to international expertise and extend their networks. It is also a tool for the institutions' postdocs to gain experience internationally. This also benefits their publication records and indirectly adds on prestige to their 'mother' institute. There is also the element of knowledge transfer: when they return they share the gained knowledge and skills with the other postdocs in their institute.
- There is also the benefit of staff exchange, which implies access to facilities that are not available in the 'mother' institution (e.g. data sources) to carry out research.

7 Synergies with National RDI System

Evaluation questions

- What were the effects of the domestic and international economic environments on the policy and funding environment for FP7 and Horizon 2020?
- What was the impact of FP7 on the national R&D environment?
- Did national R&D supports leverage FP7 supports and provide synergies? Did FP7 funding duplicate investment?
- What are the links between the funding opportunities in FP7 and the Irish R&D system for Irish-based companies?

7.1 Effects of domestic and international environment on participation

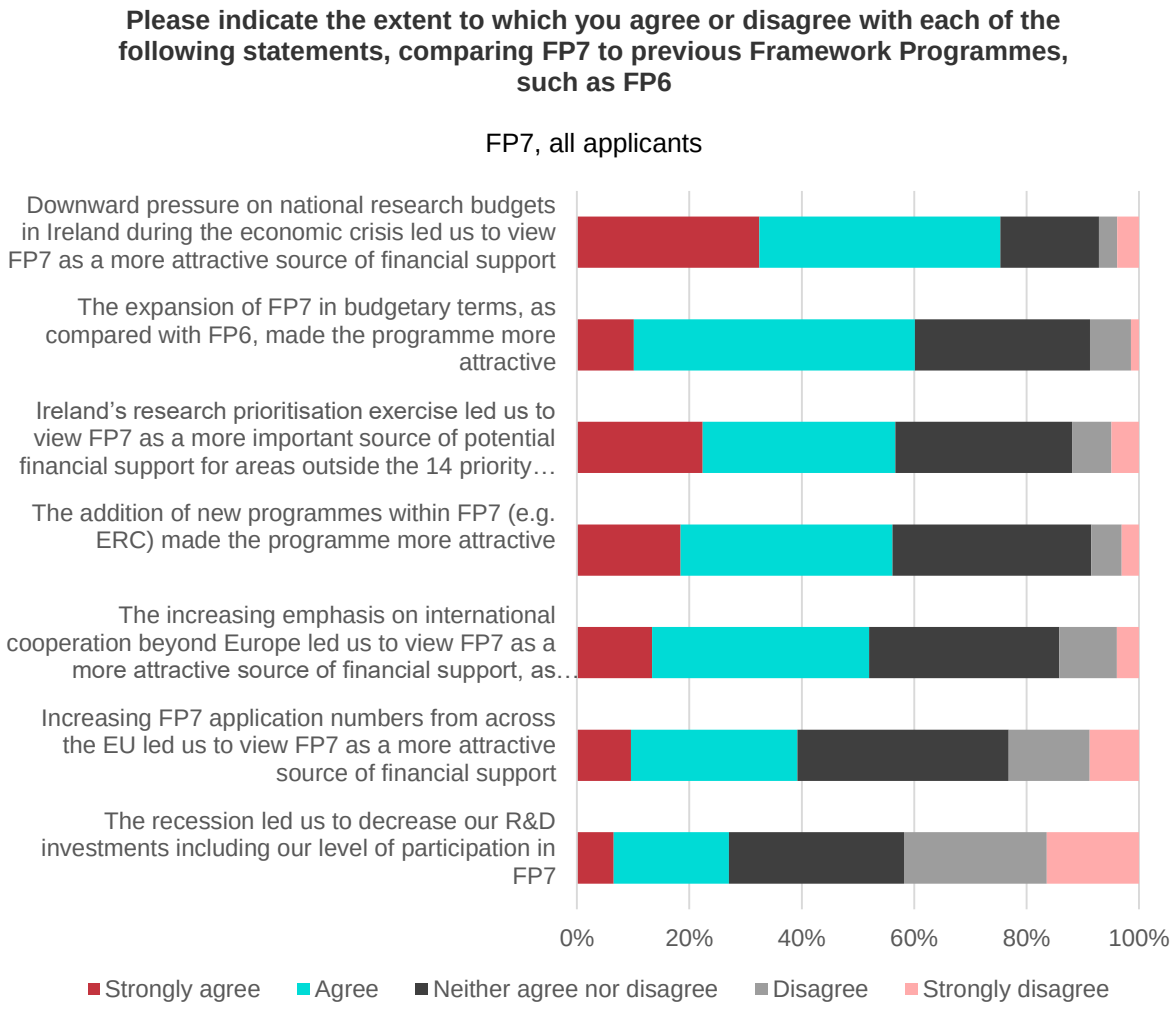
Pressures within the domestic environment did have an effect on Ireland's applications to FP7, with the economic crisis placing a downward pressure on many national budgets, thereby encouraging organisations to make applications where they might otherwise have looked for national support. This applies especially to the public sector.

We investigated the extent to which changes in the domestic and international environment (including changes in the FP7 instruments and rules) had affected participation in the programme. Survey respondents were provided with a list of statements and were asked to indicate the extent to which they agreed or disagreed with each of them.

The majority of FP7 applicants who replied to this question reported that FP7 was made more attractive by the downward pressure on national research budgets in Ireland during the economic crisis. 75% of respondents either agreed or strongly agreed with this statement. This is in line with our findings regarding the main drivers for participants in FP7, especially within the academic and research institute sectors, and the fact that 'access to funds' has increased its importance as a driver in comparison with FP6 (particularly among research organisations and companies (see Section 5.1.1).

The expansion of the budget for FP7, as compared with FP6, was also reported widely as a factor in making the programme more attractive. 60% of respondents to this question either agreed or strongly agreed with this statement. 57% of respondents to this question agreed or strongly agreed that the National Research Prioritisation Exercise in Ireland led them to view FP7 as more important, in so far as it funds areas that are outside of the programme. This view may be influenced by an attitude towards Horizon 2020 rather than FP7, as the Research Prioritisation Exercise was launched in early 2012, around two years before the end of FP7. In terms of wider contextual issues, very few respondents to this question (27%) agreed or strongly agreed that the recession led to them reducing their R&D investment levels, which implies that organisations tried to protect their R&D related budgets, probably looking for alternative sources of funding.

Figure 27 - Attractiveness of FP7



Source: Participant survey, Technopolis (2016). Base: Up to 208 respondents

7.2 Links between national R&D supports and FP7

We found a number of positive links between national R&D and FP7, beginning with a view from HEIs and public research organisations in particular that national programmes provide a valuable underpinning for subsequent success within the European RTD Framework Programme. There are also examples of research fields that sit outside national research priorities where FP7 has provided access to funding that would not have been available locally.

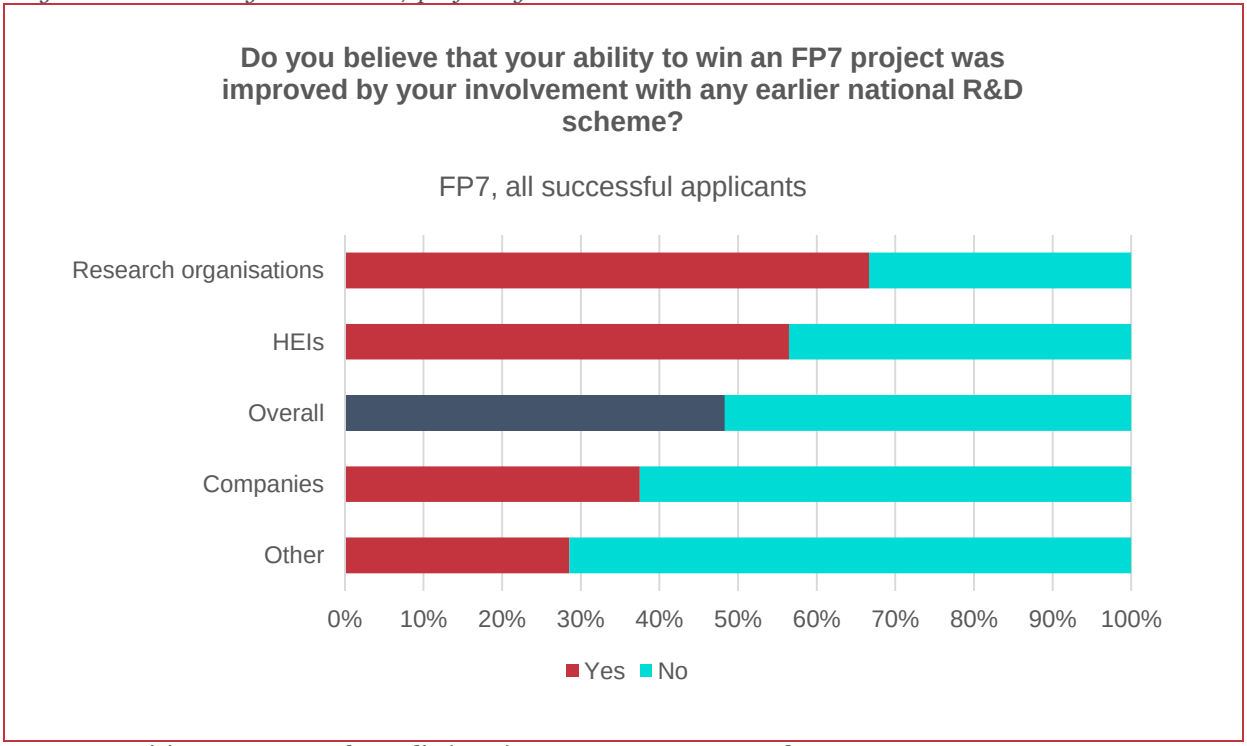
We explored how access to national R&D support interacts with applicant ability to participate in FP7 afterwards and the extent to which a project or development supported through FP7 was later on complemented or supported by a national programme.

Overall, similar proportions of respondents reported that their ability to win an FP7 project was improved by their involvement in earlier national R&D schemes (48%) as those who did not believe this was the case (52%).

There is a clear separation between the different stakeholder groups (see Figure 28). 67% of research organisations believe involvement in earlier national R&D schemes helped them to win an FP7 project, and 56% higher education institutions, compared to 38% of companies and 29% of 'other'

organisations. Results for research organisations have to be taken with caution due to the small sample (15 respondents).

Figure 28 - The ability to win an FP7 project by involvement in national R&D schemes



Source: Participant survey, Technopolis (2016). Base: Up to 207 respondents

The use of national R&D support to continue FP7 work has been less common. Overall, a minority (24%) of FP7 applicants who responded to this question benefited from direct national R&D support for their FP7 project. The group who most widely reported receiving direct national R&D funding for the FP7 project was research organisations, with 53% (but again results have to be taken with caution due to the small number of replies). Next were higher education institutions (28%), followed by organisations classed as 'other' (21%). This was least widely reported in applicants from companies (11%) (see Figure 29).

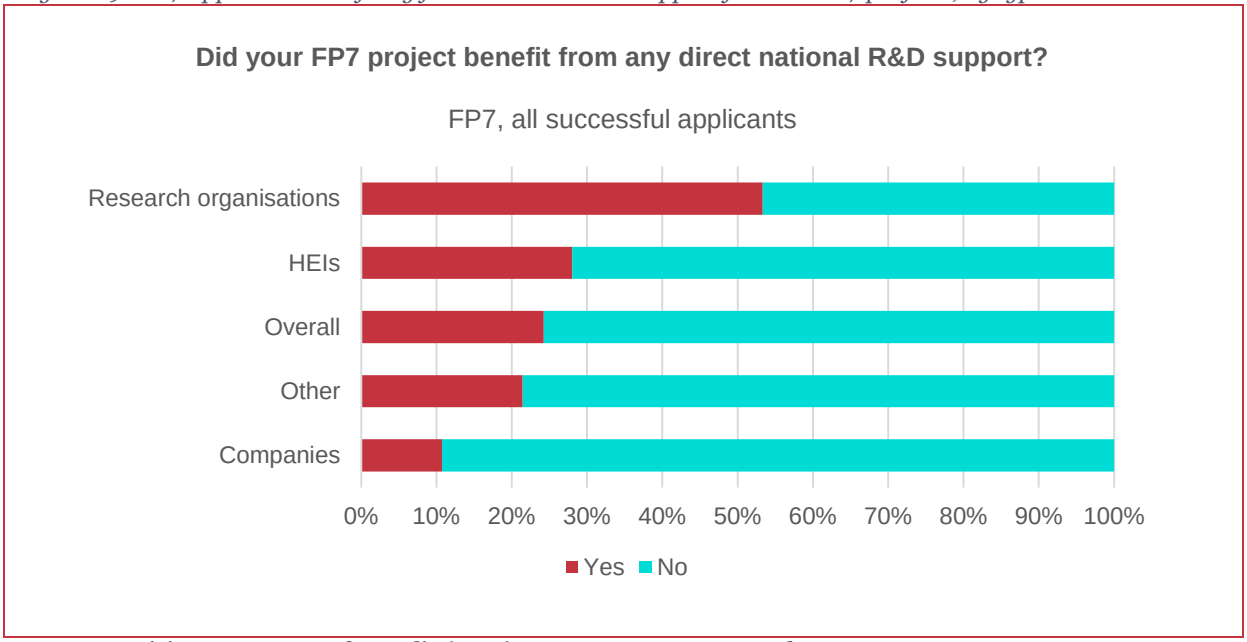
There seem to be good reasons why FP7 projects were not followed up with national funding and these reasons point towards the complementarity of FP7 with the national RDI system.

Respondents were offered a menu of options and were asked to choose all the relevant options. The most widely reported reason for not receiving national R&D support for an FP7 project was that there was no national funding available in the same research area as their FP7 project (35%). The second most widely reported reason for not receiving national R&D support for an FP7 project was that the project addressed a European issue rather than a national issue (29%).

National funding being unable to fund international partners was the third most widely reported reason for not receiving national R&D support for an FP7 project (28%), followed by there being no national funding available for the type of activity performed by the project (also 28%).

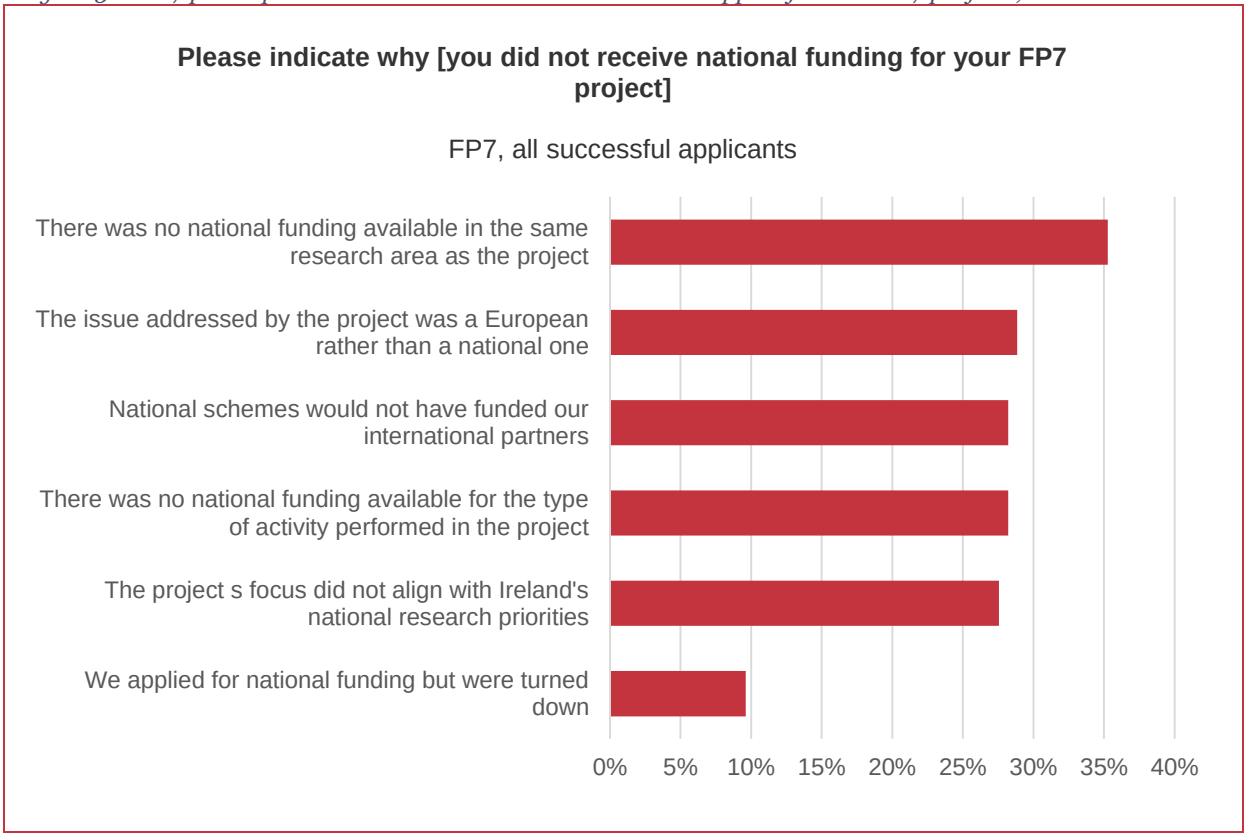
The project not aligning with Ireland's national research priorities was reported by 28% of respondents to this question as the reason that their FP7 project did not receive national R&D support. Least widely reported was having applied for national funding and being turned down, with only 10% of respondents to this question stating that this was the case.

Figure 29 - FP7 applicants benefiting from national R&D support for their FP7 projects, by type



Source: Participant survey, Technopolis (2016). Base: Up to 206 respondents

Figure 30 - FP7 participants who did not receive national R&D support for their FP7 projects, all



Source: Participant survey, Technopolis (2016). Base: Up to 55 respondents

A majority of those interviewed believed that Ireland's national STI policies were well aligned with the EU programmes, and produced substantial synergies and complementarities

A minority was less positive about the degree to which the national and EU levels are well aligned, though this related mostly to thematic areas where there may be less of a research agenda, such as transport. Other areas, such as environment, were thought to be diffuse and thus without a distinct natural national focus, which also included significant elements such as water being outside of the national Smart Specialisation Strategy. This is not to say that the activities of Irish researchers and companies were not aligned with European priorities, as this was repeatedly praised.

Several remarked on the opportunities for support in areas outside the identified national priorities, but this view is mixed. To a number of interviewees, this is a limiting factor, which leads to a lack of national research funding for some areas. Others believed that this was a positive, which drove those who were not eligible for national research funding toward the Framework Programmes. This is largely supported by the composition analysis of FP7 participation, set out in section 2.3.3, and in particular Table 8, which shows that circa 60% of the drawdown from FP7 corresponds to areas outside the 14 research priority areas.

7.3 Links between the funding opportunities in FP7 and the Irish R&D system for Irish-based companies

7.3.1 Participation in EI and IDA grants

We identify an important pool of EI and IDA client companies that have not taken part in FP7. Those companies (circa 1,600 in total) represent an untapped potential in terms of prospective applicants and participants in future FPs.

As mentioned in Section 2.4.1.4, 61% of companies that took part in FP7 (i.e. successful applicants) are EI or IDA clients. In this section, we expand the analysis to account for unsuccessful applicants but also for those EI and IDA clients that do not take part in FP7, to understand the extent to which:

- Companies use both national funding and FP7 funding for R&D activities
- Some EI and IDA clients are not active in FP7 (and could in the future be targeted as Horizon 2020 participants).

In order to obtain a view of these overlaps (or lack thereof) we focus the analysis on access to EI and IDA R&D related support and/or FP7 (but have not excluded those companies that were part of FP7 and may have been awarded other national grants).

The number of firms (before matching their participation in the EU programme and national programmes) for the period of analysis (2007-2013) is as follows:

- EI clients: 1,557 firms (who had EI R&D support approved)
- IDA clients: 160 firms (who had IDA R&D support approved)
- FP7 applicants: 1,060 firms, out of which 373 are successful applicants (this is different from the 332 figure shown in Section 2.3.1, as further cleaning of ID codes and names allowed identification additional unique participants)

We have pooled these three sources of information and have then looked at the overlaps between FP7 applicants and EI and IDA clients separately in Figure 31 and Figure 32.

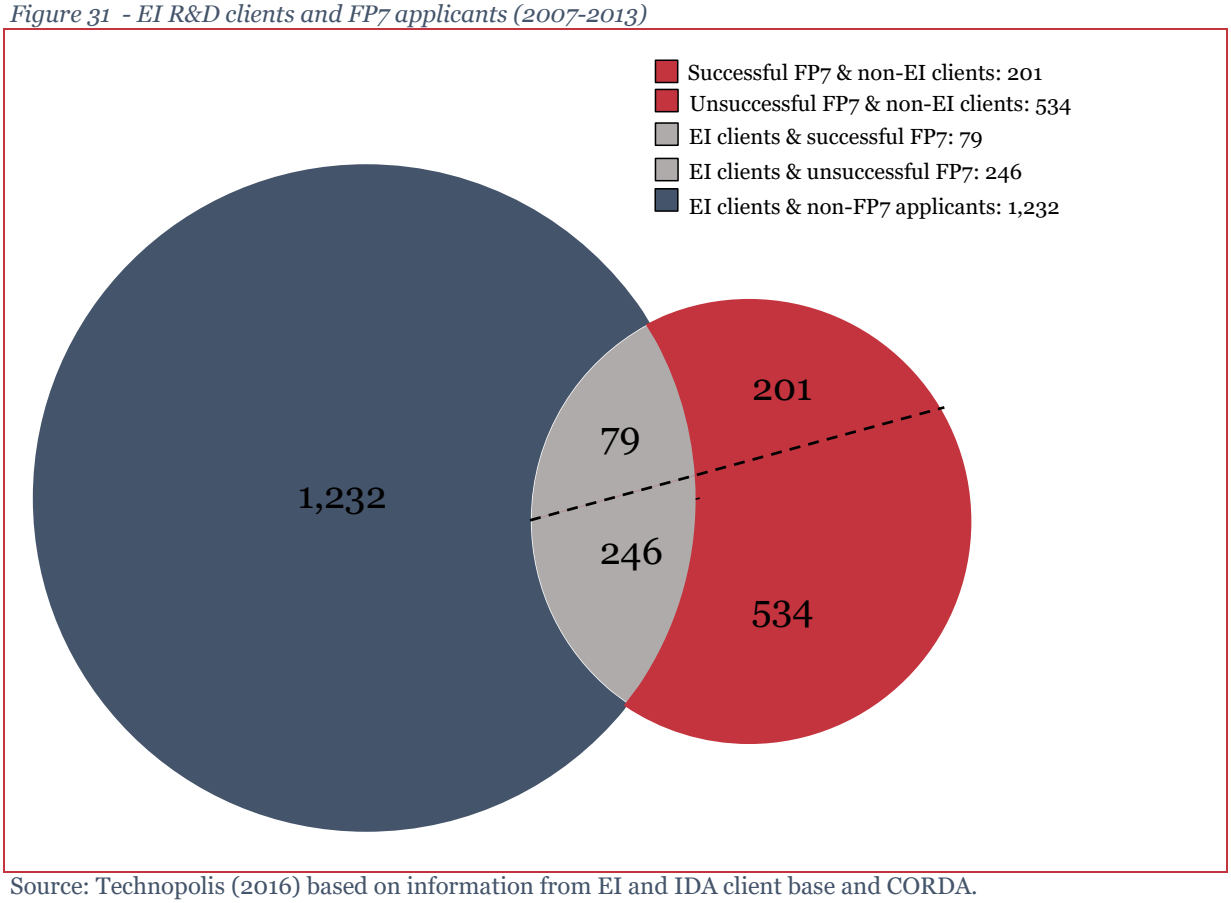
Figure 31 shows the analysis of overlaps between FP7 applicants and EI clients. The analysis is based on a total of 2,351 companies (of which, again 1,557 are EI clients). Again, this analysis focus on clients that are recipients of R&D related support, given that those are the companies for whom participation in FP7 is more relevant (in comparison with companies that have only taken part in other schemes, such as the support provided for lean production or entreprenuership).

A total of 1,478 EI client companies (for R&D support) have not participated in FP7. This includes 1,232 companies that have never applied to FP7 and 246 companies that have applied to the programme, but have not been succesful. This pool of 1,478 companies may include good candidates

for future iterations of the programme (i.e. Horizon 2020). Only 79 of the companies were successful in FP7 and also had an R&D support from EI.

Furthermore, there are 735 that have applied to FP7 but have not been EI clients (R&D support) (this includes 201 succesful applicants and 534 unsuccesful applicants). This reveals that there is a large group of companies that do not use the national R&D schemes but made use of the European support offered through FP7[19].

Figure 31 - EI R&D clients and FP7 applicants (2007-2013)



Source: Technopolis (2016) based on information from EI and IDA client base and CORDA.

Figure 32 shows the results for IDA clients. We have a total of 837 firms in this analysis (of which, again 160 are IDA clients), which excludes EI clients.

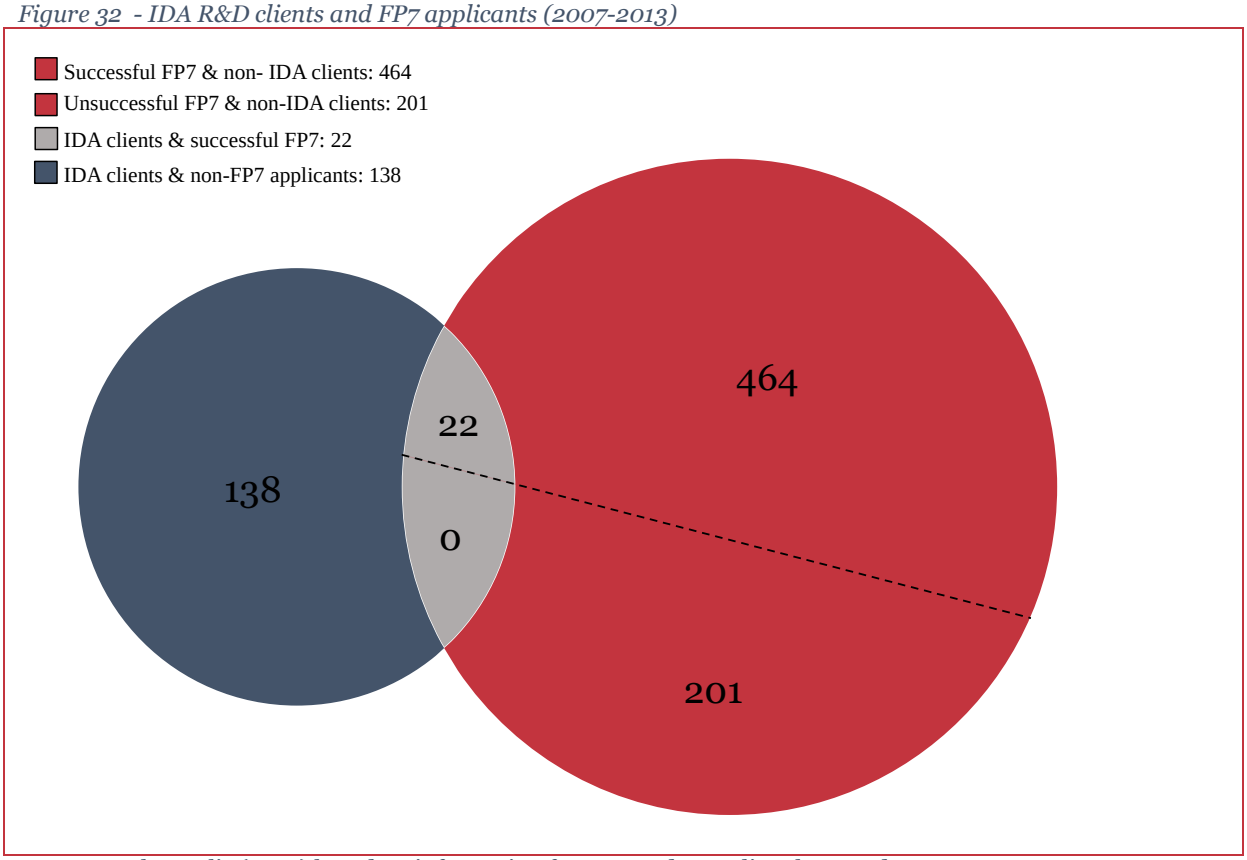
A total of 138 client companies (for R&D support) have not participated in FP7. Again, this pool of companies may include good candidates for future iterations of the programme (i.e. Horizon 2020). Only 22 of the companies were successful in FP7 and also had an R&D support from IDA. This mostly includes companies in the manufacturing and IT sector such as Intel (manufacturing of electronic components), IBM, Pfizer, LM Ericsson, and United Technologies Research Centre (UTRC).

Furthermore, there are 665 that have applied to FP7 but have not been IDA clients (R&D support) (this includes 464 succesful applicants and 201 unsuccesful applicants). However, these group

[19] Additionally, 59 companies have had another type of EI grant (e.g. capacity building, internationalisation, etc.) along with an FP7 project, but they are not included in the graph.

includes firms of different origins and consequently could include companies that are not potential clients.[20].

Figure 32 - IDA R&D clients and FP7 applicants (2007-2013)



Source: Technopolis (2016) based on information from EI and IDA client base and CORDA.

Finally, it is worth noting that companies that took part in SFI's CSETs and/or Strategic Research Cluster programmes were also involved in FP7. Of these companies, 40 companies (out of 174) took part in the programme (with 126 participations between them and total drawdown of €44.6m). Eight of them are MNCs, including Intel, Ericsson, IBM and Microsoft.

Figure 33 shows the distribution of firms that have applied for support from EI across different EI sectors[21]. The figure also shows the distribution for firms that are successful FP7 applicants and have applied for support from FP7 across the EI sectors (this analysis includes all EI grants and support, not only R&D).

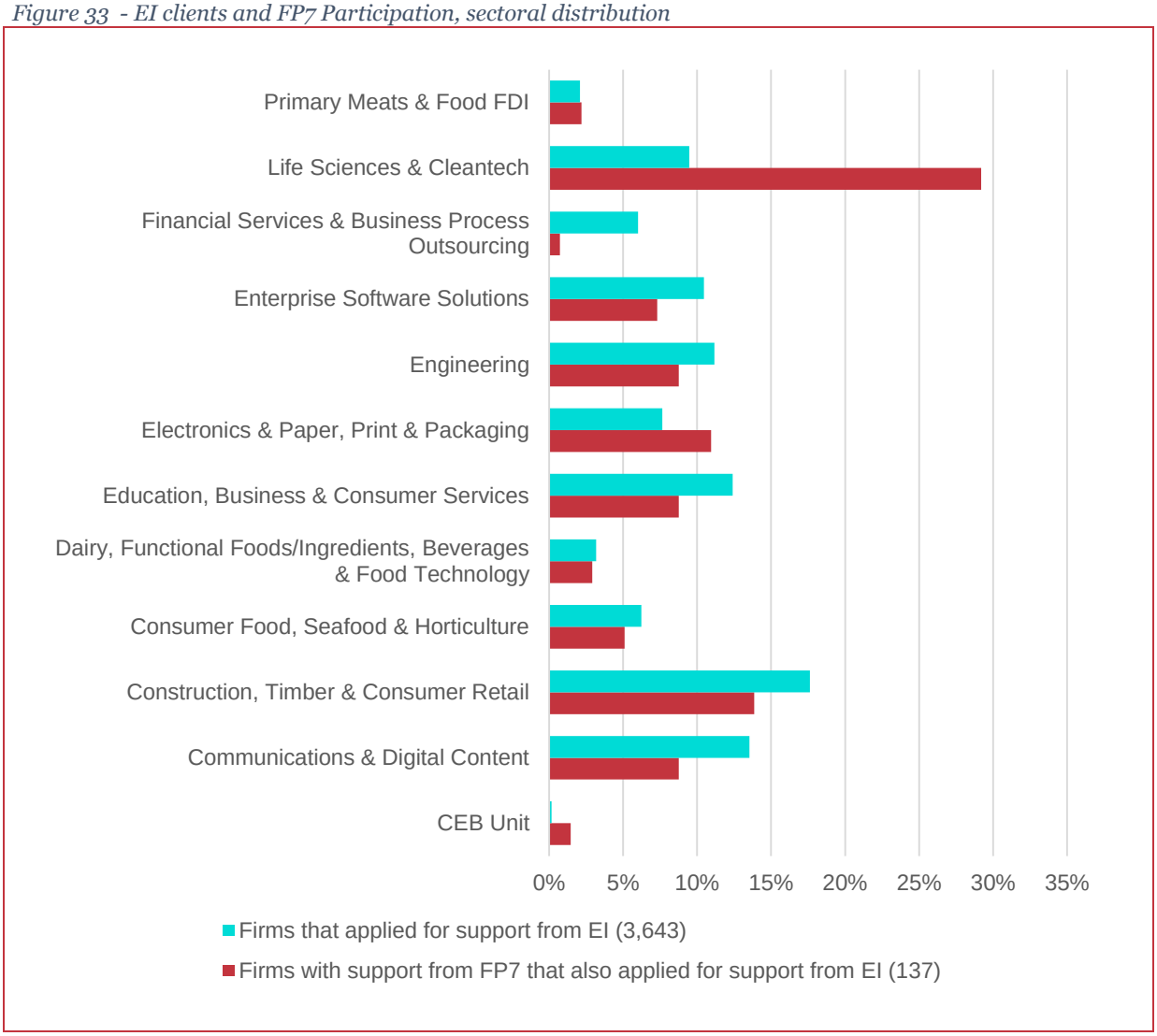
It shows that the companies that have had both, grants from FP7 but also from EI are sweked towards the life sciences and cleantech sector (in comparison with the general population of EI clients). The overlaps in terms of EU and national funding, for companies, have taken place mostly among companies operating in the area of healthcare, medical devices and diganostics (which include two of the 14 research priority areas).

A similar analysis has been conducted for IDA but this not show in the graph given the small sample.

[20] Additionally, 59 companies have had another type of EI grant (e.g. capacity building, internationalisation, etc.) along with an FP7 project, but they are not included in the graph.

[21] Note that there are 123 missing observations for EI variable on sector description in total and one missing variable for the selection of firms that have both applied for support from EI and have a grant from Fp7.

Figure 33 - EI clients and FP7 Participation, sectoral distribution



Source: Technopolis (2016), based on information from CORDA and EI client database

7.3.2 A wider view from the system

Survey responses provide a strong suggestion of the complementarity and additionality of Framework Programmes with the funding available at national level for Irish-based companies. FP7 provided opportunities for Irish-based companies to secure much larger sums than were available nationally and to secure funding covering many more areas of industrial applied research than were available nationally.

We asked all the different actors their views on links between the national R&D system and participation in FP7 among for Irish-based companies. This was with the aim of obtaining a view from the 'system' and different stakeholders and contrasting it with the views of companies. Respondents were offered a list of statements and were asked to state whether or not they agreed or disagreed with each of them.

Nearly 40% respondents to this set of questions were companies, while an additional 40% were representatives from HEIs. The analysis (based on up to 145 respondents) also includes successful and unsuccessful applicants.

Links with actors in the research system

A majority of respondents (75%) either agreed or strongly agreed that FP7 provided opportunities for Irish-based companies to improve their links with Ireland's universities or public research institutes. This percentage goes up to 86% in the case of respondents from companies. This is high considering that only 23% of projects (328) included collaborations between two or more Irish organisations (as discussed in Section 3.3). These two results seem to indicate that respondents see those links materialising even outside projects, perhaps in their ability to interact with universities or public research institutes due to newly developed research capacity.

Close to half of respondents to this question (48%) agreed or strongly agreed that FP7 provided opportunities for Irish-based MNCs to improve their R&D links with Ireland's SMEs. This is in line with results emerging from respondents from companies (53%).

Access to funds and interaction with existing research funding

A majority of respondents (74%) agreed or strongly agreed that FP7 provided opportunities for Irish-based companies to secure much larger sums than were available nationally. This percentage goes up to 88% in the case of respondents from companies.

75% of respondents agreed or strongly agreed that FP7 provided opportunities for Irish-based companies to secure funding covering many more areas of industrial applied research than were available nationally. Again, this percentage goes up to 82% in the case of respondents from companies.

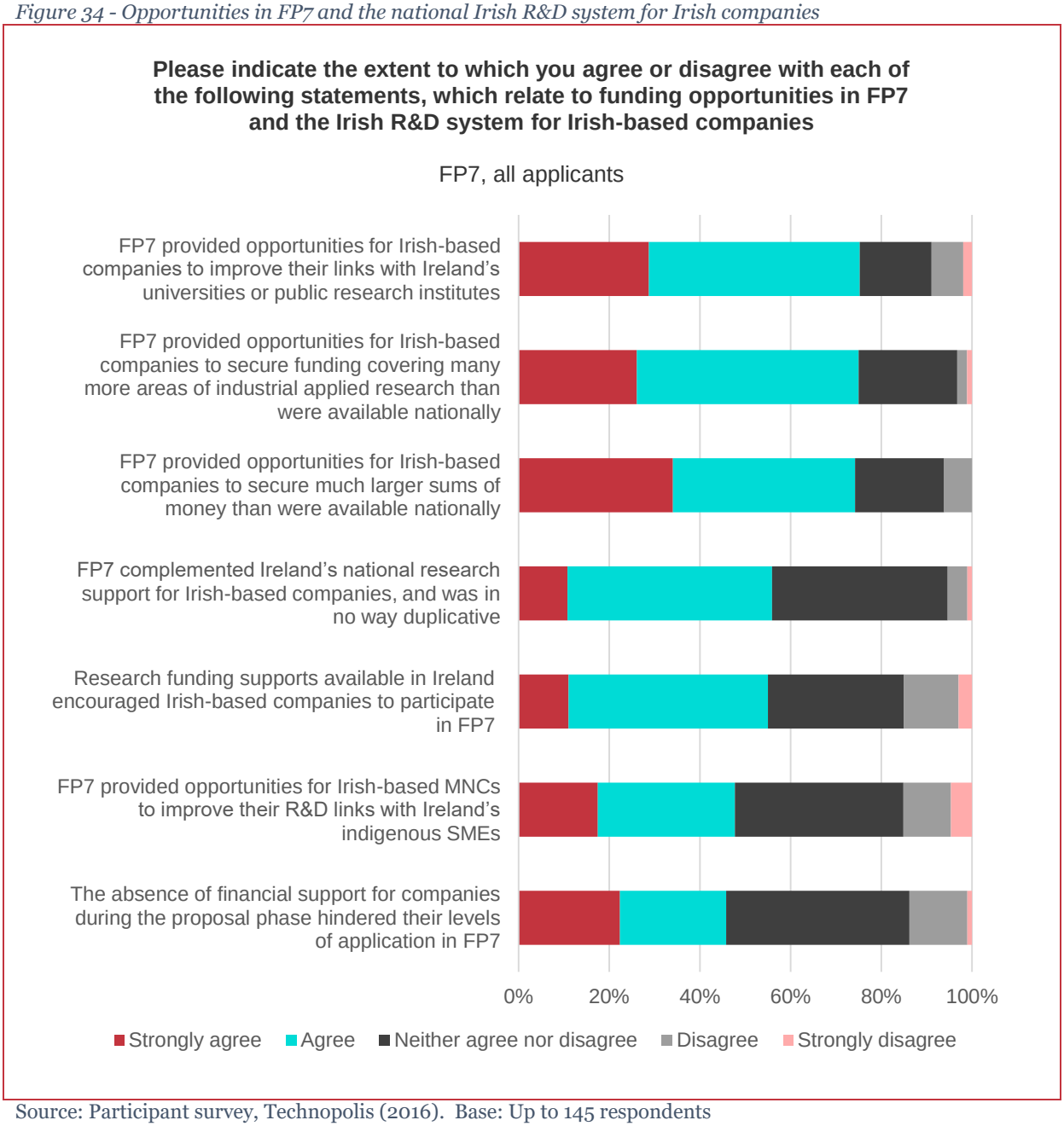
Respondents were a bit more cautious to indicate that FP7 complemented Ireland's national research support for Irish-based companies, and was in no way duplicative, with only 56% of respondents agreeing (or strongly agreeing with this statement). Companies were more in agreement with this statement (69% agreed or strongly agreed).

In line with that, 55% agrees (or strongly agrees) that research-funding supports available in Ireland encouraged Irish-based companies to participate in FP7, which indicates that the stakeholders identify positive complementarities between national level supports and FP7.

Financial support

Finally, 46% agreed or strongly agreed that an absence of financial support for companies during the proposal phase hindered their application level. This is similar for companies (50%). Also, one fifth of respondents from companies (21%) disagree or strongly disagree that absence of financial support hindered their application level, but that result corresponds to only nine companies.

Figure 34 - Opportunities in FP7 and the national Irish R&D system for Irish companies



Source: Participant survey, Technopolis (2016). Base: Up to 145 respondents

7.4 Added value of FP7 funding

The survey analysis provides further evidence of the added value of FP7 funding as the majority of respondents state that they would have to stop their projects had they not received FP7 funding. This is probably explained by the fact that, in several cases, the research project addressed an issue or area that lie outside national research priorities or that the project addressed a problem that was European in nature.

This is explored through an analysis of deadweight in which we attempt to capture 'what would have happened in the absence of the FP7 funding' (i.e. a counterfactual scenario). Furthermore, we also put the question to unsuccessful applicants, which gives us the opportunity to test whether those alternative scenarios did take place for those who did not receive funding.

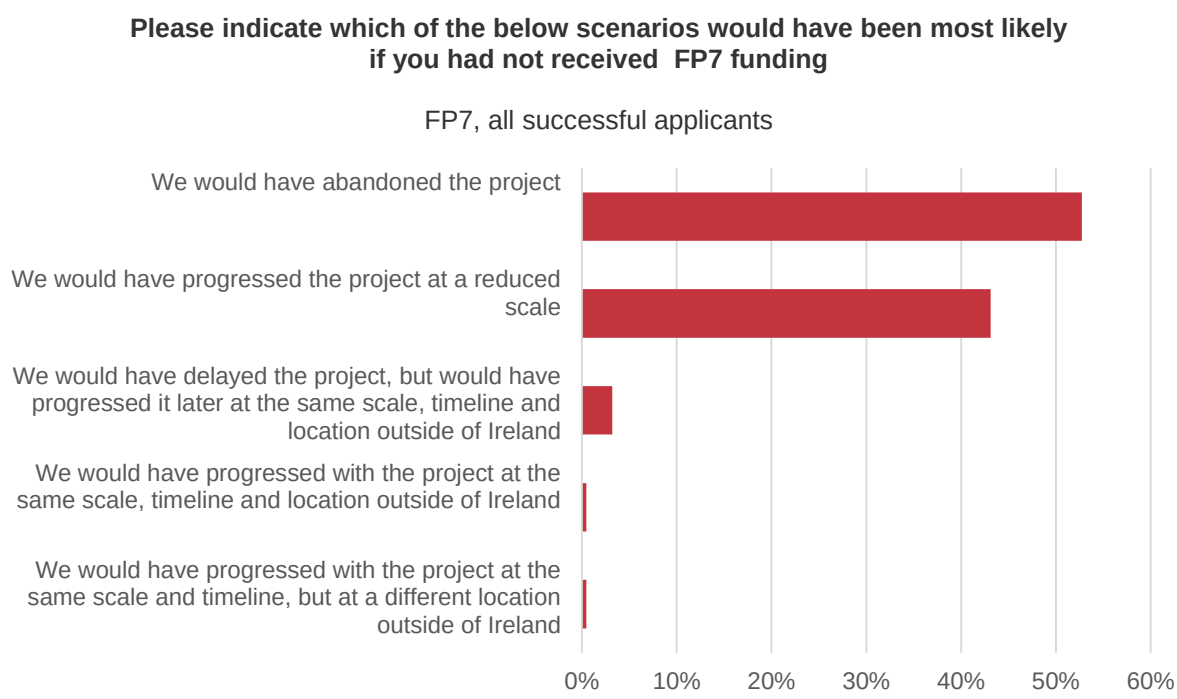
The majority of respondents (and successful applicants) indicated that they would have abandoned the project had their project not received FP7 funding (53%). Furthermore, 43% of respondents indicated that they would have still progressed the project, but at a reduced scale (see Figure 26).

Very few respondents to this question (3%) suggested that they would have progressed at the same scale, timeline and location (outside of Ireland) had the project not received FP7 funding. The same answers were consistent across all stakeholder groups.

Examining the same topic with unsuccessful applicants reveals that the anticipated scenarios reflected what actually happened to projects that were not funded. 48% of unsuccessful applicants stated that they actually abandoned their project, while 36% stated that they progressed their project at a reduced scale. 13% stated that they delayed the project but carried on later at the same scale, timeline and location outside of Ireland.

Interview data largely reinforces those views expressed in the survey. A majority of our interview partners believe that participation in Framework Programmes provides substantial added value. In particular, interviewees mentioned the scale of Framework Programme projects as being greater than those that could be supported by national funding.

Figure 35 - Added value of FP7 funding, all successful applicants



Source: Participant survey, Technopolis (2016). Base: 218 respondents

Summary of findings and conclusions

- Pressures within the domestic environment did have an effect on Ireland's applications to FP7, with the economic crisis placing a downward pressure on many national budgets, thereby encouraging organisations to make applications where they might otherwise have looked for national support. This applies especially to the public sector.
- We found a number of positive links between national R&D and FP7, beginning with a view from

HEIs and public research organisations in particular that national programmes provide a valuable underpinning for subsequent success within the European RTD Framework Programme. There are also examples of research fields that sit outside national research priorities where FP7 has provided access to funding beyond what was available locally.

- Survey responses provide a strong suggestion of the complementarity and additionality of Framework Programmes with the funding available at national level for Irish-based companies. Our survey and our interviews confirm that FP7 provided opportunities for Irish-based companies to secure much larger sums than were available nationally and to secure funding covering many more areas of industrial applied research than were available nationally.
- The survey analysis provides further evidence of the added value of FP7 funding as the majority of respondents state that they would have had to stop their projects had they not received FP7 funding. This is probably explained by the fact that, in several cases, the research project addressed an issue or area that lie outside national research priorities or that the project addressed a problem that was European in nature.
- Finally, we identified an important pool of EI and IDA client companies that have received some form of RDI support from the agencies but were not FP7 participants.. Those companies (circa 1,600 in total) represent an untapped potential in terms of prospective applicants and participants in future FPs.

8 Impact

Evaluation questions

- What were the economic, scientific and, if possible to identify, societal impacts of participation in FP7?
- Is it possible to identify increased or additional employment, sales, exports, productivity, skills intensity?

8.1 Economic impacts of participation in FP7

Companies maintain that participation in FP7 has had an impact on their levels of turnover, employment, and productivity. It implies that the positive benefits mapped in the prior section (access to international networks and knowledge, increased research and technological capacity, ability to attract and retain research staff, etc.) have materialised in commercial gains. Participant companies and the Irish industrial base more generally are likely to reap the benefits of participation in FP7 for years to come. In fact, existing econometric models suggest that the effects could last up to 15 years. In the case of Ireland, this translates to an estimated €6.5bn in terms of GDP growth (between 2007 and 2028), equivalent to an annual GDP growth of ~€300M.

The study team have assessed the economic impact of FP7 on companies using two routes: an analysis of participant's views on the impact that FP7 has had on their main financial indicators (turnover, employment and productivity) (section 8.1.1); an analysis of quantifiable effects using multiplier effects calculated by previous studies (section 8.1.2). We also tested the feasibility of conducting an econometric analysis to further test the economic impact of FP7 on companies and concluded that this was not possible due to data limitations discussed in section 8.1.3 and in Appendix E.

8.1.1 Participant views

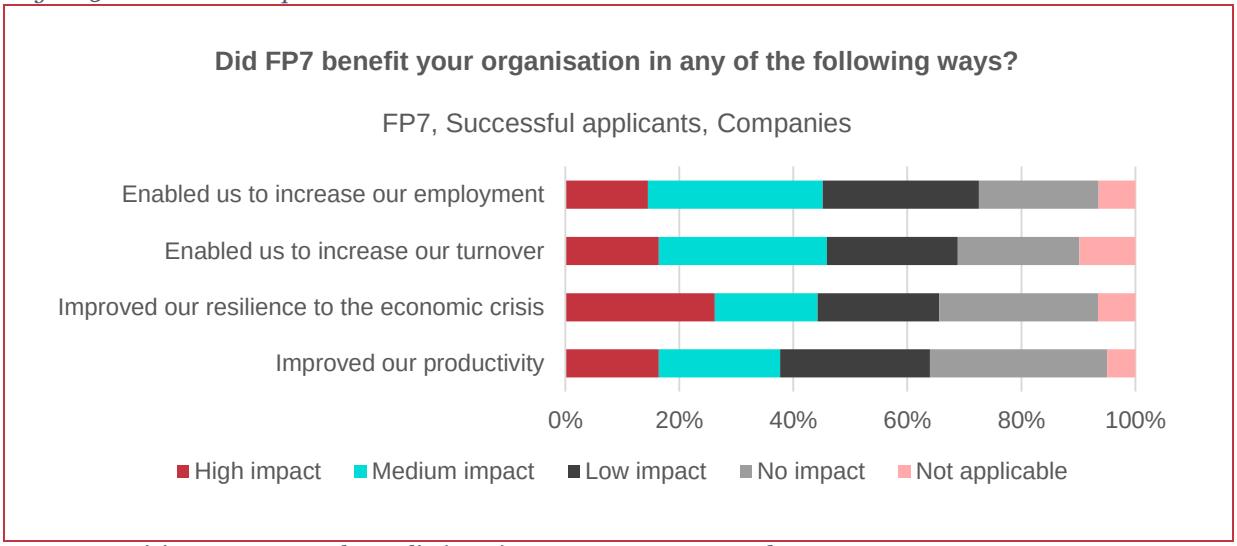
The majority of survey participants from companies state that participation in FP7 has led to positive economic outcomes:

- 73% state a positive impact in terms of increased employment (with 15% indicating that impact has been high)
- 69% state a positive impact in terms of increased turnover (with 16% indicating that impact has been high)
- 64% state a positive impact in terms of increased productivity (with 16% indicating that impact has been high).

The results are shown in Figure 36. Participants also stated that FP7 has had a positive impact in terms of their resilience to the economic crisis, with 26% stating that the impact has been high (and only 28% stating that it participation has not have any impact).

This positive view from survey participants has been matched with the views expressed in our programme of interviews. We heard a variety of ways that participation in FP7 has led to economic impacts. Several respondents told us that creating jobs and revenue is the ultimate objective of participation in Framework Programmes, but that many FP7 projects were targeted more at improving knowledge and/or policy development, with more of a public good focus rather than a commercial one. Nonetheless, even under such circumstances, we were told that there are indirect economic returns, such as savings due to new technologies and other developments, which are reflected on the results from the survey related to impact on productivity.

Figure 36 - Economic impact



Source: Participant survey, Technopolis (2016). Base: Up to 62 respondents

8.1.2 Estimation of impacts based on prior studies

The "Ex-post evaluation of the 7th EU Framework Programme (2007-2013)"[22], prepared by a High Level Expert Group estimated the impact of the programme in terms of GDP and job creation for Europe and the study team has been asked to use a similar methodology to arrive to a similar estimate for Ireland.

The report relies on estimates (ratios) calculated from a report commissioned by ERASME (Zagamé et al, 2012 and Fougeyrollas et al 2012)[23],[24], which in turn uses an input-output macro-economic model to estimate the impact of R&D expenditure (input) on EU employment and GDP. We have used this model and the ERASME paper as the basis for calculating the effect of Ireland's participation in FP7 on GDP and employment.

In their model, the authors account for three stages:

- Implementation, the stage at which the EC Contribution is allocated
- R&D allocation phase, where a leverage (or 'crowding-in') takes effect and additional resources are attracted by each € invested. Using an econometric model the authors estimate that this leverage effect is 0.74, i.e. that each €1 of EC Contribution leads to additional €0.74 investment from private and public organisations. This leverage effect goes beyond the (official) contribution that participants made to their projects.
- Long-term effect, which includes three phases and takes place in the subsequent 15 years after the 'implementation' phase: an innovation (where research outcomes are commercialised), diffusion (where other actors in the system benefit from the innovations and increase their level of competitiveness) and a final phase where the innovation becomes 'obsolete' and the economy stops reaping the benefits from the innovations that emerged from the programme.

The model relies on several assumptions. First, it assumes that the EC contribution in a given year (e.g. 2012) is a 'one-off' shock, i.e. an external increase in R&D income which kicks-off a series of

[22] European Commission (2015) "Commitment and Coherence. Ex-post evaluation of the 7th EU Framework Programme (2007-2013)" High Level Group

http://ec.europa.eu/research/evaluations/pdf/fp7_final_evaluation_expert_group_report.pdf#view=fit&pagemode=none

[23] Zagamé, Paul, Arnaud, Fougeyrollas and Pierre le Mouël (2012) Consequences of the 2013 FP7 call for proposals for the economy and employment in the European Union. ERASME, 2012.

[24] Fougeyrollas, Arnaud, Pierre le Mouël and Paul, Zagamé (2012) Consequences of the 2012 FP7 call for proposals for the economy and employment in the European Union. ERASME, 2013.

dynamics (captured by the model) that lead to additional economic output (GDP) and employment over a period of time (15 years).

Second, the analysis does not account for lags, i.e. a period of time between the start of a project (and its conclusion) and the point at which one would expect to see some material effects. In fact, the analysis shows that 210,000 jobs are generated across the EU the 1st year (i.e. 2013), where probably only few projects had finished (given that typically FP7 projects tend to last from 3 to 5 years). Third, the model also assumes that the entire investment allocated in a given year was spent that same year, which is also a strong simplification. Finally, the model does not account for any measure of additionality or deadweight (i.e. it does not account for a counterfactual scenario in which the financial support provided through FP7 did not take place) or indeed structural differences between the Irish economy and the European Union economy as a whole.

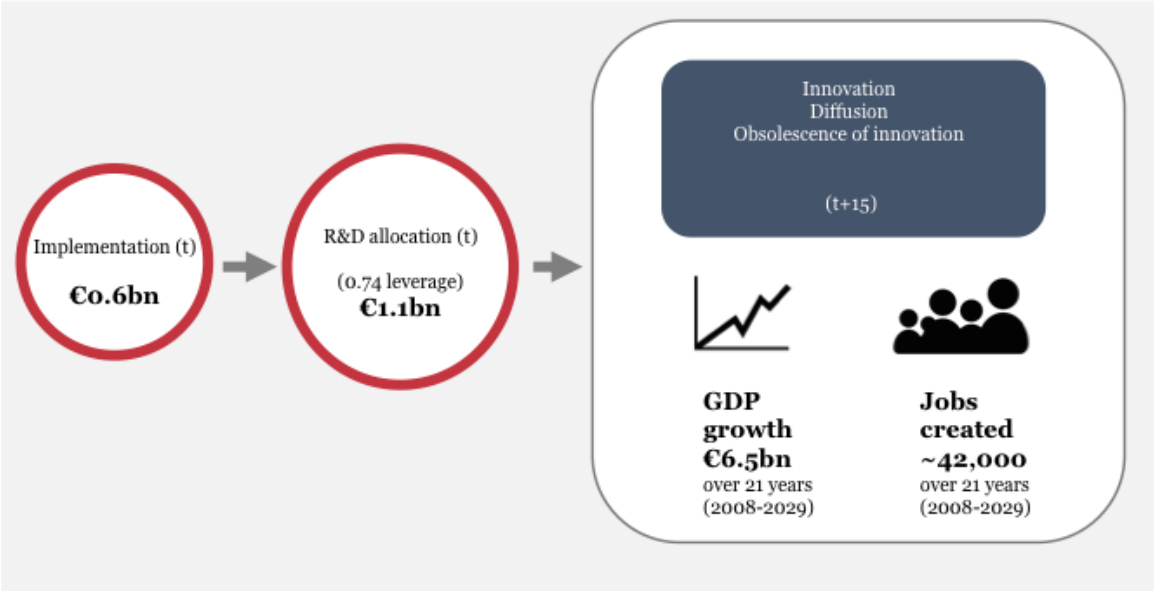
Given these assumptions, the results emerging from this model should be taken with caution and only as an indication of an upper bound threshold of potential impacts.

The study estimates that the EC contribution in 2012 and 2013 would have a 15-year multiplier effect of respectively 5.4 and 6.5 in terms of GDP growth and would generate between 36,000 and 41,000 new jobs across the EU. We have used the average multiplier effects of those two years (for both GDP and employment) and applied it to Ireland's annual drawdown for the period 2007-2013[25]. Based on those ratios we estimate that an EC contribution of €625M would lead to:

- A total investment of €1.1bn (i.e. a leverage of €0.46bn)
- A total contribution to Ireland's GDP of €6.5bn over 21 years (2007-2028), i.e. equivalent to an annual GDP growth of ~€300M.
- A total of ~42,000 jobs created in Ireland over 21 years (2007-2028), i.e. equivalent to ~2,000 jobs created per year

Figure 37 shows a schematic representation of these figures while Appendix E provides the table with the parameters used in this exercise (so that it can be reproduced by DJEI in the future studies).

Figure 37 - Economic effect of Ireland's participation in FP7



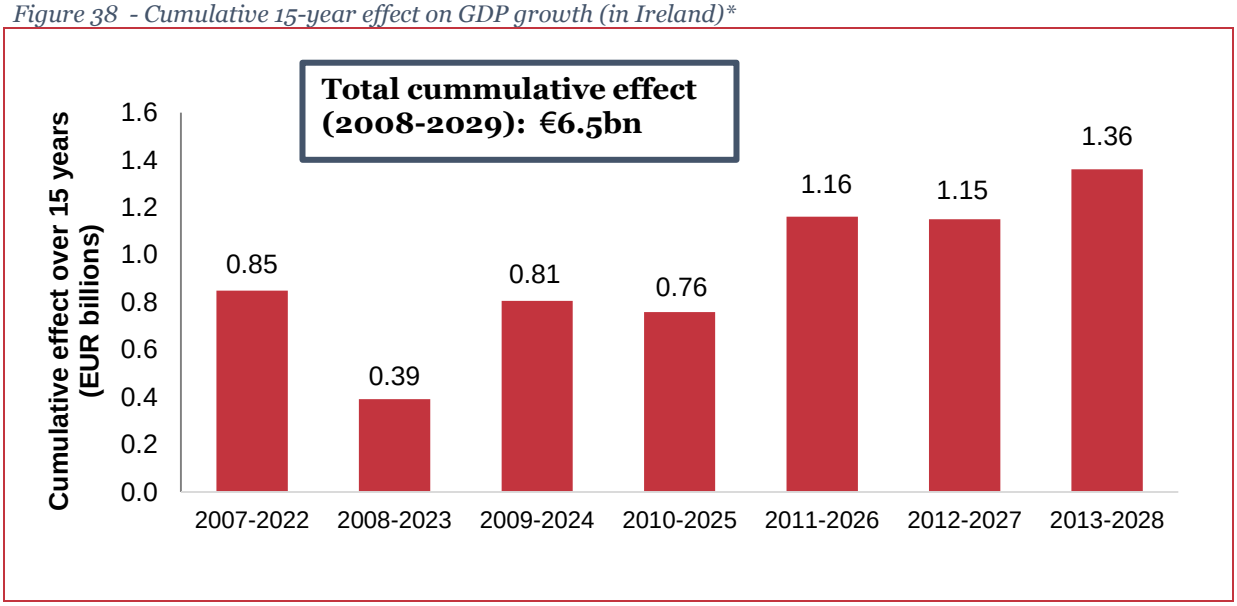
[25] Based on available multipliers produced by the model we need to assume that effects from the EC contribution made between 2007-2013 are accrue over 15 years for each year of contribution, i.e. the effects of investment in 2007 will accrue up to 2022. Similarly the effects of investment in 2013 will accrue up to 2028.

Figure 38 and 39 show the cumulative effects (per period) for GDP and employment, respectively. The differences in the cumulative effect in each 15-year period are mainly explained by differences in EC contribution per year (e.g. the total drawdown from Ireland was €0.12bn in 2007 and €0.18bn in 2013).

Figure 38 shows that the EC contribution in 2007 would lead to a total GPD growth of €0.85bn (between 2007 and 2022) in Ireland, while the EC contribution in 2013 would lead to a total GDP growth of €1.36bn (between 2013 and 2028).

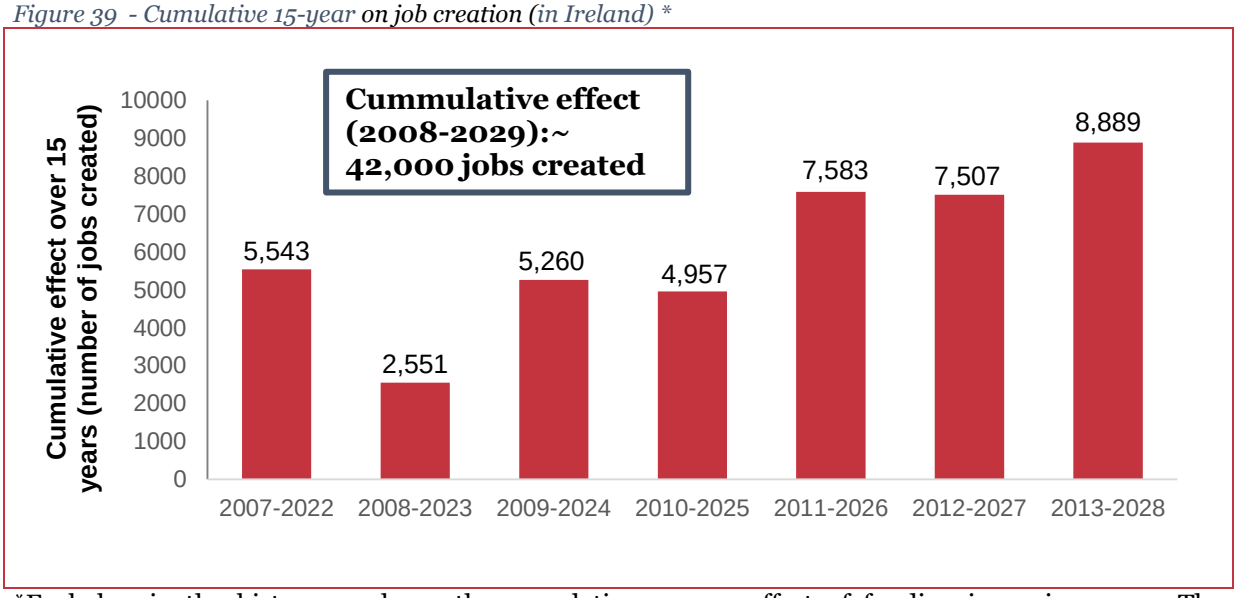
Similarly, Figure 39 shows that the EC contribution in 2007 would lead to ~5,500 new jobs (between 2007 and 2022) in Ireland, while the EC contribution in 2013 would lead to ~8,900 new jobs (between 2013 and 2028).

*Figure 38 - Cumulative 15-year effect on GDP growth (in Ireland)**



*Each bar in the histogram shows the cumulative 15-year effect of funding in a given year. The investment in 2008 (€ 0.12bn) would lead to an additional GDP of €0.39bn between 2008 and 2023.

*Figure 39 - Cumulative 15-year on job creation (in Ireland) **



*Each bar in the histogram shows the cumulative 15-year effect of funding in a given year. The investment in 2007 (€ 0.12bn) would lead to a total of 4,541 jobs created between 2008 and 2023.

8.1.3 Estimation of impacts based on national business surveys

In line with our brief, the study team also explored the possibility of undertaking econometric analysis of industry participants through sources such as the DJEI Annual Employment Survey data (AES) and Annual Business Survey of Economic Impact (ABSEI) data.

We investigated the suitability of counterfactual impact evaluation (CIE) of industry participation based on data availability and quality, potentially including construction of control groups and application of CIE methods such as difference-in-difference analysis.

More specifically the study team:

- Matched the E-Corda, ABSEI and AES data on the basis of a unique identifier (ABSEI code)
- Cleaned the data, including company names, missing observations and abnormalities in the data
- Created new indicators, including the treatment groups

The data was prepared with the objective of undertaking propensity score matching (PSM)[26] and difference-in-difference analysis[27], which are techniques used for robust analysis. One of the concerns was that additional lags were needed to credibly establish impact. The strategy was to seek to use at least a two-year lag (from launch of the call to impact) and that, only if the data would allow, we would experiment with additional lags.

The suitability of undertaking a counterfactual impact evaluation of industry participation was evaluated after the matching the data, cleaning of the data, and the creation of the new indicators was close to finalised.

This initial stage revealed that the dataset was insufficient (too small) to conduct a PSM and difference-in-difference analysis. We found that we only had data for a small number of the firms that were successful FP7 applicants, in particular for the early years of the programme.

Given those data limitations we concluded that it was not appropriate to conduct an econometric exercise. Appendix F contains further information on our approach and the data limitations we encountered, which could help to inform future similar studies.

8.2 Scientific and societal impacts of participation in FP7

8.2.1 Scientific impacts[28]

FP7 not only provide sizeable additional resources in Ireland dedicated to R&D activities, it has also serve as an opportunity for Irish researchers to improve their publication records and improve their visibility and profile in so far those publications are produced in collaboration with high profile institutions and researchers and are likely to have high citations levels.

[26] PSM is a technique that allows matching participant and non-participants by using 'scores' that combine a series of relevant indicators. PSM entails scoring every company in a series of characteristics in order to statistically compare scores between companies of the two groups to select good matching pairs. To improve matching, it is advisable to use as many characteristics as possible. In practice, the score is thus a composite of company characteristics. (M. Caliendo and S. Kopeinig, "Some Practical Guidance for the Implementation of Propensity Score Matching", Discussion papers series IZA DP No. 1588. IZA, 2005.)

[27] Difference-in-difference is a quasi-experimental method used in impact evaluation exercises to calculate the change in outcome for a control and treatment group (first difference) and how that change compares across those two groups (second difference). The technique attempts to mimic the experimental design (i.e. randomized control trials) using observational data (e.g. data contained in the ABSEI dataset). It is usually used in combination with PSM (when control groups had not been identified at the outset of the intervention.

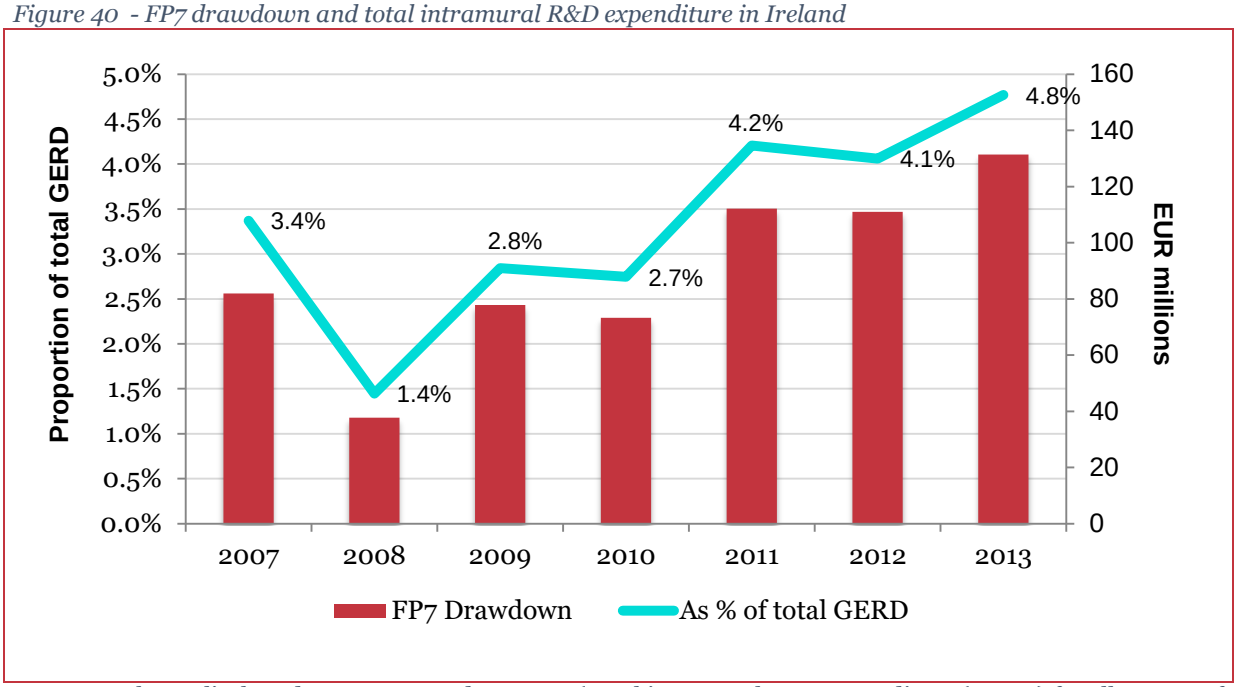
[28] The study had hope to get access to the data hosted by the EU commission regarding scientific outputs (publications) emerging from the projects in which Irish organisations took part. DJEI has requested the data to the EU and has sent several remainders but the data has not being provided yet.

8.2.1.1 Investments

Participation in FP7 has signified a sizable contribution to Ireland's pool of resources available at public and private sector to perform R&D activities.

As shown in Figure 40, FP7 annual drawdown has been equivalent to 1%-5% of the total annual Gross Expenditure on R&D (GERD) in Ireland and, as such, it represents a substantial contribution to the total R&D spent in Ireland and will no doubt help to advance knowledge and innovation in country.

Figure 40 - FP7 drawdown and total intramural R&D expenditure in Ireland



Source: Technopolis, based on CORDA and Eurostat (Total intramural R&D expenditure (GERD) for all sectors of performance [rd_e_gerdtot])

8.2.1.2 Scientific outputs: publications

The SESAM Research Performance and Impact Reporting tool (RESPIR) is used by the EC to capture information on outputs and outcomes at project level. The data registered information on projects that have submitted their final report and the information correspond to outputs achieve at that point in the project cycle. The system does not register data on the ICT programme, ERC and some of the Join Technology Initiatives (IMI, ENIAC, ARTEMIS). A total of 622 projects with Irish participation are registered in the dataset (42% of total number of projects). Please refer to Appendix A for further description of the SESAM/RESPIR datasets.

The data shows that 362 projects (out of 622) have had at least one publication by the end of the project. Furthermore, a total of 7,267 publications have been registered across those projects (11.5 publications per project) and 3,187 (44%) correspond to publications submitted to High Impact Peer Reviewed Journals.

The information provided by the EC to the study team does not allow identifying how many of those publications included an author based on an Irish organisation. If we assume a proportional distribution between Irish participation in projects and the outputs emerging from those projects, we estimate that circa **880 publications** correspond to authors based in Ireland. (This estimation is based on a ratio of 12%, which reflects the EC Contribution to Irish organisaitons, €625M, versus a total EC Contribution across all participants in projects that included the participation of an Irish

organisation, €5,148M)[29]. This stock (~880 publications) is relatively low in comparison with the number of publications for all authors affiliated to Irish organisations between 2007 and 2016 which amount to 107,716 (according to Scopus, Elsevier's abstract and citation database of peer-reviewed literature), i.e. FP7 related publications only represent 0.8% of the total. Even accounting for a potential underestimation due to the exclusion of ERC (which according to FP7 monitoring report could be around 25%)[30], the number of publications would still remain circa 1% of the overall number of publications of authors based in Irish organisations. A full-blown bilbiometric analysis could shed more light into the scientific activity emerging from FP7 and investigate this impact dimension further. This could include, for instance, the analysis the quality and impact of publications in comparison with publications emrging from outside the programme.

8.2.1.3 Research profile and reputation

Our programme of interviews revealed that participation in the Framework Programme has returned significant scientific impact at the national level. Many respondents agreed that EU investment in research represented a very important contribution to the Irish research base. Some interesting examples were offered to support this view, including a number of successful research groups in Ireland that have been built themselves on long-term Framework Programme involvement, such as the Tyndall Institute. Such centres and groups have been able to build on international collaboration, and have been able to publish in more and better journals.

Participation in Framework Programme projects, many respondents said, means that Irish researchers are able to work with exceedingly high quality colleagues elsewhere, with a likelihood therefore that resulting publications would be highly cited. This has had an impact on Ireland's citations, with recently published statistics from the SFI reportedly showing Ireland as 16th in the global scientific ranking (based on international scientific citations per paper)[31].

The Framework Programme was stated to be particularly valuable for widening networks, and as a way to have scientific and research results disseminated to a broader audience than would otherwise be possible.

A majority of respondents stated that participation in the Framework Programme has led to increased capacities and competences in the Irish research base. Though there were no exact figures offered, interviewees stated that Ireland has an increasing number of researchers and scientists who are performing at a high level, widening the pool of potential participants.

Our stakeholder interviews reveal that participation in Framework Programmes has raised Ireland's international scientific profile, making it more attractive to researchers and potential partners around the world.

Interviewees suggested that participation has made Ireland's higher education and research system more internationalised, which we were told is evident in the nationality of PhD students and researchers.

One 'softer' scientific impact that we were told about in interview is the Framework Programmes' impact on scientific ambition. We heard that many scientists could be seen to be building their portfolios with a view to accessing ERC awards.

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[29] We also searched in Scopus in the abstracts or in the keywords of the publication for mentions to FP7, for all authors affiliated to Irish organisations. We only found 113 publications published between 2007 and 2016, which means that this method probably underestimates the real number of publications published in the context of the framework programme

[30] According to the 7th FP7 Monitoring report ERC represent an additional 25% of the publications recorded in SESAM/RESPIR. https://ec.europa.eu/research/evaluations/pdf/archive/fp7_monitoring_reports/7th_fp7_monitoring_report.pdf#view=fit&pagemode=none

[31] Science Foundation 2014 Annual report (2015). http://www.sfi.ie/assets/files/downloads/Publications/Annual%20Reports/SFI%20Annual%20Report%202014.pdf

Our ICT case study provides further analysis on the benefits that FP7 bring to the research community; more specifically to Ireland's ICT R&D environment (see Section 9.2).

8.2.2 Societal impacts

Irish organisations have taken part in projects that could have tangible societal impacts. Understanding those impacts would require individual case studies at project level (which was outside the scope of this study). However, an overview of a selection of projects and their final reports show that FP7 has funded research that could help Ireland to address societal challenges (including those related to public health and climate change) and also improve public engagement in science and science education.

The evidence provided in this chapter is only indicative as it is too soon in the cycle of the programme to identify and measure societal impacts, which will likely take 3-5 additional years to materialise. Furthermore, and as mentioned above, understanding those (potential) impacts would require individual case studies at project level (which was outside the scope of this study).

According to the SESAM/RESPIR data, 122 projects with Irish participation (out of the 622 submitted to the reporting tool) have had an impact on EU policies.

Interviewees agreed that there are societal impacts emerging from participation in FP7 (due to a great deal of 'public good' research), however, no concrete examples where provided. There was general agreement that societal impacts are difficult to quantify without a specific evaluation taking place at the project level.

From the Cordis database, the study team identified 14 Irish-coordinated FP7 projects across the areas of energy, environment, the ERC, food (in particular where there are crossovers with medicine and health), health, NMP (again with a health crossover), Science in Society and transport. We define societal impact as covering not only research that leads to improvements in people's lives (such as health related outcomes) or in society as a whole (such as environmental outcomes), but also include issues such as public engagement in science and science education. Each of the identified projects described some initial or expected societal impacts within their final reports.

Examples of societal benefits are broad. Potential impacts related to **public health, consumer protection and sustainable sourcing and production** were all reported in the food area. One project created a toolkit for policy makers and stakeholders to improve communications to the public about food risks and benefits. Another project examined personalised nutrition and the application of individualised nutrition advice for improving health. Another food-based example relates to the development of software to monitor food chemical exposure, which the report suggested is expected to both influence international food regulation and protect consumers. Another project examined sustainable sourcing and production of biologically active molecules of marine based origin for cosmetic, pharmaceutical and neutraceutical applications, which may not only limit the impacts of these practices on biodiversity, but may also lead to the development of new lead molecules for drug discovery.

Further examples of **public health impacts** are visible across health, NMP, environment and the ERC. In health, we identified one project that sought to develop an open, multi-lingual platform and repository for child health research, which could improve care for Europe's children. In NMP, one project examined ways to identify the symptoms of Alzheimer's disease much earlier, as well as ways to help researchers develop new treatments for cancer through the use of nanoscopic technology. One project under an environmental call looked to develop a disease risk mapping system for three water-related high-impact vector-borne diseases in East Africa, which would support decision-makers tackling these diseases. The project also reported raised awareness of the potential impact of environmental change on health among decision makers. One particular ERC project looked at reducing health inequality by developing an understanding of how the circumstances that children are born and raised in affect their development, which would inform policies to prevent, rather than just

cure, diseases. One project, related more to **public safety**, was identified in the transport area, where a project developed a reliability-based safety assessment framework for rail infrastructure.

Examples of **public engagement in science and science education** were identified under both Science for Society and Transport programmes. These projects aimed to foster the public's interest and engagement in scientific topics. Other projects, in science education, focused on teacher training, curriculum and course development, and opportunities for skills development for 2nd and 3rd level students as well as exposure for young researchers.

Projects reporting potential impacts related to the **reduction of carbon emissions and reducing Europe's dependency on fossil fuels** were found in the environment area. One project examined low water volume cooling for Concentrated Solar Power (CSP) plants (and thus enabling more use of CSP), while another examined a technique to obtain biofuels and platform chemicals from lignocellulosic biomass.

A full list of these projects, with more details, is presented in the table below.

Table 24 - Sample of FP7 projects with potential or expected societal impacts

Area	Project title	Activity	Potential/expected societal benefits	Co-ordinator
Food (KBBE)	FoodRisC[32]	Mapping out the sources of communication around food risks and benefits to the public Creating a toolkit for policymakers, food authorities and other stakeholders to facilitate coherent communications	Better communications and messaging around food risks and benefits Improved consumer awareness and behaviour	University College Dublin
	Food4Me[33]	Examining personalised nutrition and advancing the novel research area of 'nutrigenomics' Investigating consumer attitudes with the aim to produce new scientific tools for implementation of personalised nutrition Establishing a standardised and compatible platform for assessing food intake	Public health Awareness of personalised nutrition	University College Dublin
	FACET	Developing software to monitor food chemical exposure	Consumer protection Influencing international food regulatory affairs	University College Dublin
	BAMMBO	Seeking environmentally-kind practices and sustainable sources of biologically active molecules of marine based origin for cosmetic, pharmaceutical and neutraceutical applications	Sustainability of production Limiting impact on biodiversity Potential development of new lead molecules for drug development Potential development of new therapies	Limerick IoT
NMP	LANIR	Examining ways to identify the symptoms of Alzheimer's disease much earlier Helping researchers to develop new treatments for cancer through the use of nanoscopic technology.	Earlier diagnosis Disease prevention or management	University of Limerick
Energy	MACCSOL	Examining low water volume cooling systems for Concentrated Solar Power (CSP) plants Enabling more widespread use of CSP	Reducing carbon emissions Contribute to fuel security	University of Limerick
	DIBANET	Examining use of acid hydrolysis to obtain biofuels and platform chemicals from lignocellulosic biomass	Reducing Europe's dependence on fossil fuels Fuel security	University of Limerick

[32] See: http://www.foodrisc.org/

[33] See: http://www.food4me.org/

Area	Project title	Activity	Potential/expected societal benefits	Co-ordinator
Health	RICHE[34]	Addressing an implementation gap in child health research in Europe Overcoming stakeholder-identified gaps/fragmentation Providing an open, multi-lingual platform for child health research coordination and inventory of current research	Improving care for Europe's children Currently 249 members/users (38 Irish - researchers, managers in public health, healthcare practitioners)	Dublin City University *
Enviro-nment	HEALTHY FUTURES	Building a disease risk mapping system for water-related high-impact vector-borne diseases in eastern Africa, accounting for environmental/climatic changes Releasing an interactive, web-based mapping and decision support tool and decision-support frameworks for the three target diseases	Assisting the decision-making of those tackling the target diseases Raised awareness of potential future environmental change impacts on health among decision makers in the countries of the East African Community	Trinity College Dublin
ERC	DEVHEALTH	Combining insights from social and biomedical sciences Developing an integrated approach to health throughout the life course Devising policies to prevent, rather than just cure, diseases.	Develop understanding of how the circumstances in which children are born and raised affect biological development of the brain and body Reduce health inequality	University College Dublin
Science in Society	StudioLab	Fostering direct involvement of the public in the creative process of art and science Developing education curricula and modules for students Helping education institutions to grow their number of courses	Public engagement in science and scientific topics Opportunities for 2nd and 3rd level students to develop a broad range of skills from laboratory techniques to design and film principles (conceive projects as events, exhibits and products) via the Science Gallery's Ambassadors Programme	The Science Gallery at Trinity College
	Euroscienc e Open Forum 2012	An interdisciplinary, pan-European meeting Showcasing the latest advances in science and technology Promoting dialogue on the role of science and technology in society and public policy Stimulating public interest in science and technology	Public engagement in science and scientific topics Generated a high level of public interest in its event programme "Science in the City" and the 2013 follow on event "Festival of Curiosity"	Forfás
	ESTABLIS H[35]	Developing science teacher training focused on the understanding of and attitude towards Inquiry Base Science Education (IBSE) Developing a series of short self-instructive programmes to offer guidance to develop skills essential and supportive for using IBSE in teaching	Improved science education Copies of all four ESTABLISH resource books have been sent to each of the 732 second level schools in Ireland ESTABLISH resources have been presented at multiple national teacher conferences, such as ISTA, IOP, and Scientix Continued requests for the resources to be translated other languages, or used on websites	Dublin City University
Trans-port	SMART RAIL[36]	Developing a reliability-based safety assessment framework for rail infrastructure based on 'whole life management'	Safety of rail infrastructure	University College Dublin **
	YEAR-2010	Delivering a competition for early-stage researchers in the area of transport,	Developing promising young researchers	University College

[34] See: http://www.childhealthresearch.eu

[35] See: http://www.establish-fp7.eu/

[36] See: http://smartrail.fehrl.org/

Area	Project title	Activity	Potential/expected societal benefits	Co-ordinator
		resulting in 50 finalists presenting to the annual Transport Research Area conference in Brussels Exhibition of the work open to the public	Public engagement in science and scientific topics	Dublin

Source: Cordis database, project websites. * Also included participation from the Heath Research Board and Open Applications Consulting Ltd. ** Also included participation from Irish Rail.

Though it is still early following the completion of these projects, these kinds of examples are good illustrations of where the international scale (e.g. regulation) and the exchange of international expertise (e.g. best practice, excellence) afforded by the Framework Programmes are important to realising important societal impacts.

We recommend Ireland given more thought to the appropriate metrics for capturing and measuring societal impacts. Several of our interview partners stated that job creation, otherwise constructed as an economic impact, could also qualify as a societal impact. Mobility was also put forward as an important societal impact of Framework Programme participation. We think that Ireland could consider establishing monitoring mechanisms to follow up on success stories with potential material impact. This could come in the form of a regular newsletter (e.g. bi-annual) that showcases those successes and impacts (not only societal but also scientific and economic) and is disseminated broadly, across the entire research, industrial and educational communities.

Summary of findings and conclusions

- It has been difficult to fully capture the impacts of FP7, due to issues such as lack of data and the relatively short timeframe since the programme conclusion. In this context, the evidence primarily relies on estimates and indicators of impacts. Nonetheless, there are some important findings that would be useful to test further in future and allowing for further improvements in data quality and availability.
- In terms of **economic impact**, FP7 has had positive effects on participant companies' turnover, employment, and productivity. These results, reported by survey respondents, mean that the positive benefits mapped in the prior section (access to international networks and knowledge, increased research and technological capacity, ability to attract and retain research staff, etc.) have materialised in commercial gains.
- Participant companies and the Irish industry base are likely to reap the benefits of participation in FP7 for years to come. In fact, existing econometric models predict that the effects could last 15 years. In the case of Ireland, this could mean an indicative estimate of €6.5bn in terms of GDP growth (between 2007 and 2028), equivalent to an annual GDP growth of ~€300M.
- In terms of **scientific impacts**, FP7 not only provided sizeable additional resources dedicated to R&D activities in Ireland, it has also served as an opportunity for Irish researchers to improve their publication records and improve their visibility and profile in so far those publications are developed in collaboration with high profile institutions / researchers and are likely to have high citations levels.
- Regarding **societal impacts**, FP7 has funded research that could help Ireland to address societal challenges (including those related to public health and climate change), but also to improve public engagement in science and science education. It could be useful develop metrics for societal impacts and to showcase relevant projects across the research, industrial and educational communities.

9 ICT Case study

In this case study we explore in more depth the benefits and (potential) impacts deriving from FP7 participation on the ICT sector in Ireland, setting a specific focus on the synergies between the FP ICT research and the national RDI system.

In this case study we explore the research questions: i) What was the impact of FP7 on the national R&D environment? ii) Did national R&D supports leverage FP7 supports and provide synergies? Did FP7 funding duplicate investment? iii) What are the links between the funding opportunities in FP7 and the Irish R&D system for Irish-based academics and companies?

These questions have been explored in Section 7 of the report but in this case study we explored them again with a focus on the ICT sector.

In response to these questions, we first set out the background for our analysis in terms of the profile of the ICT sector in Ireland and the characteristics of the FP participations by the research and industry actors in the field of ICT. We then investigate the (potential) impact of FP7 on the ICT R&D system in Ireland (Section 9.2) and the level of EC funding leverage reached by the ICT participants in FP7 (9.3).

Section 9.4 focuses on the synergies between FP7 and the national R&D system, investigating the level of synergy between national and European research priorities and its importance and value.

In Section 9.5 we consider the extent to which the national bodies were successful in supporting the ICT research and industry actors in their efforts to obtain FP funding. Section 9.6 covers the links between the funding opportunities in FP7 and the Irish R&D system for Irish-based academics and companies active in the ICT sector.

To develop this case study, we have conducted additional desk research and data analysis as well as 14 interviews with key players in the Irish ICT R&D environment, including research centres, MNCs and SMEs.

9.1 Setting the background

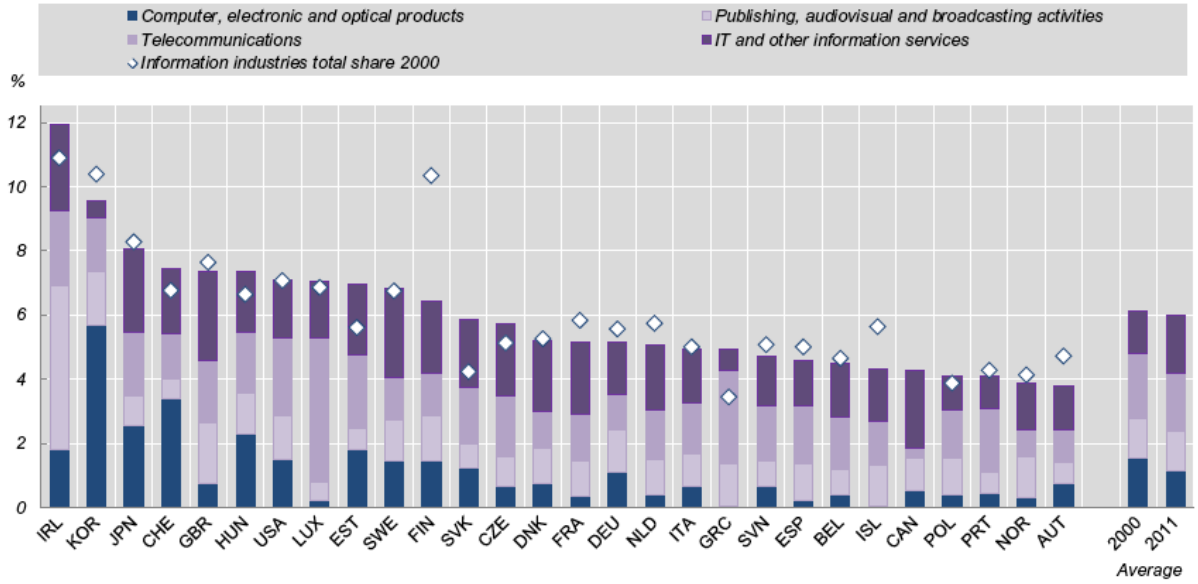
9.1.1 The ICT sector in Ireland

In order to understand the potential value of the FP for the national R&D environment, it is important to set the participation of the Irish ICT R&D actors in the context of the characteristics of the ICT sector in Ireland and its development.

The 2013 OECD Science, Technology and Industry Scoreboard highlights the fact that over the last decade, Ireland has built up a strong specialisation in information industries and is the OECD's leading exporter of IT services. Information and communication activities together represent almost 12% of Ireland's total value added, against an OECD average of around 6% (Figure 41).

Most important, the ongoing importance of the ICT manufacturing sector in Ireland should be noted, even though it was drastically reduced over the last two decades in line with the international trends: the ICT sector of 'Computer, electronics and optical products' account for an equal share of the total value added (about 2%) to the 'Telecommunications' and 'IT and other information services' sectors.

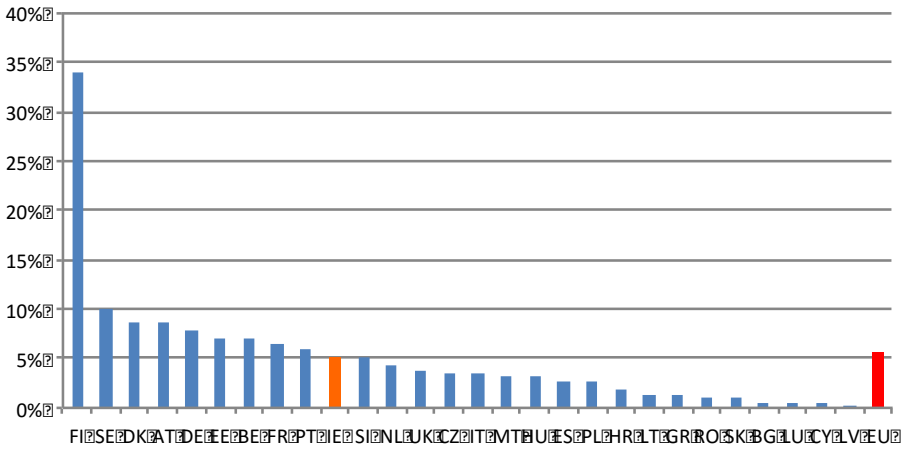
Figure 41 - Information industries in OECD economies, 2000 and 2011 (as a percentage of total value added)



Source: OECD (2013), *OECD Science, Technology and Industry Scoreboard 2013: Innovation for Growth*, OECD Publishing

The European Commission Digital Agenda Scoreboard (2015) informs that despite the leading position of Ireland among the EU Member States in terms of ICT share of GDP (10.2% in 2012), the country ranks only 12th among the EU Member States in terms of **ICT R&D intensity** (Figure 42). The values are just below the EU average and considerably lower than for three of the four comparator countries in this study (Finland, Denmark and Austria). This relatively low level of ICT R&D intensity can be attributed partly to the characteristics of the ICT cluster itself as described in the OECD report: at European level, the ICT manufacturing (computer, electronic and optical products), communication equipment and telecommunication sectors all show a particularly low level of Business expenditure in R&D. The ICT services sector is the only ICT sector where Business expenditure in R&D has shown an ongoing increase since 2006 at the European level, reflecting the technological developments in the software sector.

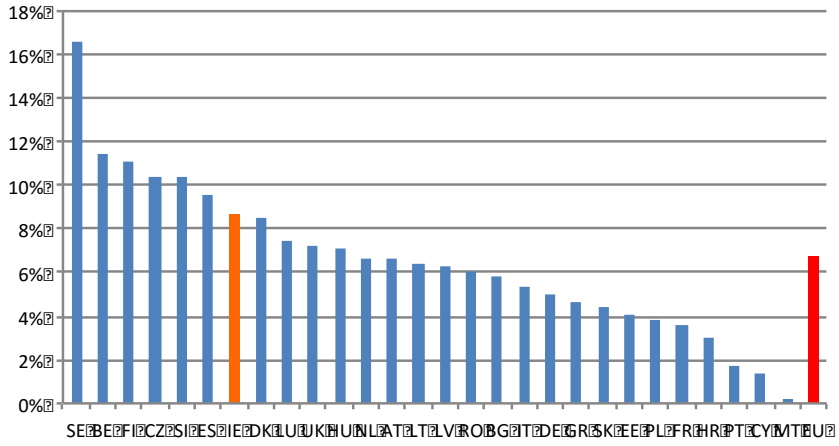
Figure 42 ICT R&D Intensity in the EU Member States (2012)



Source: JRC-IPTS calculations and estimates, based on EUROSTAT data, PREDICT project. ICT R&D intensity is calculated as ratio BERD/Value Added.

The 2015 EC Digital Agenda Scoreboard highlights the considerable efforts made at the national level to sustain and foster ICT R&D in the country (Figure 43). The support provided to ICT R&D by the public funders in Ireland is higher than in the majority of the other EU Member States, including three of the four comparator countries in this study.

Figure 43 - ICT GBAORD as share of Total GBAORD, 2013



Source: JRC-IPTS calculations and estimates, based on EUROSTAT data, PREDICT project

9.1.2 Participation in FP7 by the actors in the field of ICT

The Irish ICT research and industry actors accounted for 433 participations in the FP7 ICT programme leveraging approximately €129M. These two figures are different from the ones shown in Section 2.2.4.1 because they include the ICT-related JTIs (ENIAC and ARTEMIS).

According to CORDA, in comparison to the participation pattern in the ICT programme overall, the Irish research actors (HEIs and Research Institutes) took up a higher share of the EC funding, while large enterprises were involved to a lower extent (Table 25). The data also indicates that the Irish SMEs accounted for 14% of the Irish participations in the ICT programme, which goes in line with SME participation by EU28 countries compared to 13% in the EU28.

Table 25 - EC Contribution for the stakeholder types in the FP7 ICT programme (including ICT-related JTIs)

	FP7 ICT Programme (including ENIAC and ARTEMIS)	
	EU28	**Ireland**
Research (HEIs/REC)	61%	66%
Large enterprises	23%	17%
SMEs	13%	14%
Other	3%	2%
Total	**€7,765M**	**€129M**

Source: Technopolis (2016) based on CORDA.

ICT research in the Framework Programme covers a broad range of technologies in the discipline and spans the various stages in the research cycle, i.e. from fundamental to application-oriented research. In order to reach a comprehensive view on the **type of research** conducted in the ICT programme, a categorisation of the lines of research in terms of the maturity of the technologies covered and the areas of application is needed. We developed such categorisation in the context of our contribution to

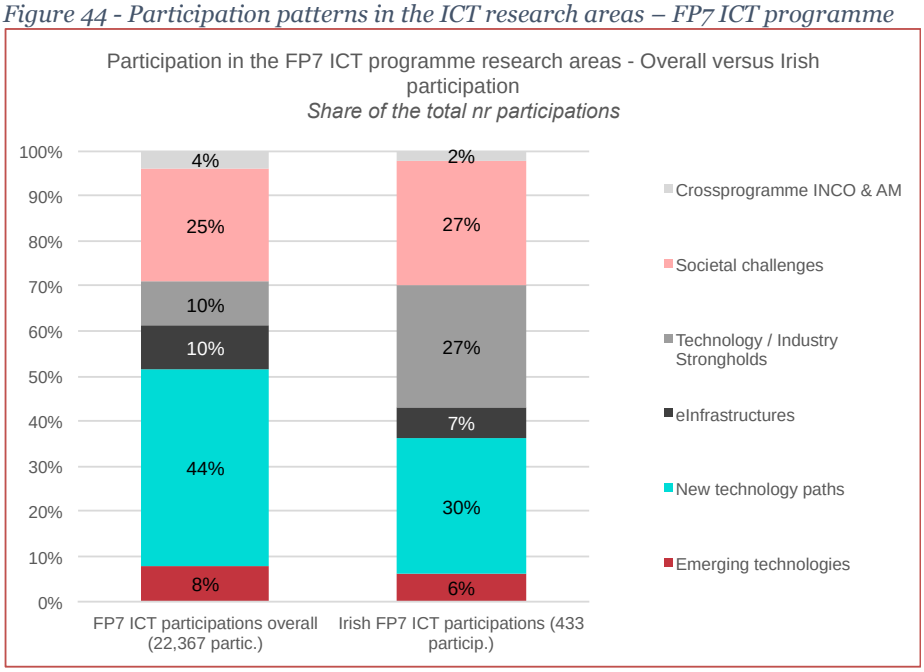
the FP7 ICT Interim Evaluation[37], in collaboration with the European Commission. We categorised the research funded in the ICT programme into four major groupings, i.e. future emerging technologies, new technology paths, technology/industry strongholds, and societal challenges.

Figure 44 shows the participation patterns in the FP7 ICT programme, for the Irish participants and overall. There was a higher-than-average participation of the Irish ICT R&D actors in the research areas focusing on technology/industry strongholds in Europe, in particular on the field of Network & Service Infrastructures. From a technological perspective, most of the participation came from software and infrastructures and from the Future Internet.

In relative terms, however, the highest level of participation by the Irish actors was in the area of **New technology paths** where research in the field of Components, systems and engineering attracted the overall majority of Irish participations. The technological focus in this area was predominantly on photonics, micronano- and embedded systems, the more exploratory lines of research related to the Future Internet and information management technologies.

In terms of ICT-enabled innovation in the field of societal challenges, the Irish R&D actors were involved in particular in projects related to the healthcare sector, sustainability and energy efficiency, and eContent.

Figure 44 - Participation patterns in the ICT research areas – FP7 ICT programme



Source: Technopolis (2016) based on CORDA.

While the data above refer to the participation in the FP7 ICT programme in the Cooperation pillar, the pervasive nature of ICT and its increasingly important enabling function for innovation suggests that the Irish actors in ICT were involved also in other areas of FP7. In fact, our estimates show that the importance of the FP for the ICT sector goes well beyond participation in the ICT programme.

We used information contained in CORDA regarding industry NACE codes. Based on this information we estimate that there have been a total of 148 participations in the FP7 ICT programme from companies operating in the ICT-sector.

[37] Mahieu, B. (2010) Interim evaluation of the ICT research in the 7th Framework Programme – Evidence report, Technopolis Group, a study for the European Commission, DG Connect

In addition to those 148 participations, the Irish ICT industry actors accounted for another 108 participations in the other programmes of the FP. Table 26 shows the breadth of the areas covered. The industry participants focused especially on the field of ICT for Security, the NMP programme (focused on nanotechnologies, new materials and advanced production technologies and supporting under FP7 the Energy-Efficient Buildings and the Factory of the Future PPPs), the Marie Curie Actions and last but not least, the 'research for the benefit of SMEs' programme (SME actions).

EC data on FP participations do not allow us to identify whether and to what extent ICT-related centres or university departments are involved in the FP beyond the ICT programme in FP7. However, our interviews confirmed that also in the case of the research actors, participation in the FP is far broader. Similar to the industry actors, our interviewees mentioned the NMP programme, the Space programme, and contributions in the societal challenges areas of healthcare (medical instruments), security, environment/climate change, and smart agriculture.

Table 26 - Participation of ICT industry actors in FP7 programmes beyond the ICT programme

		Large Enterprises	SMEs	Total
Marie-Curie Actions	Marie-Curie Actions	6	4	10
Cooperation	NMP programme	5	6	11
	Space	2	3	5
	Energy	1	1	2
	Environment	1	4	5
	Health		6	6
	Food, agriculture & biotech	1	7	8
	Transport	1	4	5
	Security	10	23	33
Capacities	SME actions		20	20
	Other	2	1	3

Source: Technopolis (2016) based on CORDA.

9.2 The impact of FP7 on the national ICT R&D environment

It is early-stage to consider how FP7 has impacted the Irish ICT R&D landscape and its competitiveness. However, some observations on the level and scope of impacts that can be expected can be made based on the profile of the participants and the focus of their participation in FP7, combined with the benefits that the participants have experienced from FP participation and their involvement in the EU platforms.

9.2.1 The benefits from FP participation

In a first instance, our discussions with interviewees explored in more depth the different types of benefits that FP participation brings to the ICT research community. The feedback broadly supported a consistent finding in Framework evaluations[38]: from the participant perspective the main outputs of the FP are knowledge and networks, including marketing-relevant networks and supply chains. They also broadly confirmed the input provided through the survey in this study, reported in Section 6.1, above.

[38] Erik Arnold, Bea Mahieu, James Stroyan, David Campbell, et al., *Understanding the Long Term Impact of the Framework Programme*, Brussels: European Commission, 2011

The importance of the FP as an opportunity for the development of knowledge, to remain on the cutting-edge of research topics, was a common reflection – for ICT actors in research and industry alike. Interviewees typically set this knowledge in the context of the creation of further collaboration opportunities and for the learning from others – and to then disseminate the knowledge to others.

The emphasis set on specific benefits typically reflect the organisations' position in the Irish ICT R&D ecosystem and their funding opportunities and specific needs:

- Research organisations and SMEs that strongly depend on competitive funding for their sustainability indicate reputation building as a major benefit. Being recognised and known as partner of the best research groups in the field in Europe allows them to leverage funding, at EU and national level.
- Several of the ICT research centres that have knowledge transfer to local industry as part of their mission consider success in the FP critical to reaching their objectives. Professional relationships with worldwide leaders that have a level of expertise that is not available nationally helps them to deepen their knowledge and develop critical mass in fields of research that are relevant to their members.
- Research collaboration with leaders in Europe that have a level of expertise that is not available nationally is a key benefit also for the large enterprises.
- Research organisations and large enterprises alike want to conduct pre-competitive research and develop networks with as main purpose to accelerate the research agenda. To these organisations, participation in the FP provides them with knowledge and expertise that allows them to broaden up fields of activity and/or to develop new technologies, thus creating business opportunities.
- Research actors and SMEs in the field of ICT services that strive for a presence on the international market emphasise the opportunity the FP offers in developing an international brand, to be recognised for doing 'state-of-the-art' research and to set up relationships with potential customers outside of Ireland. These organisations also point out that the FP provides a platform to do research that otherwise could not have been done: only by doing R&D at a European level one can explore, develop and demonstrate solutions that have a potential application beyond the national level. A topic of importance in this context is also the development of international standards; to be part of the development of standards is a huge advantage to obtain future uptake.
- For SMEs a major benefit from FP participation is the development of relationships with customers and the development of client knowledge. It provides them with the opportunity to develop relationships and gain an improved understanding of their supply chain as well as the appreciation of potential key customers.

Next to these 'intangible' benefits that create impacts in a longer-term perspective, there are quite obviously also the direct outcomes of the FP on the commercialisation of the R&D outputs and the creation of spin-offs.

9.2.2 The importance of the EU platforms (ETPs, JTIs, PPPs)

While interviewees indicated access to international networks and competences and knowledge gained as the main benefits of FP participation, they indicated the attainment of earlier insight into the evolution of core research questions to be a major benefit of their active involvement in the EU platforms such as the European Technology Platforms (ETPs), Joint Technology Initiatives (JTIs) and Public Private Partnerships (PPPs).

Most of the organisations interviewed were active members of one or more of these platforms and participated in the organised workshops or working groups and were at times even members of the board. They indicated as key benefits from an active membership in these European platforms:

- It provides a networking opportunity, with the best companies and the best academics in the EU in your field of research

- It gives a direct access to technology road mapping and insight in the current thinking. Gaining an understanding of what industry will need in 10 years time allows for an orientation of the research agenda to those needs
- It allows for influencing the road maps towards areas of particular interest and/or Irish needs, maintaining the relevance of the organisation's research

In this context it should be noted that the EC has strengthened the role of these platforms under Horizon 2020, in particular in the field of ICT where the research agenda for close to each action line in the ICT work programme is influenced directly by the Strategic Research Agenda developed in a relevant ETP and PPP.

9.2.3 Expectations for impacts on the national R&D competitiveness in ICT

Notwithstanding the importance of participation in any line of research of the FP, an expansion of expertise and knowledge to the benefit of the Irish ICT R&D competitiveness can be expected to derive in particular from participation in the 'Future emerging technologies' (FET) and 'New technology paths' research areas. (Level of participation in FP7 ICT across technology paths is shown in Table 27).

While FET allows for (bottom-up) fundamental research in a range of research fields, research in the new technology paths regarded predominantly research in the field of photonics, micronano- and embedded systems, an area of research directly linked to the computer, electronic and optical products market sector (Table 27, below).

Other fields of ICT research are the Future Internet research (network technologies, cloud computing, the Internet of Things etc.) and information management technologies such as data analytics. Participation in these projects can especially be expected to lead to further FP funding opportunities under Horizon 2020, seeing the growing importance set by the EC on both the Internet of Things and Big Data analytics.

Table 27 - Breakdown of the participation in the FP7 ICT New technology paths research area

Research area	FP7 ICT Challenge	HEIs	Large Enter-prises	SMEs	Other	Total
Future emerging technologies		23	3		1	27
New technology paths	Ch1 - Network & Service Infrastructure	13	2	6	1	22
	Ch2 - Cognitive systems, interaction, robotics	7	1	1		9
	Ch3 - Components, systems, engineering	50	8	10	1	69
	Ch4 - Digital libraries & content	10	3	2	1	16

Source: Technopolis (2016) based on CORDA.

9.3 National R&D and FP7 leverage

9.3.1 Leverage of EC funding

As already mentioned Irish research and industry actors succeeded in leveraging close to €136M in EC funding from their participation in the FP7 ICT programme and the ICT-related JTIs and PPPs. EC funding was obtained especially for research in the challenge area Network and service infrastructure, followed by the challenge area Components, systems, engineering (Table 28)

When taking into account also the EC funding leveraged by the ICT industry actors in other parts of FP7, the total EC funding obtained by the Irish participants in the ICT sector is **€165.5M**.

Table 28 - Leveraging of EC funding in the FP7 ICT challenge areas

	EC funding (in € million)	% of the total EC funding
Future Emerging Technologies	7.18	5%
e-Infrastructures	6.62	5%
Ch1 - Network & Service Infrastructure	37.61	28%
Ch2 - Cognitive systems, interaction, robotics	2.99	2%
Ch3 - Components, systems, engineering	25.50	19%
Ch4 - Digital libraries & content	16.59	12%
Ch5 - Healthcare	9.29	7%
Ch6 - Mobility, sustainability & energy efficiency	9.83	7%
Ch7 - Independent living & inclusion	3.76	3%
Horizontal Actions & INCO	2.30	0%
PPPs / JTIs	14.01	10%
Total	136	100%

Source: Technopolis (2016) based on CORDA.

In the context of the relatively low level of ICT R&D intensity in Ireland (see Figure 42, above), it may be useful to consider also that the FP participation fostered **R&D expenditure** by the participants themselves. Table 29 shows that participation in FP7 triggered an investment of €45M in R&D by the Irish ICT industry sector. The EC rulings on co-funding under FP7[39] implied that Ireland-based ICT large enterprises invested a similar sum for their participation in the FP as the HEIs, despite their lower level of participation as such.

Table 29 - Leverage of EC funding and participant investment per stakeholder type in the ICT sector (in €)

Stakeholder type	Total cost (in € million)	Total EC funding (in € million)	Participant funding (in € million)
From participation in the ICT programme & JTIs/PPPs			
HEIs	121.0	90.1	30.9
REC	0.7	0.5	0.1
PUB	3.6	2.1	1.5
OTH	1.4	1.1	0.3
Total	**126.7**	**93.8**	**32.8**
From participation of ICT enterprises in FP7 overall			
Large Enterprises	60.9	30.2	30.7
SMEs	55.7	41.4	14.3
Total	116.6	71.6	45.0

[39] During FP7 the EC covered costs of R&D projects as follows: For non-profit public bodies, SMEs, research organisations, higher education establishments the EC funded up to 75% of the project costs; for the other participants – ie non-SME private enterprises – the funding rate was 50% of the project costs. CSA were 100% funded, as well as NoE that were not R&D-oriented

Stakeholder type	Total cost (in € million)	Total EC funding (in € million)	Participant funding (in € million)
GRAND TOTAL	**243.3**	**165.4**	**77.8**

Source: Technopolis (2016) based on CORDA.

The investment costs for industry participation in the FP may also explain the fact that among the ICT actors, only higher education institutions have taken up the role of project coordinator in FP7 (in 16% of their participations).

9.3.2 The additive or duplicative function of FP funding versus national funding

The question whether FP funding is to be considered a duplication of national funding is closely related to the question of the added value of the FP research, covered in Section 7.4, above.

The responses by our interviewees in the ICT sector are aligned with the survey responses and the view of their peers in the other sectors participating in the FP, i.e. participation in Framework Programmes provides substantial added value. Furthermore, funding in the FP was sought predominantly because the research could not have been conducted at the national level – be it because funding for the specific line of research was not available at the national level or the needed expertise or because the research topic itself required the conduct of research at an international scale.

9.4 Synergies between FP7 and the national R&D system

9.4.1 The level of synergy in research priorities at national and European level

In 2012, the National Research Prioritisation Exercise led to the identification of 14 areas upon which to focus national funding in order to create the critical mass needed for and enhanced level of competitiveness of the national R&D system.

Our analysis reported in Section 2.3.3, above, suggested a mix of synergy and complementarity of the FP research in ICT with the national priorities.

We considered that in the ICT area, the FP7 ICT programme aligns well with three national priority areas, i.e. Data Analytics, Management, Security & Privacy; Digital Platforms, Content & Application; and Future Networks & Communications. We saw a good alignment also with the areas of Connected Health & Independent Living and Smart Grids and Cities related to the use of biosensors and chips for disease monitoring and management, and to the implementation of ICT-based solutions for energy distribution. The analysis showed that 45% of the FP7 ICT funding could be matched to the Irish national priority areas.

Interviewees confirmed our analysis. On the one hand, they indicated a good alignment in content between the FP and national priorities. They considered that the national priorities were the result of an intelligent foresighting by the national policymaking combined with input from the ICT research community. Some interviewees were of the opinion that this entailed the risk of a lock-in for the national ICT R&D system, focused on the existing strengths of a number of prominent research and technology institutions; other interviewees considered that the national priorities reflect the needs of the Irish economy and its ICT sector in particular. They also pointed out that even though the priorities are based on current strengths, they nevertheless steer the research agendas in specific directions, for example to the development of ICT-enabled innovation in areas tuned to the needs of Ireland (ageing, agriculture, etc.). In general, the interviewees applauded the high-level objective of targeting Irish funding on strength areas and creating scale.

On the other hand, several interviewees made critical reflections in relation to the synergy of the natural priorities and their implementation in the national funding system with the FP priorities.

Some interviewees highlighted the strong demand on commercialisation and the pronounced focus on applied research in the national priorities and the national funding system in Ireland. According to

the interviewees, the overall majority of SFI funding is currently dedicated to the funding of the applied research centres. The FP, instead, shows a more balanced approach, taking a longer-term view and focusing (also) on building up knowledge and the next generation of tools - despite its more pronounced focus on innovation in Horizon 2020.

Interviewees see this mismatch illustrated, for example, in the lack of national funding instruments for fundamental research similar to the FET Open and FET Proactive instruments, i.e. beyond the funding of individual researchers conducting bottom-up research.

Finally, interviewees also pointed at the increasing importance attributed to interdisciplinary research in the FP in general and the ICT specific programme, which is seen as highly positive and a strong added value from FP7, in comparison with the national funding.

9.4.2 The value of a synergy in research priorities at national and European level

The data on the focus of participation in FP7 ICT research showed a significant level of participation in the future emerging technologies and especially the 'new technology paths' research areas (accounting for 36% of the participations - see Figure 44, above), the latter including research in photonics and nanoelectronics, i.e. KETs. Our interviews pointed out that these areas less covered by national schemes. In other words, the FP7 seems to have compensated for the apparent lack in relevant funding streams at the national level.

Interviewees nevertheless stressed the importance of an improved synergy between the FP and the national priorities and funding system by highlighting the increased competition and elevated challenge that gaining FP funding entails. They recognised that the FP provides space for high-risk research, i.e. innovative disruptive research at low TRL levels, but pointed out that in order to remain competitive in the FP7s national support is needed in order to build portfolio and track record.

An additional benefit of a synergy between national and European priorities is that it provides the grounds for the transfer of knowledge gained in the FP projects back into the national R&D system, allowing for a strengthening of the research base and the creation of critical mass in the field at the national level.

While no doubt these opportunities exist in the key areas of expertise in the Irish ICT R&D system, some interviewees pointed that more could be done at national level to facilitate the effective exploitation of the knowledge gained in the FP.

In line with this, interviewees indicated the need to support open platforms for transfer of knowledge emerging not only from FP7 participation but also from the EI and SFI-funded centres. Some interviewees also mentioned that even within established interuniversity research centres, there are few 'on the ground' collaborations among researchers in the centre units and thus, internal knowledge transfer.

9.5 The quality of the national support system

Similar to the research centres in the other areas, a requirement set on SFI- and EI-supported research centres in the field of ICT is their participation in the Framework Programme. In this context, several interviewees mentioned the ambition of their research institution to reach a typical RTO funding model, i.e. 30% national funding, 30% contract research, 30% funding from other sources, i.e. the FP.

Notwithstanding the importance of FP participation for the Irish ICT R&D system, the requirement to leverage FP funding is to be set against the context of the reduction in national ICT R&D funding. According to the 2016 EC Digital Agenda Scoreboard, public funding for ICT research (ICT GBAORD) has seen an on-going decrease in absolute terms between 2010 and 2013, even though its share in the overall research funding slightly increased in the same time period (Table 30).

Table 30 - Trend in industry and public expenditure for R&D in ICT (2010 – 2013)

Indicator (including breakdown and unit)	Ireland value			
	2010	2011	2012	2013
ICT BERD – Million €	719	816	858	-
ICT BERD - % of Total BERD	39	44	44	-
Total BERD - % GDP	1.2	1.1	1.2	-
ICT GBAORD – Million €	71	68	66	64
ICT GBAORD - % of Total GBAORD	8.5	8.6	8.6	8.7

Source: Digital Agenda Scoreboard (2016) R&D – Ireland

All interviewees highlighted the challenge that competing for FP funding poses on their institution's resources for the forming of an FP consortium and the writing of proposals. Some of the larger institutions and universities have set up EU programme offices to deal with this challenge; a solution that is out of reach for the smaller institutions. In addition, the harsh competition for funding in Horizon 2020 and the particularly low success rates have set at higher risk the return of investment, a disincentive that is particularly felt among the SMEs.

In this context, the interviewees were full of praise for the availability and competence of the staff in the National Support Network in providing information and other advisory services. In addition, the financial support in the form of travel grants and coordination support grants is highly appreciated.

9.6 The links between the funding opportunities in FP7 and the Irish R&D system for Irish-based ICT companies

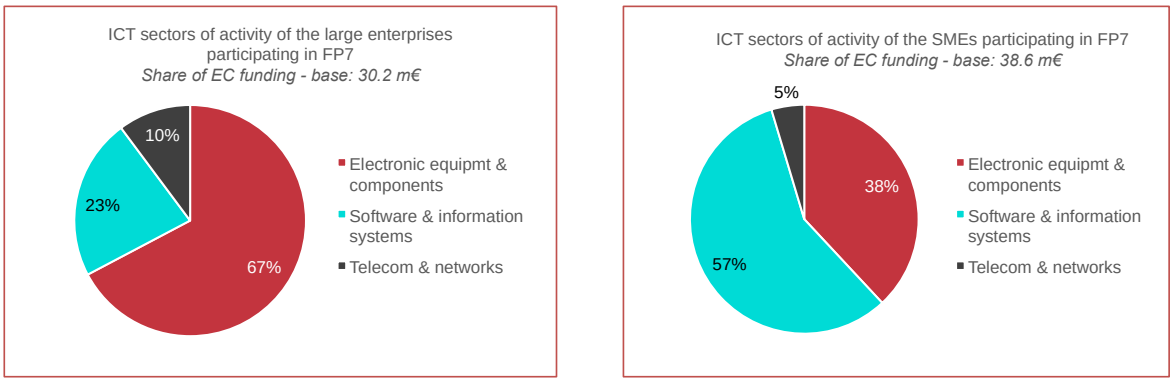
9.6.1 The (potential) value of FP research for the Irish ICT industry

The picture emerging from the participation profile in the FP ICT programmes over these last years shows that the Irish ICT R&D system has gained critical mass and reached international competitiveness in fields of research relevant for the main industry sectors in the country, in particular the software and information systems and the electronic equipment and components sectors. The data reported in Section 9.1 show in particular a considerable level of participation in research related to the field of software systems, the future internet, and photonics, micronano- and embedded systems, setting the basis for international R&D competitiveness in growing fields of ICT application in the global market such as the Internet of Things and Big Data analytics. In addition, an increasing contribution to ICT-enabled innovation in the healthcare sector is visible, reflecting the high importance set on this area in the national priorities, next to the competence shown in the field of smart cities.

The only area where the FP participation seems less aligned with the trends in the Irish ICT market is the field of digital content. Robotics is another area of opportunity where Irish competence is visible only to a limited extent, taking into account the growing importance of this field of research in, for example, the agricultural and healthcare sectors.

Data on the participation by SMEs are of particular importance in the Irish context. Our analysis shows the emergence of highly competitive SMEs in the Irish ICT sector, in particular in the software and information systems and the electronic equipment and components sectors, which are also the areas of expertise for the large enterprises participating (Figure 45).

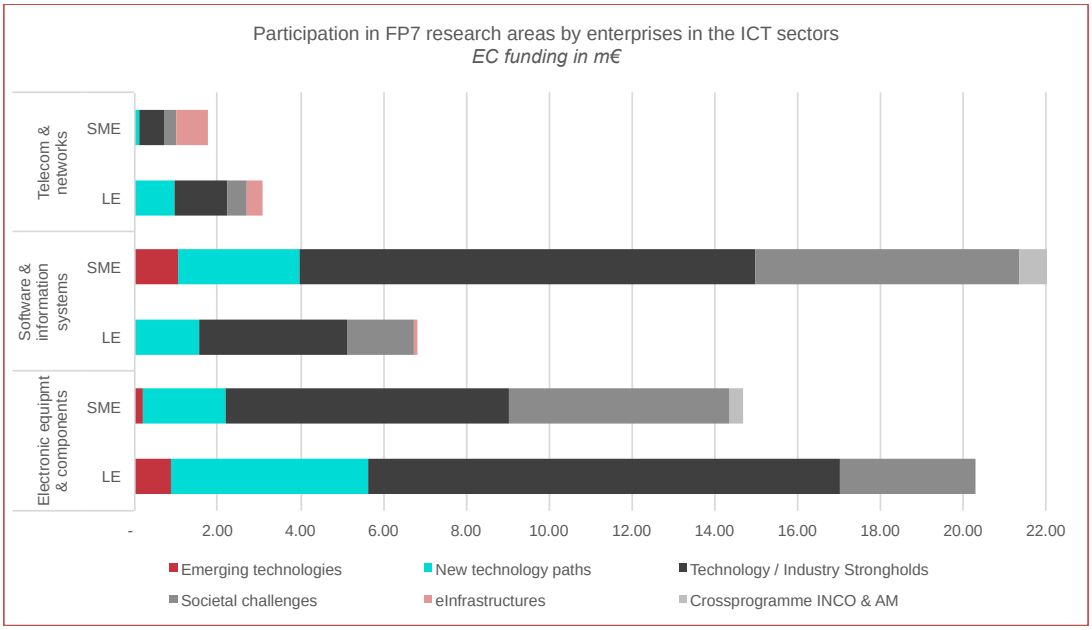
Figure 45 - Profile of the large enterprises and SMEs participating in FP7



Striking is in particular the relatively strong participation of SMEs in the more risky research areas in the FP7 ICT programme, focusing on future emerging technologies and new technology paths. In these research areas, SME participation accounted for respectively 49% and 41% of the EC funding for industry participants. A breakdown of these data in terms of sectoral profile shows a value of these high-profile participations (in terms of EC funding) in particular for SMEs in the software and information systems sector (Figure 46). In contrast, large enterprises participating in the FP7 future emerging technologies and new technology paths were active predominantly in the electronic equipment and components sector.

To be noted also is that an equal number of SMEs active in the software/information systems and the electronic equipment/components sectors gained access to EC funding in the 'Research for the benefit of SMEs' programme (9 participations each, on a total of 20 participations).

Figure 46 - Participation profile in FP7 of industry actors in the ICT sectors



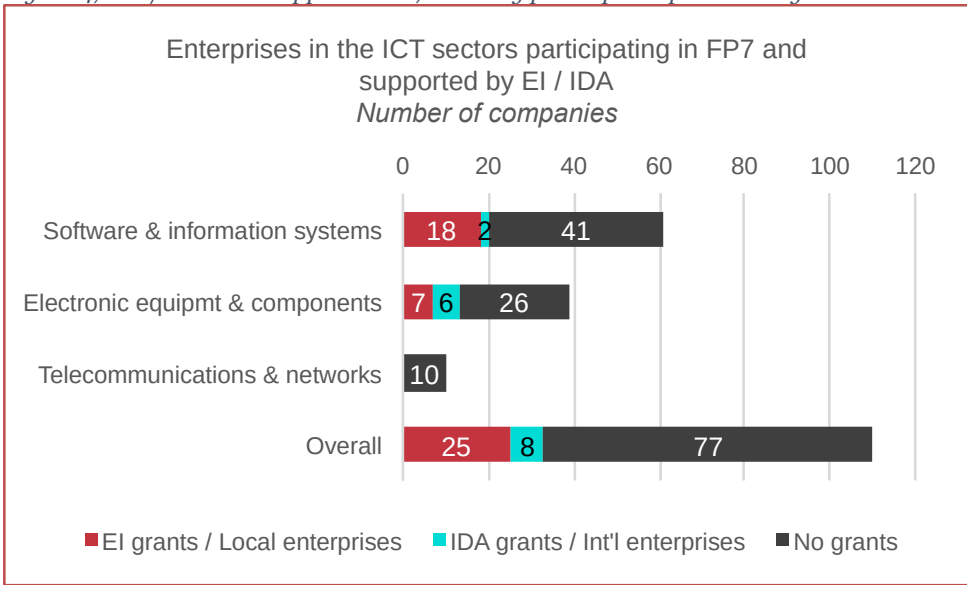
9.6.2 The effects of the national support system

Our analysis of the FP7 industry participants shows that one third of the 110 ICT enterprises participating had received (also) EI or IDA R&D grants (25 and 8 companies, respectively). This included a quarter of the participating large enterprises (8 on 31) and a third of the SMEs (25 on 79).

The national funding bodies support participation in the FP by industry actors through different channels. In addition, Enterprise Ireland sets the requirement for the co-funding of participation in projects funded under the JTIs that research participants involve also local SMEs in their consortia; the EI-funded centres are also expected to facilitate SME participation in their FP projects.

Several of our interviewees indicated the alignment of their institutions' practice to these expectations and the support they deliver to their industry members and partners to reach FP participation. They stressed the importance of the FP for SMEs as an opportunity to set up relationships with consortium partners that are part of their supply chain and to reach an improved understanding of the characteristics and needs of the ecosystem for their products at the European level. After the project, these relationships become business opportunities.

Figure 47 - EI/IDA R&D support to FP7 industry participants per industry sector



Summary of findings and conclusions

- Irish ICT R&D actors use the FP especially as a platform for the exploration of new technology paths, especially in the field of photonics, micro/nano and embedded systems.
- ICT for healthcare was in FP7 the main focus for participation in the societal challenges sub-programmes; this relates to the field of software for eHealth and photonics/electronics for the innovation in medical instruments.
- A considerable number of hi-tech SMEs were involved in exploratory research in the field of software/information systems and electronic equipment/components.
- The overall profile of participation is in line with Ireland's strengths in ICT (software, photonics) as well as the trends in FP priorities (Future Internet, IoT, big data, smart cities etc.). With the exception of: robotics, a field of increasing importance in the EC (including for agriculture).
- Interviewees emphasised the importance of an active involvement in the EU platforms such as JTIs and ETPs - to gain access to expertise, create visibility in the international environment, learn about future trends, and have the opportunity to influence EC policymaking in the field.

10 Concluding remarks

As presented in the opening chapter of this report Ireland had set up a series of objectives regarding its participation in FP7, this included to:

- Increase Irish participation with respect to FP6
- Improve access to research networks throughout EU & internationally
- Improve access to specialist research infrastructures
- Increase opportunities for Irish researchers to take up positions in other countries
- Improve appreciation of Ireland's scientific capabilities internationally
- Improve Ireland's ability to derive policy benefits from European research
- Improve Ireland's ability to derive economic benefits from European research

Our analysis shows that Ireland has met those objectives:

- Ireland performed well against its targets for FP7, with a drawdown of around €625M, which was more than three times the drawdown realised in FP6 and more than 150% of its original target for FP7.
- FP7 has delivered a series of benefits to participant organisations that range from enhanced access to international scientific networks; to improvements in technological capacity and investments; to improvements in an organisation's ability to attract researchers; and tangible results in terms of commercialisation of research outcomes and improved national and international competitiveness.
- MCA fellows benefited from working with leading overseas research groups and the extension of their international scientific networks, but also from access to major international research facilities.
- Findings emerging from our ICT case study (but that are likely to be relevant across different industries) show that:
  - Research organisations and SMEs that strongly depend on competitive funding for their sustainability indicate reputation building as a major benefit.
  - Several of the ICT research centres that have knowledge transfer to local industry as part of their mission consider success in the FP critical to reaching their objectives.
  - Participation in the FP provides research organisations and large enterprises with knowledge and expertise that allows them to broaden up fields of activity and/or to develop new technologies, thus creating business opportunities.
  - Research actors and SMEs in the field of ICT services that strive for a presence on the international market emphasise the opportunity the FP offers in developing an international brand, to be recognised for doing 'state-of-the-art' research and to set up relationships with potential customers outside of Ireland.
  - For SMEs, a major benefit from FP participation is the development of relationships with customers and the development of client knowledge.
- Companies maintain that participation in FP7 has had an impact on their levels of turnover, employment, and productivity. It implies that the positive benefits mapped in the prior section (access to international networks and knowledge, increased research and technological capacity, ability to attract and retain research staff, etc.) have materialised in commercial gains. Participant companies and Irish industry base are likely to reap the benefits of participation in FP7 for years to come. In fact, existing econometric models predict that the effects could last 15 years. In the case

of Ireland, this could mean €6.5bn in terms of GDP growth (between 2007 and 2028), equivalent to an annual GDP growth of ~€300M.

Our ex-post evaluation has covered more ground than the ones set up in the original objectives drawn up by the study team from the Strategy for Science, Technology and Innovation (2006-2013) and Forfás' Recommendations for a Support Structure report (2009).

Each chapter of our report presents the main findings and conclusions. These are also summarised in the Executive Summary. Our findings of FP7 have served to complement our findings from participation in Horizon 2020, which in turn have led to a series of actionable recommendations. These analysis, conclusions and recommendations sit in the last chapter of our mid-term evaluation of Horizon 2020 report.

Two additional recommendations not covered in the mid-term report relates to (i) the need to develop an intervention logic model for future FPs (including Horizon 2020) (iii) the lessons learned emerging from our assessment of the viability of conducting counterfactual econometric analysis.

Intervention logic model

As mentioned in Section 1.3 we recommend that Ireland should prepare an intervention Logic Model (LM) for Horizon 2020. Ideally, this LM will provide an overarching logic model that connects national investments with the drawdown of EU contributions and improvements in research, innovation and policy.

The overarching LM could be supported by a series of subsidiary LMs, one for each of the main pillars and possibly also a LM for the related, strategic initiatives.

These more specific LMs would differ from each other not only in terms of expected impacts but also in terms of the various inputs and activities put in place to achieve the targets set up across the different programmes and instruments, and would be part of a series of nested strategies that build up in to the overarching LM.

Econometric analysis

Our analysis of the suitability of using ABSEI database to conduct econometric analysis reveals that this database does not contain enough number of companies to conduct a robust analysis. This is mainly because:

- ABSEI is a sample based-survey (as opposed to a census), which means that it does have full annual data for all EI and IDA companies operating in Ireland. Subsequently, several businesses that took part in FP7 are not found in the database. It also means that a slightly different set of companies each year, which means that only a relatively small number of companies (that are found in both, ABSEI and the registry of FP7 participant companies) present complete time series (i.e. information from before and after participation in FP7 took place).
- ABSEI predominantly includes companies with 10 or more employees, which further limits the number of companies that are found in both, ABSEI and the registry of FP7 participant companies.
- A robust econometric analysis need of the economic impact of participation in FP7 would need to account for 'lags', i.e. for a period where the potential benefits would materialise. In our case, the analysis required excluding companies that are successful applicants and participated for the first time in FP7 in 2012 or 2013 to account for a minimum two-year lag (under this assumption for lags, the effect of participation 2012 would only materialise in 2014 onwards). Ideally, even a larger lag period would be allowed to account for the fact that projects tend to last three years and, presumably, any commercial outcomes would take place at least a year after the project ended (if not more).All these different issues led to a substantive decrease in the number of observations available for the analysis, from circa 300 to 65. This dramatic reduction in the number of observations meant that a robust econometric analysis was not possible.

If DJEI considers re-running this exercise in the future, we recommend:

- Conducting the analysis at the time when ABSEI dataset capture data for the year 2018 (at the moment of the analysis the dataset only covered information for up to 2013).
- Liaise with the Central Statistics Office in Ireland to explore the possibility of using company level returns (e.g. Census of Industrial Production; Annual Services Inquiry[40]). Of course, PSM techniques would have to be used to guarantee comparability between participants and non-participant companies (i.e. treatment and control groups). The main disadvantage of this type of data is that it does now allow controlling for relevant factors such as R&D expenditure (which may explain any observed difference between participant and non-participant companies). To minimise this shortcoming, the dataset could be combined with sources such as PATSTAT (the European Patent Office's Worldwide Patent Statistical Database) in order to use patent filing as a proxy for R&D activity.

[40] The BERD survey would also provide a good alternative, but it depends on the coverage of companies (as this survey may suffer from the same problems identified for the ABSEI data.

Appendix A Methodology

A.1 Desk research

Early in the study a large amount of background information and documentation was provided by DJEI. This included strategy and policy documents, monitoring data and reports, and FP/Horizon 2020 participation and award data.

The desk research has also included a rapid identification and meta-analysis of existing studies and evaluations in this field. This informed the design of data collection tools (e.g. proven questions sets, potential drivers and barriers to participation).

A.2 Composition analysis

The study has made extensive use data on projects and participants provided by two main sources of information:

CORDA data

CORDA is the official European Commission data on FP7 and Horizon 2020 applications, projects and participants, The study has undertaken an in-depth review of application and participation data, covering IE, and comparator countries.

Full datasets of application, project and participant data for the whole of FP7 and the first calls of Horizon 2020 (to November 2015), covering all countries, were requested and obtained from DJEI in January 2016. A further update to Horizon 2020 proposal data (to March 2016) was provided in March.

Contact information for the participant survey was initially extracted. A more thorough analysis of the data was then conducted – the results of which are presented in the report.

SESAM Research Performance and Impact Reporting tool (RESPIR)

The REPIR tool presents statistical data on research outputs (peer-reviewed applications, applications for patents, gender and ethical issues, etc.) based on FP7 project final reports that are submitted and registered in the SESAM application. RESPIR reports on data derived from projects administered by DG RTD and the Research Executive Agency (REA).

This reporting tool and database combines the inputs coming from the project coordinators (inserted in the project final report) together with the ones written in the assessment of the Project Officer (PO) at the end of the project.

RESPIR takes into account only the following completed projects:

- where the assessment report has been electronically signed and submitted by the PO in the IT tool SESAM;
- where the final payment is available (previous reporting periods closed) or the Financial Officer (F) has finalised the calculation of the final payment.

For FP7, RESPIR does not cover the interventions and activities managed by Directorate Generals for Communication Networks, Content and Technology (i.e. the ICT programme), Energy and Transport and Mobility, the European Research Council (ERC) and some Joint Technology Initiatives (IMI, ENIAC, ARTEMIS)[41].

[41] EC (2103) 7th FP7 Monitoring Report. https://ec.europa.eu/research/evaluations/pdf/archive/fp7_monitoring_reports/7th_fp7_monitoring_report.pdf#view=fit&pagemode=none

A total of **622 projects** involving the participation of an Irish organisation are considered in these statistics as the "*reference population*" (42% of the total number of projects that involved an Irish organisation [1,465 projects]).

The following aspects are covered by these statistics:

- Assessment of the Project Officer;
- Publications;
- Intellectual property rights (IPRs);
- Dissemination activities;
- Projects' workforce and gender of scientific staff;
- Ethical issues

Note that the information made available by the EC to the study team is at **project level**, which means that in some cases it is not possible to disentangle if an output has been directly generated by an Irish organisation or by any other partners in the consortium. This would be difficult to disentangle anyway, given the collaborative nature of the majority of the FP7 projects. In line with that, the module "Projects' workforce and gender of scientific staff" is not reported here as it correspondents to the workforce from all the organisations involved in projects that included participation from an Irish organisation.

The table below shows a distribution of number of projects ("Signed Grant Agreements") as registered in SESAM/RESPIR and the number of Processed Final Reports (i.e. reference population)

Table 31 - Reference population according to SESAM/RESPIR

Priority Area		Number of Signed Grant Agreements	Number of Processed Final Reports	% of Processed Final Reports
Cooperation	Health - HEALTH	115	63	55%
	Food, Agriculture and Fisheries, and Biotechnology - KBBE	105	56	53%
	Nanosciences, Nanotechnologies, Materials and new Production Technologies - NMP	96	60	63%
	Energy - ENERGY	24	17	71%
	Environment (including Climate Change) - ENV	55	39	71%
	Transport (including Aeronautics) - TPT	34	24	71%
	Socio-economic sciences and Humanities - SSH	31	15	48%
	Space - SPA	17	10	59%
	Security - SEC	64	29	45%
	General Activities - GA	5	4	80%

	Joint Technology Initiatives (Annex IV-SP1) - SP1-JTI	5	3	60%
People	Marie-Curie Actions - PEOPLE	307	162	53%
Capacities	Research Infrastructures - INFRA	36	25	69%
	Research for the benefit of SMEs - SME	127	89	70%
	Regions of Knowledge - REGIONS	7	5	71%
	Research Potential - REGPOT	3	2	67%
	Science in Society - SiS	27	16	59%
	Support for the coherent development of research policies - COH	1	0	0%
	Activities of International Cooperation - INCO	3	3	100%
Euratom	Nuclear Fission and Radiation Protection - Fission	2	0	0%
Total		1,064	622	58%

Source: SESAM/REPIR. Report generated on: 2016/05/30

A.3 Survey

A.3.1 Sampling strategy

To maximise responses the survey was target to all IE successful and unsuccessful participants. Potential participants have had different patterns of application across both programmes (FP7 and Horizon 2020) as shown in the table below. This included, for instance, participants that were successful in FP7 and successful in Horizon 2020 (55 in total).

We identified a total of 5,907 (unique[42]) IE applicants (extracted from eCORDA, November 2015) and divided them in **four groups** according to two criteria: their success status in FP7 and their success status in Horizon 2020 (only for those that did apply to FP7):

1. FP7 Successful
2. FP7 Unsuccessful
3. Horizon 2020 Successful (that did not apply to FP7)
4. Horizon 2020 Unsuccessful (that did not apply to FP7)

Table 32 – Type of participants

FP7		Horizon 2020	
	Number		**Number**
FP7 Successful	1,100	Successful	55
		Never successful	174

[42] Unique contacts, based on recorded email address

		Have not applied to Horizon 2020 yet	871
FP7 Unsuccessful	4,414	Successful	108
		Never successful	1,154
		Have not applied to Horizon 2020 yet	3,152
		Horizon 2020 Successful	56
		Horizon 2020 Unsuccessful	337
		TOTAL	**5,907**

A.3.2 Questionnaires and dissemination

A main **questionnaire** was designed, approved and placed online by mid-February. It was then tested internally, before going 'live'. The questionnaire employed a modular construction to allow all issues to be covered essentially within a single survey but with careful routing to allow respondents to move quickly through the questions, skipping those not relevant to their individual experience.

This main questionnaire was then adapted to address the four different types of respondents:

- Survey 1: Successful applicants to FP7 (including those participants that have been successful in at least one application). The questionnaire asked participants about their status concerning Horizon 2020.
- Survey 2: Unsuccessful applicants to FP7 (participants that have been unsuccessful in all their application). The questionnaire asked participants about their status concerning Horizon 2020.
- Survey 3: Successful applicants to Horizon 2020 (that did not participate in Fp7). The questionnaire verified the participants' status concerning Horizon 2020.
- Survey 4: Unsuccessful applicants to Horizon 2020 (that did not participate in Fp7). The questionnaire verified the participants' status concerning Horizon 2020.

The questionnaire for Survey 1 is provided in Appendix G.

All 5,907 unique IE applicants were contacted in mid-February and invited to participate in the survey. Auto-responses suggest that a number of the email addresses (mainly from FP7) were out of date, and so we estimate that the initial survey request is likely to have reached ~5,300 people in total.

To complement this request, we also arranged for stakeholders to promote the survey and notify their contacts of the opportunity to contribute.

Several reminders were also sent to the non-respondents and a final reminder was sent on 4th March (the original deadline) – with a note to say that the deadline had been extended by a week. The survey was then closed on 11th March.

A.3.3 Response rates

Overall, **778 individuals responded to the survey**, 276 of which are FP7 successful applicants and 200 Horizon 2020 successful applicants. This is a very good response rate, and towards the upper end of what was predicted at the time of the proposal – which set out an ambition to achieve 100+ responses in order to allow some reasonably robust analysis to be undertaken.

There was a good spread of respondents from different **organisation types** and across **successful and unsuccessful applicants** as it is shown in the tables and figures below. In order to make the

analysis per type of stakeholder more tractable we have grouped them into four categories as shown in Table 34).

Table 33 - Response rate per type of survey

Type of survey	Responses	Response rate
Survey 1	276	25%
Survey 2	453	10%
Survey 3	17	30%
Survey 4	32	9%
Total	778	13%

Table 34 - Responses by type of stakeholders

	Company	HEI	Research organisations	Other	Total
Irish-owned SME (<250 employees)	130				130
Irish-owned large company (>250 employees)	7				7
Foreign-owned SME (<250 employees)	13				13
Foreign-owned large company (>250 employees)	30				30
Higher Education (e.g. university or institute of technology)		447			447
Private research and technology organisation			10		10
Public research institute (e.g. Teagasc)			40		40
Civil Society Organisations (e.g. Alzheimer Society of Ireland)				4	4
Other (please specify)				38	38
Other public sector (e.g. Geological Survey of Ireland)				37	37
Total	180	447	50	79	756

Table 35 - Overview of response rates

Type of organisations	FP7			Horizon 2020			
	Successful	Unsuccessful	Total	Successful	Unsuccessful	Other	Total
HEIs	147	280	427	99	88	193	380
Companies	73	87	160	60	30	57	147
Research organisations	19	29	48	15	7	22	44

Type of	FP7			Horizon 2020			
Other	37	57	94	26	14	40	80
Total	276	453	729	200	139	312	651

Figure 48 - FP7 – successful and unsuccessful

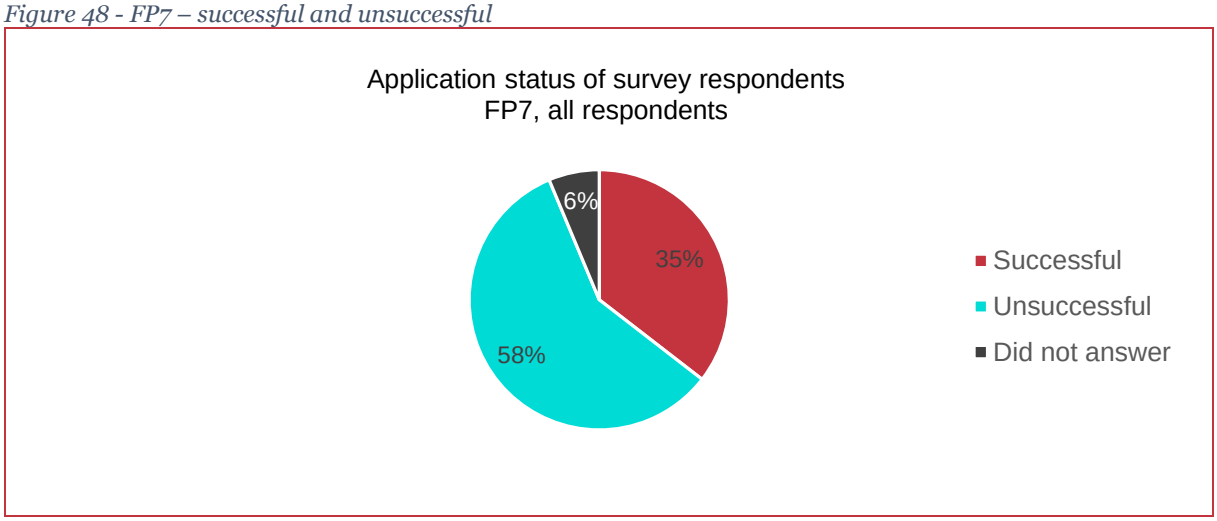


Figure 49 - FP7 – type of organisations

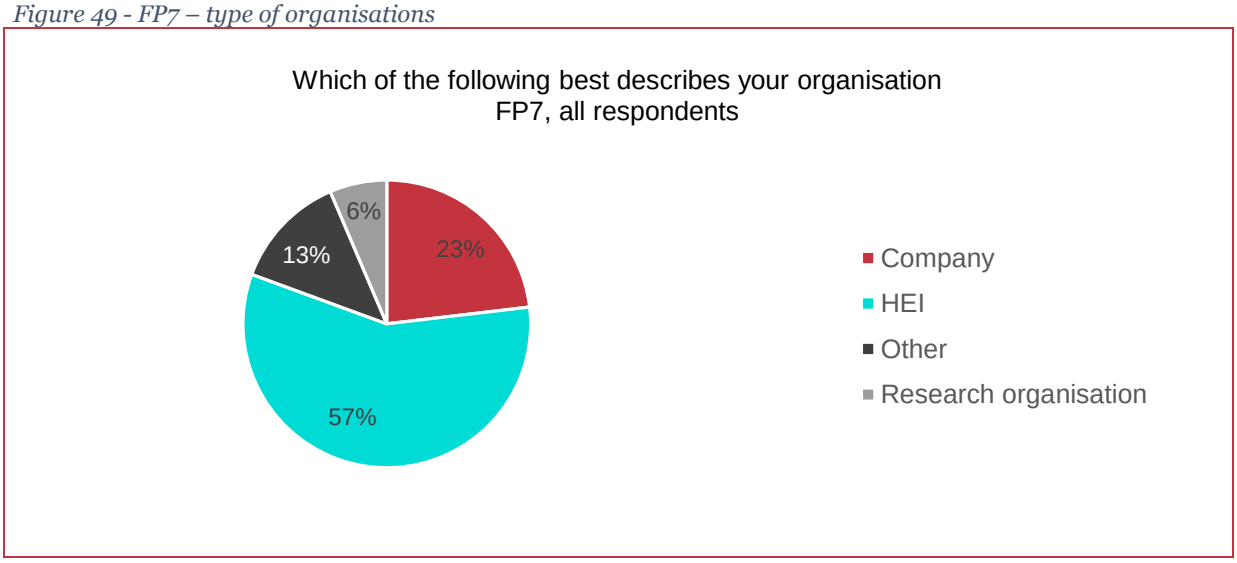


Figure 50 - Horizon 2020 – successful and unsuccessful

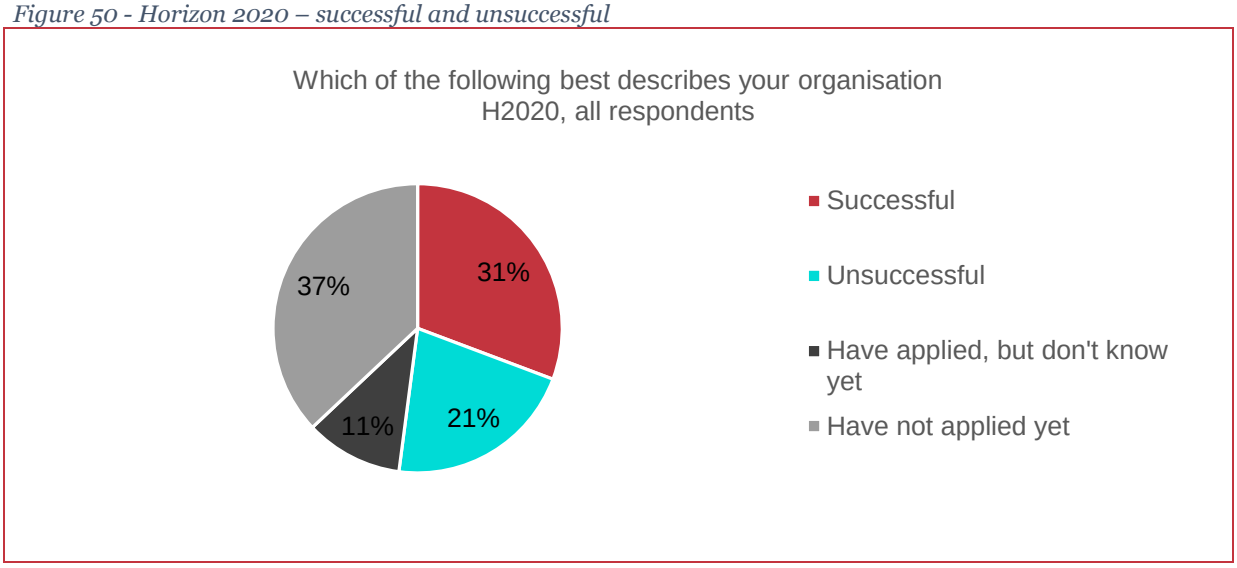
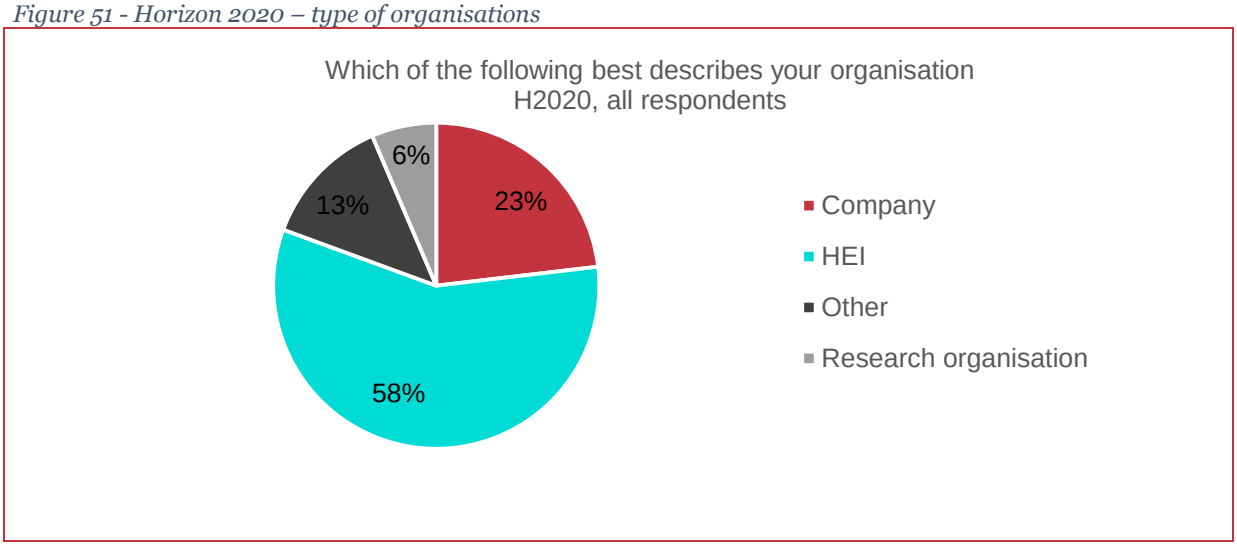


Figure 51 - Horizon 2020 – type of organisations



A.4 Interviews

A.4.1 Overview

During the inception phase of the study we proposed to undertake **25 interviews** with a range of stakeholders to gather qualitative feedback on several aspects of the evaluation.

The study team interviewed 76 people, including 57 high-level stakeholders (NCPs, High Level Group, Delegates, Research funders) and 19 FP participants. A total of 21 interviews were conducted face to face while the remaining 55 were conducted via telephone.

A.4.2 List of interviewees

The tables below show the list of interviews.

Table 36 – Summary of interviewees, by stakeholder type

Stakeholder type	Interviews conducted
Government department / agency	15
NCP / ND	18
Participant	19
Representative of university / IoT / Research Office	24
Grand Total	**76**

Table 37 - List of interviewees

Name	Organisation
Michael Morris	AMBER
Bill Lane	Analogue Devices
Eileen O'Herlihy	APC
Fergus Shanahan	APC
Kate Carmody	Beal Organic Cheese
Edward McDonnell	Centre for Applied Data Analytics Research (CeADAR)
Timothy Kelly	Corballis Consulting Ltd.
Niall Smyth	Cork Institute of Technology
Cian O'Mahony	Creme Global
Abhay Pandit	CÚRAM
Patrick Barrett	Department of Agriculture, Fisheries and Food
Tim Cullinane	Department of Education and Skills
Pauline Mulligan	Department of Jobs, Enterprise and Innovation
Siobhán Fitzpatrick	Department of Jobs, Enterprise and Innovation
Dominic O'Brien	Dept. of Environment, Community and Local Government
Nuala Bannon	Dept. of Environment, Community and Local Government
Muiris O'Connor	Dept. of Health
Michael Morrissey	Dept. of Transport, Tourism & Sport
Niamh Kenny	DP Energy
Bob Flynn	Enterprise Ireland
Catriona Ward	Enterprise Ireland

Ciaran Duffy	Enterprise Ireland
Conor Sheehan	Enterprise Ireland
Gearóid Mooney	Enterprise Ireland
Imelda Lambkin	Enterprise Ireland
Jill Leonard	Enterprise Ireland
Mark Sweeney	Enterprise Ireland
Michael Murphy	Enterprise Ireland
Philip Cheasty	Enterprise Ireland
Sean Burke	Enterprise Ireland
Sergio Fernandez-Ceballos	Enterprise Ireland
Stephen O'Reilly	Enterprise Ireland
Alice Wemaere	Environmental Protection Agency
Brian Donlon	Environmental Protection Agency
Kay Duggan-Walls	Health Research Board
Patricia Clarke	Health Research Board
Nicki O'Connor	Higher Education Authority
Pól Mac Aonghusa	IBM - Ireland Research Lab
Jean-Christophe Desplat	ICHEC - Irish Centre for High-End Computing
Jennifer Craig	iCRAG
John Walsh	iCRAG
David Brady	IDA Ireland
Leo Clancy	IDA Ireland
Geraldine Boylan	INFANT
Louise Kenny	INFANT
Dietrich Rebholz-Schuhmann	Insight - Centre for Data Analytics (NUIG)
Brian Quinn & Dermot Honan	Intel Labs
Paul Killeen	IOTI (Athlone IoT)
Paul Townsend	IPIC - Irish Photonic Integration Centre (Tyndall)
Eucharia Meehan	Irish Research Council
Paul Kilkenny	Irish Research Council

Jennifer Brennan	IUA
Ned Costello	IUA
Mike Hinchey	Lero - The Irish Software Engineering Research Centre
Patrick Murray	Limerick Institute of Technology
Ivan O'Connell	MCCI's (Microelectronic Circuits Centre Ireland), Tyndall National Institute
Dirk Pesch	Nimbus Centre for Embedded Systems Research at Cork Institute of Technology
Ronan Flanagan	NUMA Engineering Services
Frank Smyth	PILOT PHOTONICS
Niamh O'Dowd	RCSI
Mark Ferguson	Science Foundation Ireland
Giovanni Tummarello	SINDICE LTD
Jon O'Halloran	SSPC
Kieran Hodnett	SSPC
Frank O'Mara	Teagasc
Raymond Kelly	Teagasc
Oonagh Kinsman	Trinity College Dublin
Cian O'Mathuna	Tyndall National Institute - Research Centre Microsystems
David O'Connell	University College Cork
Sonia Monteiro	University College Cork
Dipti Pandya	University College Dublin
Máire Coyle	University College Dublin
Orla Feely	University College Dublin
Valeria Angela Carpenè	University College Dublin
Alan Davy	Waterford Institute - Telecommunications Software and Systems Group (TSSG)
Kevin Doolin	Waterford Institute of Technology

A.5 Statistical and econometric analysis

Finally, our methodology also investigated the possibility of using statistical and econometric analysis to estimate the economic impact of FP7 in Industry. These methodologies (and the data sources used and explored) are further discussed in Appendix E.

A.6 Validation workshop

DJEI and Technopolis hosted a validation workshop on 6th April 2016, attended by a total of 47 people. Attendees from across Ireland's government departments, agencies and higher education institutions, as well as participants in FP7 and Horizon 2020 projects (including researchers, SMEs and larger, multinational companies) all contributed to the workshop.

The workshop had a dual purpose: i) to validate the emerging findings of the report among this broad group, and ii) to further consult on key issues. The agenda was designed so that the audience could hear and respond to the emerging findings of the two evaluations, before then discussing four key topics (listed below) in roundtable groups. These discussions were then reported back to the plenary.

- Topic 1 – Targeting participation on national priorities
- Topic 2 - Being strategic in engagement with Horizon 2020
- Topic 3 - Maximising the chances of success in calls and increasing the scale of participations in Horizon 2020
- Topic 4 – Capitalising on co-funding opportunities

Appendix B Additional CORDA analysis

B.1 Participation per pillar

The following sub-sections provide detail statistics of Irish participation in each pillar including number of projects, participations and EC contribution.

B.1.1 Cooperation programme

ICT, Health, NMP and Food& Agriculture were thematic areas that account for most of the drawdown from the Cooperation programme (75%). The average project had an EC contribution of €0.4M and an average Irish participation of 1.4.

Table 38 – Participation in the Cooperation programme

Specific programme	Number of projects with Irish participation	Total EC contribution (Irish participants) (In € M)	Average EC contribution per project (In € M)	Number of Irish participants (unique orgs.)	Number of Irish participations	Average participation per project
ICT	299	126.4	0.4	96	372	1.2
Health	114	78.0	0.7	46	161	1.4
NMP	96	54.7	0.6	62	142	1.5
Food, Agriculture, and Biotechnology	105	40.9	0.4	54	157	1.5
Security	63	28.0	0.4	39	86	1.4
Energy	31	19.8	0.6	24	42	1.4
Environment	55	18.2	0.3	32	73	1.3
Transport	42	16.1	0.4	29	59	1.4
JTI	29	6.8	0.2	22	45	1.6
Socio-economic sciences and Humanities	31	5.3	0.2	12	38	1.2
Space	17	3.4	0.2	17	23	1.4
General Activities	5	0.6	0.1	5	6	1.2
Total (Cooperation)	887	398.1	0.4	294*	1,204	1.4

Source: Technopolis 2016, based on CORDA. * Since one organisation can take part in different pillars total number of unique organisations (294) is different from adding up the number of unique organisations per specific programme within the Cooperation pillar.

B.1.2 Capacities programme

Within the capacities programme, Ireland has had a strong participation in the 'research for the benefit of SMEs' programme, which accounts for 56% of the total drawdown under this pillar (but only for 6% of the total drawdown).

Table 39 – Participation in the Capacities programme

Specific programme	Number of projects with Irish participation	Total EC contribution (Irish participants) (In € M)	Average EC contribution per project (In € M)	Number of Irish participants (unique orgs.)	Number of Irish participations	Average participation per project
Research for the benefit of SMEs	128	35.7	0.3	132	217	1.7
Research Infrastructures	60	15.7	0.3	23	73	1.2
Science in Society	27	8.2	0.3	18	33	1.2
Regions of Knowledge	7	2.8	0.4	19	21	3.0
Research Potential	3	0.6	0.2	3	3	1.0
Activities of International Cooperation	3	0.4	0.1	4	4	1.3
Coherent development of research policies	1	0.1	0.1	1	1	1.0
Total (Capacities)	229	63.5	0.3	173*	352	1.5

Source: Technopolis 2016, based on CORDA. * Since one organisation can take part in different pillars total number of unique organisations (173) is different from adding up the number of unique organisations per specific programme within the Capacities pillar

B.1.3 People: Marie curie

In FP7 the MC Actions followed two intervention logics: host driven actions and researcher driven actions. The latter action is rather unique as "there are very few programmes in Europe that are fully bottom up with respect to the choice of topic, and destination institutions best tailored to meet individual's need"[43].

Ireland has had a strong participation in Marie Curie, mostly on host-driven projects. However, in contrast with FP6, Ireland did not make it to the Top 10 participant countries in the Marie Curie programme (based on EC contribution) and occupies the 12th position in Fp7.

Box 2: Marie Curie Actions

Host driven

- Initial Training Networks (ITN), including European Industrial Doctorate
- (EID) and Innovative Doctoral Programme (IDP) since 2012, were research networks supporting initial and doctoral training
- Industry-Academia Partnerships and Pathways (IAPP) promoted Industry - Academia cooperation

Researcher driven actions

- Intra-European Fellowships (IEF) were providing support for researchers moving inside Europe
- International Outgoing Fellowships (IOF), were providing support for researchers moving away from Europe
- International Incoming Fellowships (IIF), were providing support for researchers moving to Europe

[43] Avramov, Dragana (2015) "FP7 ex-post evaluation PEOPLE Specific Programme (2007-2013): Rationale, implementation and achievements"

through exchange of staff

- International Research Staff Exchange Scheme (IRSES), promoted international cooperation between Member States and Associate Countries and other Third Countries through exchange of staff
- Co-funding of regional, national, international programmes (COFUND) promoted co-funding of regional, national and international research funding programmes for experienced researchers.
- Career Integration Grants (CIG), were providing support for researchers starting a permanent position in Europe.

Source: FP7 ex-post evaluation PEOPLE Specific Programme (2007-2013): Rationale, implementation and achievements

Table 40 – Participation in Marie Curie grants

Specific programme	Number of projects with Irish participation	Total EC contribution (Irish participants) (In € M)	Average EC contribution per project (In € M)	Number of Irish participants (unique orgs.)	Number of Irish participations	Average participation per project
Host driven	**138**	**84.7**	**0.5**	**55**	**183**	**1.3**
Initial Training Networks	66	35.7	0.4	24	82	1.2
Industry-Academia Partnerships and Pathways	43	25.7	0.4	34	70	1.6
Co-fund	8	21.5	2.1	8	10	1.3
International Research Staff Exchange Scheme	21	1.7	0.1	9	21	1.0
Researcher driven	**164**	**27.7**	**0.2**	**20**	**171**	**1.0**
NCP and Euraxess	**3**	**0.3**	**0.1**	**1**	**3**	**1.0**
Total	305	112.7	2.7	63*	357	3.2

Source: Technopolis 2016, based on CORDA. * Since one organisation can take part in different pillars total number of unique organisations (63) is different from adding up the number of unique organisations per specific grant within the People pillar

Marie Curie has also allowed some local collaboration. An example is the €1.4M project coordinated by the Daithi O'Murchu Marine Research Station, Galway (Ireland), with participation of partners in Ireland, United Kingdom, and Turkey. The Irish partners included Green Biofuels Ireland Ltd – an Irish biodiesel manufacturer- Irish Seaweeds Ltd and the Dundalk Institute of Technology.

B.1.4 Ideas: ERC

Ireland's participation in ERC was concentrated around the 'Starting grants' support early career researchers. Those starting grants were allocated mainly to University College Dublin (€10M) and Trinity College Dublin (€9M). In fact those two institutions account for 64% of all resources drawdown from ERC.

There have been some remarkable success in terms of individual projects receiving high marks, which have been recognised by the 'Ireland's Champions of EU Research' awards. Awardees include[44]:

- Professor James Heckman, UCD Geary Institute, for his leadership of the DEVHEALTH project on "Understanding Health across the Lifecourse: An Integrated Developmental Approach", ranked 1st in European Research Council Advanced Grant in the Ideas area.
- Dr Jennifer Claire McElwain, UCD School of Biology and Environmental Science, for her leadership of the OXYEVOL project on "Atmospheric oxygen as a driver of plant evolution over the past 400 million years", ranked 1st in the European Research Council Starter Grant in the Ideas area.

Table 41 – Participation in ERC grants

Specific programme/Type	Number of projects with Irish participation	Total EC contribution (Irish participants) (In € M)	Average EC contribution per project (In € M)	Number of Irish participants (unique orgs.)	Number of Irish participations	Average participation per project
Starting Grant	24	31.0	1.2	9	26	1.1
Consolidator Grant	3	3.8	1.3	3	3	1.0
Advanced Grant	9	14.8	1.5	4	10	1.1
Proof of Concept	6	0.9	0.1	3	6	1.0
Total	42	50.5	1.1	9*	45	1.1

Source: Technopolis 2016, based on CORDA. * Since one organisation can take part in different pillars total number of unique organisations (9) is different from adding up the number of unique organisations per specific grant within the Ideas pillar

44 http://www.ucd.ie/news/2012/06JUN12/120612-Three-out-of-five-Irelands-Champions-of-EU-Research-awards-go-to-UCD-researchers.html. Access: 19/03/16

Appendix C Additional survey analysis

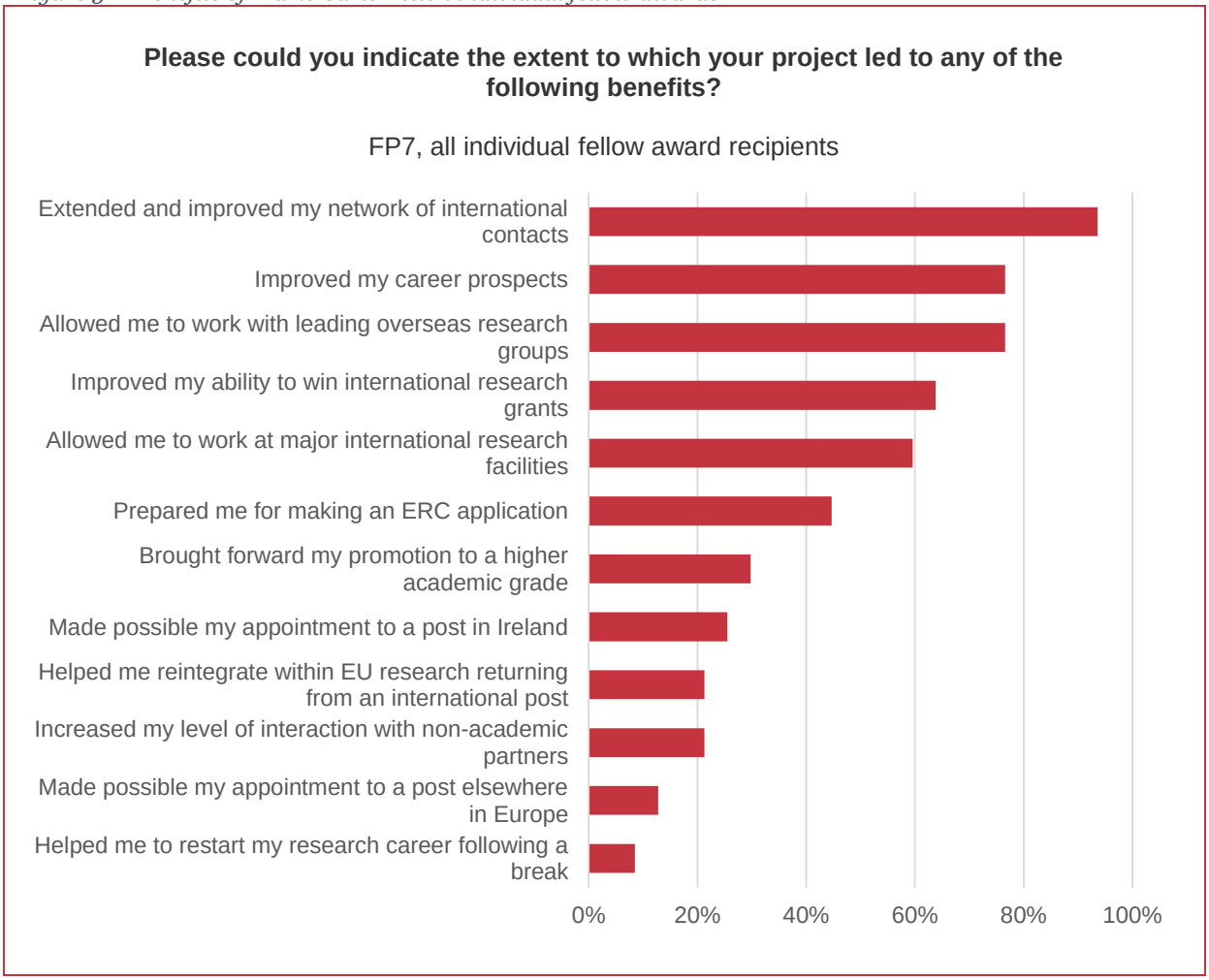
C.1 Marie Curie

Individual fellow awards

Near all the survey respondents (94%) state that the MCA individual fellow award stated that the award had extended and improved their network of international contacts.

Respondents also declare that the award has improved their career prospects and allow them to work with leading overseas research groups', both stated by 77% of survey respondents.

Figure 52 - Benefits of Marie Curie Action individual fellow awards



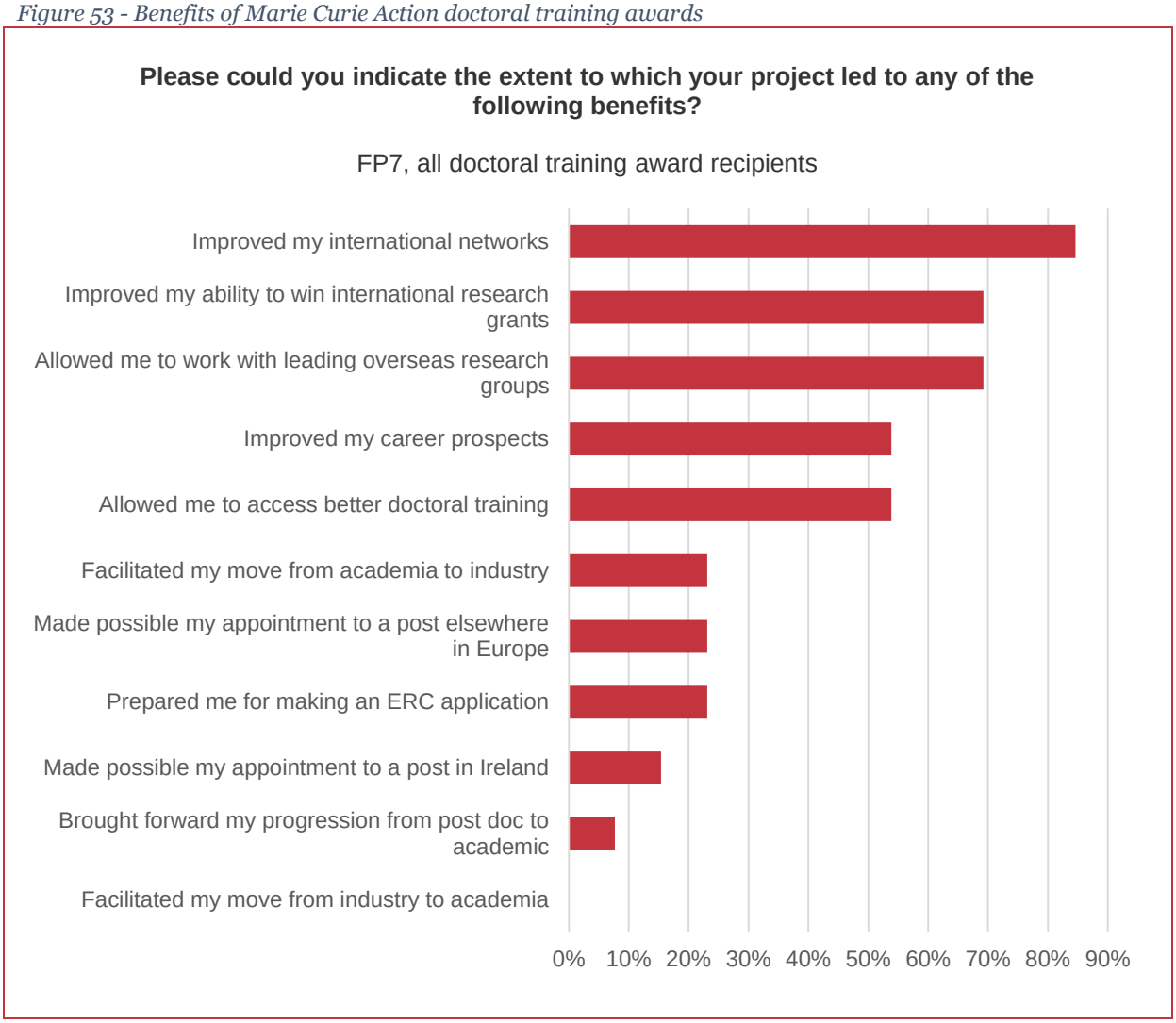
Source: Participant survey, Technopolis (2016). Base: 47 respondents

Doctoral training award

The most widely reported benefit by respondents who had received a doctoral training MCA award was the improvement of the researchers' international networks (85%), followed by the researchers ability to win international research grants and work with leading overseas research groups (both 69%).

No one who responded to our survey stated that their doctoral training award had facilitated their move from industry to academia.

Figure 53 - Benefits of Marie Curie Action doctoral training awards



Source: Participant survey, Technopolis (2016). Base: 13 respondents

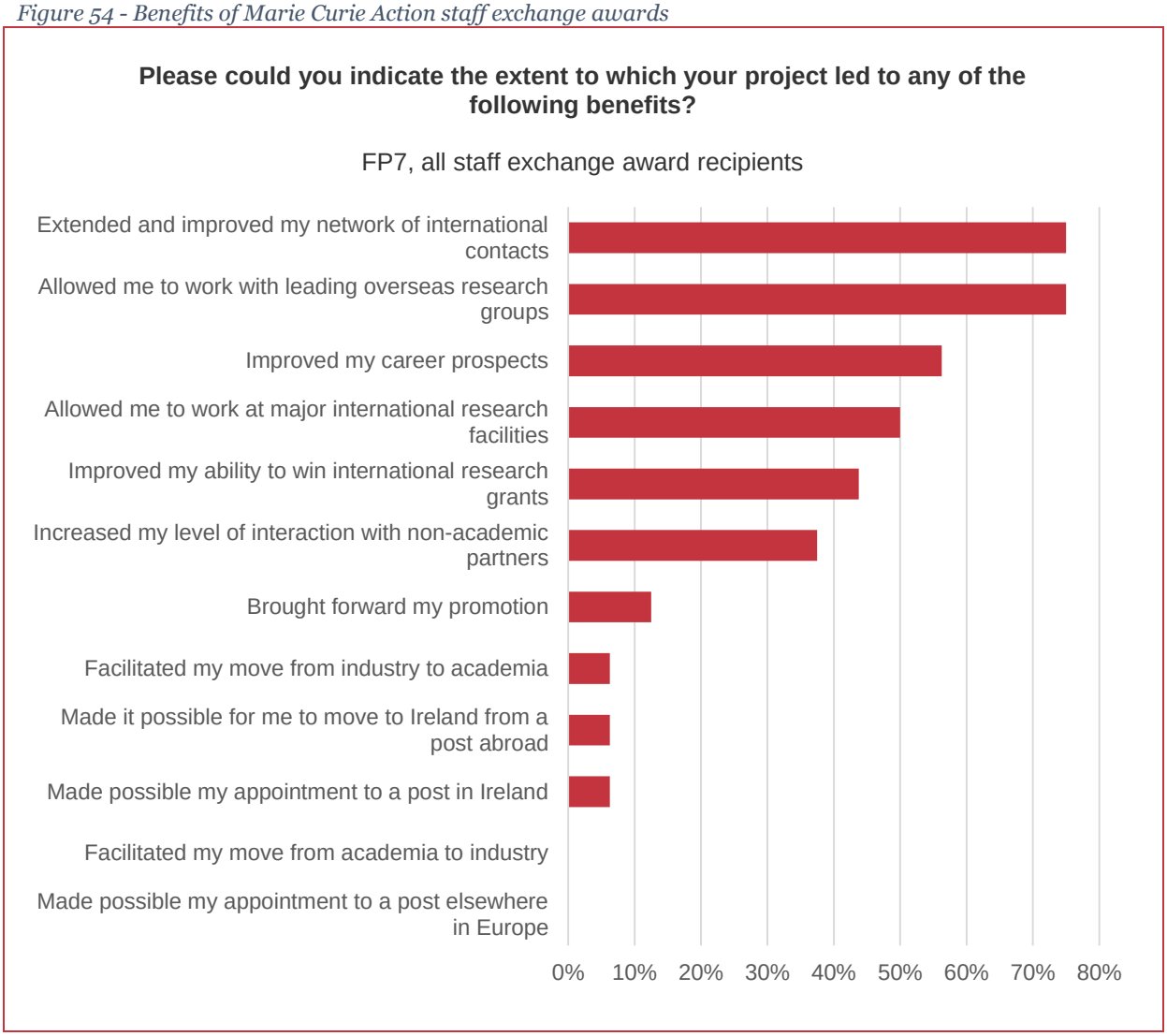
Staff exchange awards

Three quarters of survey respondents state that MCA staff exchange awards have allowed them to extend and improve their network of international contacts as well as allow them to work with leading overseas research groups.

More than half of respondents state that the award has improved their career prospects and allowed them to work at major international research facilities (56% and 50% respectively).

Again, no-one who had received an MCA staff exchange award reported that this has facilitated a move from academia to industry or made possible an appointment to a post elsewhere in Europe.

Figure 54 - Benefits of Marie Curie Action staff exchange awards



Source: Participant survey, Technopolis (2016). Base: 16 respondents

Appendix D Additional FP7 participation statistics

Table 42 - HEIs participation - Overview

	Number of Irish participations	Total EC contribution (Irish participants) (In € M)	Percentage of Irish participations	Percentage of EC contribution	Average EC contribution per participation
CAPACITIES	131	19.8	12%	5%	0.2
COOPERATION	614	246.9	57%	60%	0.4
IDEAS	45	50.5	4%	12%	1.1
PEOPLE	293	91.5	27%	22%	0.3
Euratom	1	0.3	0%	0%	0.3
Total	1,084	409.0	100%	100%	0.4

Source: Technopolis 2016, based on CORDA

Table 43 - Research organisations participation - Overview

	Number of Irish participations	Total EC contribution (Irish participants) (In € M)	Percentage of Irish participations	Percentage of EC contribution	Average EC contribution per participation
CAPACITIES	24	4.0	18%	13%	0.2
COOPERATION	87	20.0	66%	65%	0.2
PEOPLE	20	6.6	15%	22%	0.3
Total	131	30.6	100%	100%	0.2

Source: Technopolis 2016, based on CORDA

Table 44 - Public organisations participation - Overview

	Number of Irish participations	Total EC contribution (Irish participants) (In € M)	Percentage of Irish participations	Percentage of EC contribution	Average EC contribution per participation
CAPACITIES	17	1.7	21%	14%	0.1
COOPERATION	62	8.4	76%	69%	0.1
PEOPLE	2	2.1	2%	17%	1.1

Euratom	1	0.0	1%	0%	0.0
Total	82	12.2	100%	100%	0.1

Source: Technopolis 2016, based on CORDA

Appendix E Measuring economic impact

The table below show the parameters used in the estimation of impact of FP7 on GDP and employment based on the ratios calculated from a report commissioned by ERASME (Zagamé et al, 2012 and Fougeyrollas et al 2012)[45],[46].

The analysis, presented in the table below shows that investments in 2012 (€12.2bn) would to lead to a total increase in GDP of €79.4bn across the EU over 15 years. This is equivalent to a multiplier of 6.5.

Table 45 - Economic estimations

Indicators	All FP7 (EASME estimates)		Ireland (Technopolis based on EASME estimates)
	2012	2013	2007-2013
Inputs			
EC Contribution (€ billions)	€7bn	€8bn	€0.63bn
Total investment (EC Contribution plus contribution from project participants) (€ billions)	€12.2bn	€13.9bn	€0.83bn
Jobs creation			
Multiplier effect	36,879	40,935	38,907
Cumulative Job creations after 15 years	449,189	569,000	32,292
GDP			
Multiplier effect	6.5	5.3	5.9
Cumulative GDP growth (€ billions) after 15 years	€79.4bn	€74bn	€4.9bn

[45] Zagamé, Paul, Arnaud, Fougeyrollas and Pierre le Mouël (2012) Consequences of the 2013 FP7 call for proposals for the economy and employment in the European Union. ERASME, 2012.

[46] Fougeyrollas, Arnaud, Pierre le Mouël and Paul, Zagamé (2012) Consequences of the 2012 FP7 call for proposals for the economy and employment in the European Union. ERASME, 2013.

Appendix F Statistical and econometric analysis

F.1 Preparing the data

As stated in the ITT of this study we investigated the possibility of undertaking econometric analysis of industry participants through sources such as the DJEI Annual Employment Survey data (AES) and Annual Business Survey of Economic Impact (ABSEI) data.

In line with the objectives stated in the ITT, Technopolis prepared the following:

- Matched the E-Corda, ABSEI and AES data on the basis of a unique identifier (ABSEI code)
- Cleaned the data, including company names, missing observations and abnormalities in the data
- Created new indicators, including the treatment groups

The data was prepared with the objective of undertaking propensity score matching (PSM) and difference-in-difference analysis, which is a technique used for robust analysis. The objective and approach to the analysis was set out in a note and was discussed in early stages of the analysis. One of the concerns was that additional lags were needed to credibly establish impact. The strategy decided was that we would seek to use at least a two-year lag (from launch of the call to impact) and that, only if the data would allow, we would experiment with additional lags.

The suitability of undertaken a counterfactual impact evaluation of industry participation was evaluated after the matching the data, cleaning of the data, and the creation of the new indicators was close to finalised. In line with the data limitations set out below, it was decided that the dataset is insufficient/too small for PSM and difference-in-difference analysis. We found that we only had data for a small number of the firms that are always successful FP7 applicants and firms that are sometimes successful FP7 applicants, in particular for the early years. In coordination with DJEI, we decided to produce the following:

- Descriptive statistics of the data covering the characteristics of firms that participate in FP7 with non-applicants and unsuccessful applicants
- Exploratory analysis of trends comparing the performance of firms that participate in FP7 with that of non-applicants and unsuccessful applicants

To improve the robustness of our descriptive and trend analysis, we decided that the always and sometimes successful FP7 applicants should be grouped together. The number of observations used for the trend analysis is presented in Table 46. The trend analysis revealed some positive trends. However, as a result of the limited number of observations and heterogeneity the trend analysis remains limited and, consequently, it has not been included in this report.

The descriptive statistics remain of interest despite the limitations (e.g. the groups are not 'matched') Table 28 in the Interim report presents the average values for the main indicators: productivity, sales, exports, export intensity, employment, R&D expenditure, and age. A probit analysis can be used to confirm if these average differences are significant or otherwise. However, the data will not imply that the firms successful in FP7 applications have a relatively higher performance because they participated in the FP7 programme.

Table 46 - Cleaned data used for the trend analysis, number of observations (firms) for each year

Outcome company	Firms always successful in FP7 applications	Firms sometimes successful in FP7 applications	Firms not successful in FP7 applications	Non-applicants	Total
2000	13	18	56	2,210	2,297
2001	14	22	67	2,234	2,337

Outcome company	Firms always successful in FP7 applications	Firms sometimes successful in FP7 applications	Firms not successful in FP7 applications	Non-applicants	Total
2002	14	29	67	2,242	2,352
2003	15	30	70	2,171	2,286
2004	15	31	77	2,166	2,289
2005	15	39	85	2,189	2,328
2006	18	41	97	2,078	2,234
2007	22	52	107	2,162	2,343
2008	26	54	115	2,316	2,511
2009	28	63	125	2,372	2,588
2010	26	67	126	2,373	2,592
2011	27	71	132	2,443	2,673
2012	29	70	138	2,502	2,739
2013	28	70	128	2,280	2,506
Total	**290**	**657**	**1,390**	**31,738**	**34,075**

Source: ABSEI & CORDA

F.2 Limitations of the data

In order for a difference-in-difference analysis and propensity score matching (PSM) to be feasible the data using in the analysis presented in the main text would require additional cleaning. First, from the companies that are successful applicants, those for which there is missing data before the treatment need to be excluded. Note that the propensity score matching would need to match the firms based on their characteristics prior to participation and for the difference-in-difference we would need data prior to treatment. Second, the analysis would need to exclude companies that are successful applicants and participated for the first time in 2012 or 2013 because we would not be able to observe a lagged effect on export/sales/productivity for this group. This would allow using a minimum two-year lag between the year of the FP7 call and impact on firm's performance (which arguably is still too short). The effect of this data cleaning on the sample of firms in the CORDA data that we would retain for analysis is shown in the last columns of Table 47. Only 25% of the total population of Irish FP7 participants would be retained and this sample includes only 65 (19+46) firms that are successful FP7 applicants. There is limited data for this group of 65 firms for all the years (see Table 47).

Because this sample is small and there is insufficient data for time series analysis and a difference-in-difference analysis is not feasible. Note that:

- PSM would only retain the subset of firms for which there is a good match and this would reduce the dataset further.
- The difference-in-difference analysis requires several lags (minimum 2 years) and this would reduce the dataset further

We proceed to compare the characteristics of firms on the basis of the slightly larger 'cleaned' dataset.

Table 47 - Sample population descriptive statistics after additional cleaning

	CORDA database	Matched data CORDA & ABSEI	Cleaned data	Subset of the cleaned data

	CORDA database	Matched data CORDA & ABSEI		Cleaned data		Subset of the cleaned data	
	Number of companies	Number of companies	Percentage of total population of Irish FP7 participants	Number of companies in sample population	Percentage of total population of Irish FP7 participants	Number of companies in sub-sample	Percentage of total population of Irish FP7 participants
All Corda	846	310	37%	300	35%	210	25%
Firms always successful in FP7 applications	126 (15%)	39	31%	36	29%	**19**	15%
Firms sometimes successful in FP7 applications	186 (22%)	91	49%	90	48%	**46**	25%
Firms not successful in FP7 applications	552 (64%)	180	33%	174	32%	155	28%
Non-applicants	-	6,757	-	5,044	-	4,199	-
Applicants and non-applicants	-	7,067	-	5.344	-	4,409	-

Source: CORDA, ABSEI and AES

F.3 Data overview and probit analysis

Table 49 presents some of the average values of these indicators for the periods 2000-2013 for the three groups presented above. In summary, firms with successful in FP7 applications have, on average, higher levels of productivity, sales, exports, export intensity, employment, and R&D expenditure. This group of firms is, on average, younger than the groups of firms that were not successful in FP7 applications and the non-applicants. The data does not imply that the firms successful in FP7 applications have a relatively higher performance because they participated in the FP7 programme. The firms' performance over time is presented in the Appendix. This trend analysis reveals some positive trends. However, as a result of the limited number of observations and heterogeneity the trend analysis remains limited.

Table 48 - Overview of observations/firms per sample

Sample	Number of firms	Number of observations	Average years available
Firms successful in FP7 applications	126	947	7.5
Firms not successful in FP7 applications	174	1,390	8.0
Non-applicants	5,044	31,738	6.3
Total	5,344	34,075	6.4

Source: Technopolis (2016), based on CORDA and ABSEI

Table 49 - Average values of main indicators

Variable	Definition	Firms successful in FP7 applications	Firms not successful in FP7 applications	Non-applicants
Productivity	Value added per person employed. Measured as total sales less the cost of purchasing materials and services, per person employed, moving averages	379	293	279
Sales	Value of sales of manufactured goods and services produced (in thousands of Euro)	187,631	117,418	31,981
Exports	Value of export sales (in thousands of Euro)	181,545	108,287	24,803
Export intensity	Value of export sales as a percentage of total sales	64%	53%	46%
Employment	Total company staff (FTE)	180	91	79
R&D expenditure	Value of R&D expenditure (in thousands of Euro)	1,472	1,078	463
Age	Number of years since company was funded	18	19	22

Source: Technopolis (2016), based on CORDA, ABSEI and AES

The data presented in Table 48 has been used to produce a probit analysis to profile participant companies. The first columns of the table below present the results comparing the firms successful in FP7 applications with firms not successful in FP7 applications.

We find that the indicators productivity and materials are not significantly related to the dependent variable describing FP7 participation, which suggests that these indicators are not significantly different between the two groups.

The indicators sales, export, export intensity, employment, materials, R&D expenditure, age, employment and division are significantly related to the probability of participation. However, the marginal effect of most of these indicators is very small (close to zero).

The coefficient of export intensity is significant and positive and this suggests that firms that participate in FP7 programme have a higher level of export intensity than unsuccessful applicants. The marginal coefficient (column 4) denotes that a one-unit increase in export-intensity is associated with a 0.01 increase in the probability that a firm is a successful FP7 participant.

The second set of columns in the table below present the profile of firms successful in FP7 applications compared to the performance of non-applicants. We similarly find a significant relation between several of the performance indicators but only the marginal effect of export intensity is different than zero[47].

Both models also look at the relation between division (sector) and the likelihood of participation and at the relation between foreign ownership and participation. The results show that, after controlling for other factors, firms in the manufacturing industry are more likely to be successful applicants and firms in the ICT sector and other service sectors are less likely to be successful applicants. This is an interesting finding because the Irish FP7 programme participants already includes a substantial number of firms in the ICT sector. When comparing the relation between ownership and participation we find that foreign firms are more likely to participate than unsuccessful applicants but they are less likely to participate than non-applicants.

We also conducted an analysis looking at the characteristics of firms that apply for both EI/IDA support and participation in FP7. This analysis is based on a smaller sample but nonetheless the results are similar to the results of the probit analysis using also the sample of firms that have not applies for a grant from EI or IDA.

[47] The result of bivariate models looking at the relation between participation and performance yield similar results.

Table 50 - Results from a probit analysis

	Probit analysis comparing firms successful in FP7 applications with firms not successful in FP7 applications			Probit analysis comparing firms successful in FP7 applications with non-applicants		
	Coefficient	**P-value**	**Marginal effect**	**Coefficient**	**P-value**	**Marginal effect**
Productivity	0.00	0.80	0.00	0.00	0.81	0.00
Sales	0.00*	0.00	0.00*	0.00*	0.04	0.00*
Exports	0.00*	0.01	0.00*	0.00*	0.01	0.00*
Export intensity	0.26*	0.00	0.10*	0.61*	0.00	0.04*
Employment	0.00*	0.00	0.00*	0.00*	0.00	0.00*
Materials	0.00	0.84	0.00	0.00*	0.02	0.00*
R&D expenditure	0.00*	0.01	0.00*	0.00	0.53	0.00
Age	-0.01*	0.00	0.00*	-0.01*	0.00	-0.01*
Division	-0.19*	0.00	-0.07*	-0.14*	0.00	-0.01*
Owner	0.52*	0.00	0.20*	-0.44*	0.00	-0.03*
Number of observations	**2,337**			**29,532**		
Pseudo Rsq	**0.04**			**0.07**		

Note: *denotes significance levels of 0.05.

Table 51 - Results from a probit analysis including only companies that have applied for support from EI or IDA

	Probit analysis comparing firms successful in FP7 applications with firms not successful in FP7 applications			Probit analysis comparing firms successful in FP7 applications with non-applicants		
	Coefficient	**P-value**	**Marginal effect**	**Coefficient**	**P-value**	**Marginal effect**
Productivity	0.00	0.26	0.00	0.00	0.35	0.00
Sales	0.00	0.17	0.00	0.00*	0.04	0.00*
Exports	0.00	0.18	0.00	0.00*	0.02	0.00*
Export intensity	0.35*	0.00	0.13*	0.64*	0.00	0.04*
Employment	0.00*	0.04	0.00*	0.00*	0.00	0.00*
Materials	0.00	0.33	0.00	0.00*	0.02	0.00*
R&D expenditure	0.00	0.43	0.00	0.00	0.07	0.00
Age	-0.01*	0.02	0.00	-0.02*	0.00	0.00*
Division	-0.16*	0.03	-0.06*	-0.17*	0.00	-0.01*
Owner	0.47*	0.00	0.18*	-0.72*	0.00	-0.03*
Number of observations	**1,596**			**23,360**		
Pseudo Rsq	**0.03**			**0.10**		

Note: *denotes significance levels of 0.05.

F.4 Overview of related literature

The table below presents an overview of related literature that uses ABSEI to perform econometric analysis at industry level, which could serve as a reference for future exercises.

Table 52 - Related studies using ABSEI data (or predecessor of ABSEI).

Key indicators /	Model (if any)	Controls	Source
• Sales • Exports • Value added • Direct expenditure • Employment	• Descriptive statistics	• (NA)	An Analysis of the 2011 annual business survey of economic impact (2013), Forfás
• Sales • Exports • Value added (total sales less the cost of purchasing materials and services) • Direct expenditure (sum of payroll payments and materials and services purchased in Ireland) • Also used: • Value Added per person employed	• Descriptive statistics	• (NA)	Annual Business Survey of Economic Impact 2013, DJEI
• Log of value added per workers (log(LP))	• Difference-GMM	• Log of labour productivity, t-1 It is calculated as the value added per worker. The value added is deflated with a sector-specific deflator (source: EU-KLEMS) • Import intensity ratio • Log, total input consumption • Export, dummy variable • Log, total R&D expenditure • Log total training expenditure	Irish firms' productivity and Imported Inputs Emanuele Forlani† October 9, 2012, University of Pavia, DEM Working Paper Series
• Export (dummy variable) • R&D (dummy variable)	• Probit regression	• R&D status: dummy variable equal to one if active in t-1 • Export status: dummy variable equal to one if active in t-1 • Productivity, t-1 • Wage rate, t-1 • Employment, t-1 • Domestic dummy	Girma, Gorg, Hanley (2007). R&D and exporting: A comparison of British and Irish firms, University of Nottingham research paper series
• Sales per employee • Value added per employee • Net profit per employee	• Non-parametric test	• (NA)	Girma, Goerg, Strobl (2004). Exports, International Investment, and Plant Performance: Evidence from a Non-Parametric Test. CORE DISCUSSION PAPER

Key indicators /	Model (if any)	Controls	Source
			2004/09
• Log output • Log TFP	• OLS • FE • OLS-LP • IV-LP • GMM-LP	• Log capital • Log labour • Log services • Log material • Export dummy • Foreign dummy • Services outsourcing • Materials outsourcing	Gorg, Hanley, Strobl (2008). Productivity effects of international outsourcing: evidence from plant-level data. Canadian Journal of Economics Vol. 41, No. 2. Using data from the Irish Economy Expenditure Survey (1983–1998), Forfás
• Incidence of export • Level of export	• PSM and first differences	• Grant size (large, medium, small) • Employment	Gorg, Henry, Strobl (2008). Grant Support and Exporting Activity. The Review of Economics and Statistics, 90(1) Using data from theIrish Economy Expenditure Survey (1983–1998), And Annual Business Survey (1999-2002)
• Export (dummy)	• Probit	• Export status, t-1 • Export status, t-2 • Employment, t-1 • Employment_sq, t-1 • Wage per employee, t-1 • VA per employee, t-1 • Probit residual	Firm Export Participation: Entry, Spillovers and Tradability", Martina Lawless, *Applied Economics*, Vol.41(5), pages 665-675, 2009 Using data from the Forfás Irish Economy Expenditures Survey

Table 53 - Related studies using Irish data other than ABSEI

Key indicators /	Model (if any)	Controls	Data	Source
• Probability of innovation (dummy) • Intensity of innovation input • Product innovation • Process innovation	• Probit • Heckman selection model (probit and OLS)	• Ownership • Exporter • Innovation expenditure per employee • Size • Cooperation variables (with suppliers, competitors, etc.) • Time • Industry • (Additional variables are used for the Heckman selection model)	CIS	Iulia Siedschlag & Xiaoheng Zhang (2015) Internationalisation of firms and their innovation and productivity, Economics of Innovation and New Technology, 24:3, 183-203

Appendix G Survey questionnaire

[INTERNAL TITLE: SURVEY FOR (FP7) SUCCESFUL APPLICANTS (INCLUDING APPLICANTS THAT HAVE BEEN 'SOMETIMES' SUCCESSFUL)]

[DISTRIBUTION EMAIL]

Evaluation of Ireland's participation in FP7 and Horizon 2020
Questionnaire Survey for those involved in FP7 and Horizon 2020 applications

The Department of Jobs, Enterprise and Innovation (DJEI) Ireland has contracted **technopolis** |group| to undertake evaluations of Ireland's participation in FP7 and Horizon 2020. You can find a presentation letter from Mr Andrew Colgan from the Strategic Policy Division at DJEI [here].

Taking part in the survey will help to improve support to applicants and enhance the benefits Ireland derives from its growing participation in European research and technology development partnerships and programmes.

A central aspect of the study is a survey-based **consultation** of those involved in FP7 or Horizon 2020. You have received this email as you appear as the main contact for at least one FP7 application that has been successful. Technopolis was provided with that information via the FP7 and Horizon 2020 application data (the eCORDA database), housed in the European Commission. Rest assure that we will keep your details confidential and only use them in connection with this survey and evaluation.

The questionnaire can be accessed at the following link:

[here]

Please share this email (and link to the survey) with any colleague if you feel he or she is in better position to answer this questionnaire. We need to hear back from as many people and organisations as possible, so we can be sure our results are robust and capture the different experiences of all stakeholders.

Your individual responses would not be published and the survey results will only be published in an aggregate and not attributable form.

Please complete the survey **by March 4th, 2016.**

Thank you in advance for your input to this important exercise. If you would like further information, please click [here]. If you have any further questions, please contact the study team at the following address: EvaluationIreland@technopolis-group.com

[FURTHER INFORMATION ON THE TECHNOPOLIS WEBSITE]

The Department of Jobs, Enterprise and Innovation (DJEI) Ireland has contracted **technopolis** |group| to undertake evaluations of Ireland's participation in FP7 and Horizon 2020.

Taking part in the survey will help to improve support to applicants and enhance the benefits Ireland derives from its growing participation in European research and technology development partnerships and programmes.

The evaluations are concerned with Ireland's participation in the Framework Programmes not only in the context of the broad European objectives, but also their role in assisting the development and advancement of Ireland's national innovation system. The evaluations place a priority on linking the lessons of FP7 with Horizon 2020 and how future participation in the Framework Programmes can be best aligned with the national STI objectives, including maximizing and increasing levels of participation, investment and scale. The conclusions will also inform future decisions on the allocation of resources and support to potential applicants.

A central aspect of the study is a survey-based **consultation** of those involved in FP7 or Horizon 2020.

All responses obtained will be treated in the strictest confidence, in line with EU legislation on data protection. Your individual responses would not be published and the survey results will only be published in an aggregate and not attributable form.

The names of the people and organisations contributing will not be attached to the results. Your responses will be published only in an aggregated and non-attributable form.

Technopolis was provided with your organisation's name and contact details via the FP7 and Horizon 2020 application data (the eCORDA database), housed in the European Commission. We will keep your details confidential and only use them in connection with this survey and evaluation.

We need to hear back from as many people and organisations as possible, so we can be sure our results are robust and capture the different experiences of all stakeholders.

Thank you in advance for your input to this important exercise.

SECTION 1 Evaluation of FP7

PLEASE ANSWER THE FOLLOWING QUESTIONS BASED ON YOUR EXPERIENCE IN FP7

ABOUT YOU AND YOUR ORGANISATION

1. Please provide the following information about yourself

   Your full name _____

   Your job title _____

2. Which of the following best describes your organisation

   Drop down menu

   - [PRC] Irish-owned SME (<250 employees)
   - [PRC] Irish-owned large company (>250 employees)
   - [PRC] Foreign-owned SME (<250 employees)
   - [PRC] Foreign-owned large company (>250 employees)
   - [PRC] Private research and technology organisation
   - [HE] Higher Education (e.g. university or institute of technology)
   - [PRO] Public research institute (e.g. Teagasc)
   - [PUB] Other public sector (e.g. Geological Survey of Ireland)
   - [CSO] Civil Society Organisations (e.g. Alzheimer Society of Ireland)
   - Other (specify)

YOUR EXPERIENCE AS A PARTICIPANT

3. To what extent did each of the following act as a driver, encouraging you to bid for an FP7 grant?

	Significant driver	Moderate driver	Not a driver
Potential access to funds	☐	☐	☐
Potential access to specialist skills	☐	☐	☐
Potential access to specialist facilities	☐	☐	☐
Potential access to other European markets	☐	☐	☐
Potential access to technology suppliers	☐	☐	☐
Potential access to end-users	☐	☐	☐
Progress career from post doc to a permanent academic post	☐	☐	☐
Develop research skills through collaboration	☐	☐	☐
Develop international scientific networks	☐	☐	☐
Enhance in-house skills	☐	☐	☐
Enhance visibility in international markets	☐	☐	☐
Enhance technological reputation	☐	☐	☐
Monitor wider technological developments	☐	☐	☐
Support strategic ambitions	☐	☐	☐
Progress development of innovations	☐	☐	☐
Internationalise locally devised innovations	☐	☐	☐
Test innovative solutions in a local context	☐	☐	☐
Enhance your research reputation	☐	☐	☐

ABOUT YOUR CONTACT WITH NATIONAL CONTACT POINTS

4. Have you interacted with one or more National Contact Points (NCPs) in the process of applying to FP7?

   ☐ Yes

   ☐ No

(ROUTING: YES = Q5 / NO = Q8)

(ROUTING: Yes)

5. Please indicate your level of interaction with Ireland's National Contact Point (NCP) network, by stating how much you made use of each of the network's main **support services** during your FP7 application

	Extensive use	Limited use	Not used
National FP web portal	☐	☐	☐
Information days to raise awareness in Ireland more generally	☐	☐	☐
Circulation of calls and other announcements to prospective applicants	☐	☐	☐
Specific information to selected target audiences	☐	☐	☐
Information on related programmes (e.g. Eureka) where helpful	☐	☐	☐
Training for specific target groups (e.g. SMEs)	☐	☐	☐
Advice on administrative procedures and rules	☐	☐	☐
Advice on scope of calls and funding modalities and instruments	☐	☐	☐
Advice on consortium development	☐	☐	☐
Advice on proposal writing	☐	☐	☐
Assistance with partner search in Ireland	☐	☐	☐
Assistance with partner search elsewhere in Europe	☐	☐	☐
Brokering events for prospective applicants	☐	☐	☐
Signposting of other relevant support measures	☐	☐	☐

6. Please indicate the extent to which you agree or disagree with each of the following statements. Please feel free to skip any that are not applicable to your organisation.

Our interaction with Ireland's NCP system during our application to FP7 …

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Alerted us to a specific opportunity that we had been unaware of	☐	☐	☐	☐	☐
Introduced us to the Framework Programme	☐	☐	☐	☐	☐
Increased our awareness of the programme's strategic relevance	☐	☐	☐	☐	☐
Helped us to understand what calls we should target	☐	☐	☐	☐	☐
Helped us to understand the critical success factors	☐	☐	☐	☐	☐
Helped us to obtain a briefing on our ideas from EU desk officers	☐	☐	☐	☐	☐
Helped us to introduce our ideas to the Advisory Group	☐	☐	☐	☐	☐
Persuaded us to make an application	☐	☐	☐	☐	☐
Persuaded us to be more ambitious in our application	☐	☐	☐	☐	☐
Persuaded us to submit a bid as a coordinator	☐	☐	☐	☐	☐
Introduced us to a new academic or industrial partner	☐	☐	☐	☐	☐
Brokered our inclusion in an existing consortium	☐	☐	☐	☐	☐
Improved the scientific and technical quality of our bid	☐	☐	☐	☐	☐
Improved the implementation aspects of our bid	☐	☐	☐	☐	☐
Improved the quality of our consortium	☐	☐	☐	☐	☐
Improved the impact aspects of our bid	☐	☐	☐	☐	☐
Led to an application moving from reserve to funded	☐	☐	☐	☐	☐
Led to an application being successful	☐	☐	☐	☐	☐
Helped us to understand why we had been unsuccessful	☐	☐	☐	☐	☐
Persuaded us to improve and resubmit	☐	☐	☐	☐	☐
Made no material difference to our application	☐	☐	☐	☐	☐

7. What was the single most important benefit that you derived from your engagement with the NCP network during FP7?

(ROUTING: ALL)

BENEFITS

The following questions address the potential FP7 organisational benefits. Please answer based on your successful projects.

8. Did FP7 benefit **your organisation** in any of the following ways?

	High impact	Medium impact	Low impact	No impact	Not applicable
Increased our understanding about the subject	☐	☐	☐	☐	☐
Increased our scientific capacity	☐	☐	☐	☐	☐
Increased our technological capacity	☐	☐	☐	☐	☐
Increased our awareness of technological trajectories	☐	☐	☐	☐	☐
Increased our ability to participate in higher risk R&D	☐	☐	☐	☐	☐
Increased our ability to access international experts	☐	☐	☐	☐	☐
Improved our ability to collaborate on R&D	☐	☐	☐	☐	☐
Improved our management capabilities	☐	☐	☐	☐	☐
Increased our willingness to invest in R&D	☐	☐	☐	☐	☐
Increased our willingness to invest in innovation	☐	☐	☐	☐	☐
Improved our ability to attract / retain research staff	☐	☐	☐	☐	☐
Improved our international reputation	☐	☐	☐	☐	☐
Improved our international networks	☐	☐	☐	☐	☐
Improved our product (services) portfolio	☐	☐	☐	☐	☐
Improved our resilience to the economic crisis	☐	☐	☐	☐	☐
Enabled us to increase our turnover	☐	☐	☐	☐	☐
Enabled us to increase our employment	☐	☐	☐	☐	☐
Improved our productivity	☐	☐	☐	☐	☐
Improved our commercial opportunities	☐	☐	☐	☐	☐
Improved our competitive position nationally	☐	☐	☐	☐	☐
Improved our competitive position internationally	☐	☐	☐	☐	☐
Other (please specify …)					

9. Please briefly describe the single most important benefit that your organisation derived from its participation in FP7?

10. Please briefly describe the single most important benefit that you derived personally from your participation in FP7?

11. Were you a recipient of a Marie Curie Action (MCA) award in FP7, for doctoral training or staff exchange or individual fellowship?

- ☐ Yes, a doctoral training award
- ☐ Yes, a staff exchange award
- ☐ Yes, a individual fellowship award
- ☐ No

(ROUTING: If 'Yes, doctoral training" then Q11, otherwise Q15)
(ROUTING: If 'Yes, staff exchange" then Q12, otherwise Q15)
(ROUTING: If 'Yes, individual fellowship" then Q13, otherwise Q15)

12. Please could you indicate the extent to which your project led to any of the following benefits?
Tick all that apply

Allowed me to access better doctoral training	☐
Allowed me to work with leading overseas research groups	☐
Improved my international networks	☐
Improved my ability to win international research grants	☐
Prepared me for making an ERC application	☐
Improved my career prospects	☐
Brought forward my progression from post doc to academic	☐
Made possible my appointment to a post elsewhere in Europe	☐
Made possible my appointment to a post in Ireland	☐
Facilitated my move from academia to industry	☐
Facilitated my move from industry to academia	☐
Other (specify)	☐

13. Please could you indicate the extent to which your project led to any of the following benefits?
Tick all that apply

Allowed me to work with leading overseas research groups	☐
Allowed me to work at major international research facilities	☐
Extended and improved my network of international contacts	☐
Increased my level of interaction with non-academic partners	☐
Improved my ability to win international research grants	☐
Improved my career prospects	☐
Brought forward my promotion	☐
Made possible my appointment to a post elsewhere in Europe	☐
Made possible my appointment to a post in Ireland	☐
Made it possible for me to move to Ireland from a post abroad	☐
Facilitated my move from academia to industry	☐
Facilitated my move from industry to academia	☐
Other (specify)	☐

14. Please could you indicate the extent to which your project led to any of the following benefits?
Tick all that apply

Allowed me to work with leading overseas research groups	☐
Allowed me to work at major international research facilities	☐
Extended and improved my network of international contacts	☐
Increased my level of interaction with non-academic partners	☐
Improved my ability to win international research grants	☐
Prepared me for making an ERC application	☐
Improved my career prospects	☐
Brought forward my promotion to a higher academic grade	☐
Made possible my appointment to a post elsewhere in Europe	☐
Made possible my appointment to a post in Ireland	☐
Helped me to restart my research career following a break	☐
Helped me reintegrate within EU research returning from an international post	☐
Other (specify)	☐

15. Please briefly describe the single most important benefit you derived from participation in Marie Curie Actions?

IMPACTS

16. Did participation in FP7 lead to any specific commercialisation outcomes? If yes, could you please indicate the number or value below differentiating for those that are specific to Ireland.

    Please feel free to skip any that are not relevant.

	In Ireland
Number of patent applications made as a result of your participation in FP7	
Number of licence agreements made linked with FP-enabled patents or other IP	
Value of licence income linked to your FP7 IP (€m, in 2015)	
Number of external investments secured as a result of your participation in FP7 (€m)	
Combined value of external investments (e.g. angel, VC, IPO, etc) secured following FP7 (€m)	
Number of spinout companies launched as a result of your participation in FP7	
Combined employment at those spinouts (at the end of 2015)	
Combined turnover of those spinouts (€m, in 2015)	
Estimated combined value of those spinouts (€m, in 2015)	

17. Please briefly describe the single most important commercialisation outcome that has been realised in Ireland as a result of your participation in FP7

18. Please briefly describe the single most important economic impact that has been realised in Ireland as a result of your participation in FP7

WITHOUT FP7 FUNDING

19. Please indicate which of the below scenarios would have been most likely if you had not received FP7 funding. Choose one option.

    ☐ We would have progressed with the project at the same scale, timeline and location outside of Ireland

    ☐ We would have progressed with the project at the same scale and timeline, but at a different location outside of Ireland

    ☐ We would have delayed the project, but would have progressed it later at the same scale, timeline and location outside of Ireland

    ☐ We would have progressed the project at a reduced scale

    ☐ We would have abandoned the project

LINKS BETWEEN FP7 AND NATIONAL AND INTERNATIONAL ENVIRONMENTS

20. Please indicate the extent to which you agree or disagree with **each** of the following statements, comparing FP7 to previous Framework Programmes, such as FP6.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	No view
Downward pressure on national research budgets in Ireland during the economic crisis led us to view FP7 as a more attractive source of financial support	☐	☐	☐	☐	☐	☐
Ireland's research prioritisation exercise led us to view FP7 as a more important source of potential financial support for areas outside the 14 priority fields	☐	☐	☐	☐	☐	☐
The recession led us to decrease our R&D investments including our level of participation in FP7	☐	☐	☐	☐	☐	☐
The expansion of FP7 in budgetary terms, as compared with FP6, made the programme more attractive	☐	☐	☐	☐	☐	☐
The addition of new programmes within FP7 (e.g. ERC) made the programme more attractive	☐	☐	☐	☐	☐	☐
The increasing emphasis on international cooperation beyond Europe led us to view FP7 as a more attractive source of financial support, as compared with FP6	☐	☐	☐	☐	☐	☐
Increasing FP7 application numbers from across the EU led us to view FP7 as a more attractive source of financial support	☐	☐	☐	☐	☐	☐

21. Please indicate the extent to which you agree or disagree with **each** of the following statements, which relate to funding opportunities in FP7 and the Irish R&D system for Irish-based companies.

Please feel free to skip this question if you don't have any views

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	No view
Research funding supports available in Ireland encouraged Irish-based companies to participate in FP7	☐	☐	☐	☐	☐	☐
The absence of financial support for companies during the proposal phase hindered their levels of application in FP7	☐	☐	☐	☐	☐	☐
FP7 complemented Ireland's national research support for Irish-based companies, and was in no way duplicative	☐	☐	☐	☐	☐	☐
FP7 provided opportunities for Irish-based companies to secure much larger sums of money than were available nationally	☐	☐	☐	☐	☐	☐
FP7 provided opportunities for Irish-based companies to secure funding covering many more areas of industrial applied research than were available nationally	☐	☐	☐	☐	☐	☐
FP7 provided opportunities for Irish-based companies to improve their links with Ireland's universities or public research institutes	☐	☐	☐	☐	☐	☐
FP7 provided opportunities for Irish-based MNCs to improve their R&D links with Ireland's indigenous SMEs	☐	☐	☐	☐	☐	☐
Opportunities for engagement in strategic initiatives under FP7 (e.g. Joint Technology Initiatives such as Clean Sky or the Innovative Medicines Initiative) has greatly increased	☐	☐	☐	☐	☐	☐

interest in the FP among Irish-based companies						

22. Please briefly describe the single most important point of synergy between the national R&D system and the funding opportunities in FP7.

23. Do you believe that your ability to win an FP7 project was improved by your involvement with any earlier national R&D scheme?
    - ☐ Yes
    - ☐ No

24. Did your FP7 project benefit from any direct national R&D support?
    - ☐ Yes
    - ☐ No

(ROUTING, If "Yes")

25. Please name the specific programme and source(s) of national R&D funding (e.g. Enterprise Ireland's Feasibility Study grants, the Health Research Board's project grants, Science Foundation Ireland's Technology Innovation Development Awards, etc.)

(ROUTING, If "No")

26. Please indicate why not.
    Tick all that apply

☐	We applied for national funding but were turned down
☐	The project's focus did not align with Ireland's national research priorities
☐	There was no national funding available in the same research area as the project
☐	There was no national funding available for the type of activity performed in the project
☐	National schemes would not have funded our international partners
☐	The issue addressed by the project was a European rather than a national one
☐	Other (specify)

SECTION 2 Horizon 2020

PLEASE ANSWER THE FOLLOWING QUESTION BASED ON YOUR EXPERIENCE IN Horizon 2020

27. Have you applied, or are you planning to apply, to Horizon 2020?

Tick one option

☐ Yes, we have applied but do not know the result(s) yet
☐ Yes, we have applied and won at least one project
☐ Yes, we have applied and were not successful
☐ No, we have not applied yet, but we are preparing a proposal at the moment
☐ No, we have not applied but intend to do so in the future
☐ No, we have not applied and do not intend to do so in the future

(ROUTING, All "Yes" answers = Q.28, "No, we have not applied yet, but we are..."/"No, we have not applied but intend to" = 36, "No, we have not applied and do not intend to..." = Q.35)

ABOUT YOUR Horizon 2020 APPLICATION

28. Please indicate the extent to which each of the following evaluation criteria proved to be more or less challenging to satisfy when applying for Horizon 2020 projects.

	Very straightforward	Straightforward	Challenging	Very challenging
Soundness of the basic concept	☐	☐	☐	☐
Novelty of the idea / innovation	☐	☐	☐	☐
Suitability of the methodology	☐	☐	☐	☐
The presentation of 'ethical issues'	☐	☐	☐	☐
Management structure and procedures	☐	☐	☐	☐
Skills / experience of individuals	☐	☐	☐	☐
Quality of the consortium overall	☐	☐	☐	☐
Appropriateness of resourcing levels / mix	☐	☐	☐	☐
Relevance of impacts to work programme	☐	☐	☐	☐
Scale of expected EU or international impacts	☐	☐	☐	☐
Strength of dissemination / exploitation plan	☐	☐	☐	☐

29. Based on your experience of applying to and participating in Horizon 2020, please indicate your level of satisfaction with each of the following aspects of the Commission's programme management:

	Very Satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Very dissatisfied	Don't know
Calls for proposals	☐	☐	☐	☐	☐	☐
Guidance for applicants	☐	☐	☐	☐	☐	☐
Submission of proposals	☐	☐	☐	☐	☐	☐
2-stage submission	☐	☐	☐	☐	☐	☐
Evaluation of proposals	☐	☐	☐	☐	☐	☐
Ethical review procedure	☐	☐	☐	☐	☐	☐
Feedback to applicants	☐	☐	☐	☐	☐	☐
Contract negotiation	☐	☐	☐	☐	☐	☐
Time-to-grant	☐	☐	☐	☐	☐	☐
Requirements for monitoring and reporting project progress	☐	☐	☐	☐	☐	☐
Ad hoc advice on scientific issues	☐	☐	☐	☐	☐	☐
Ad hoc advice on administrative issues	☐	☐	☐	☐	☐	☐
Support for interaction with other projects	☐	☐	☐	☐	☐	☐
End of project assessment / completion	☐	☐	☐	☐	☐	☐
Support for dissemination and exploitation	☐	☐	☐	☐	☐	☐
The EC's financial models	☐	☐	☐	☐	☐	☐
The EC's payment procedures	☐	☐	☐	☐	☐	☐

30. What single improvement to the European Commission administrative system would be most likely to increase your interest in future Framework Programmes?

ABOUT YOUR CONTACT WITH National Contact Points

31. Have you interacted with one or more National Contact Points (NCPs) in the process of applying to Horizon 2020?

☐ Yes

☐ No

(ROUTING: YES = Q.32, NO = Q.36)

32. Please indicate your level of interaction with Ireland's National Contact Point (NCP) network, by stating how much you made use of each of the network's main **support services** during your Horizon 2020 application

	Extensive use	Limited use	Not used
National FP web portal	☐	☐	☐
Information days to raise awareness in Ireland more generally	☐	☐	☐
Circulation of calls and other announcements to prospective applicants	☐	☐	☐
Specific information to selected target audiences	☐	☐	☐
Training for specific target groups (e.g. SMEs)	☐	☐	☐
Advice on administrative procedures and rules	☐	☐	☐
Advice on scope of calls and funding modalities and instruments	☐	☐	☐
Advice on consortium development	☐	☐	☐
Advice on proposal writing	☐	☐	☐
Assistance with partner search in Ireland	☐	☐	☐
Assistance with partner search elsewhere in Europe	☐	☐	☐
Brokering events for prospective applicants	☐	☐	☐
Signposting of other relevant support measures	☐	☐	☐

33. Please indicate the extent to which you agree or disagree with each of the following statements. Please feel free to skip any that are not applicable to your organisation.

During Horizon 2020, our interaction with Ireland's NCP system …

	Strongly disagree	Disagree	Neither agree not disagree	Agree	Strongly agree
Alerted us to a specific opportunity that we had been unaware of	☐	☐	☐	☐	☐
Introduced us to the Framework Programme	☐	☐	☐	☐	☐
Increased our awareness of the programme's strategic relevance	☐	☐	☐	☐	☐
Helped us to understand what calls we should target	☐	☐	☐	☐	☐
Helped us to understand the critical success factors	☐	☐	☐	☐	☐
Helped us to obtain briefing on our ideas from EU desk officers	☐	☐	☐	☐	☐
Helped us to introduce our ideas to Advisory Group	☐	☐	☐	☐	☐
Persuaded us to make an application	☐	☐	☐	☐	☐
Persuaded us to be more ambitious in our application	☐	☐	☐	☐	☐
Persuaded us to submit a bid as a coordinator	☐	☐	☐	☐	☐
Introduced us to a new academic or industrial partner	☐	☐	☐	☐	☐
Brokered our inclusion in an existing consortium	☐	☐	☐	☐	☐
Improved the scientific and technical quality of our bid	☐	☐	☐	☐	☐
Improved the implementation aspects of our bid	☐	☐	☐	☐	☐
Improved the quality of our consortium	☐	☐	☐	☐	☐
Improved the impact aspects of our bid	☐	☐	☐	☐	☐
Led to an application moving from reserve to funded	☐	☐	☐	☐	☐

Led to an application being successful	☐	☐	☐	☐	☐
Helped us to understand why we had been unsuccessful	☐	☐	☐	☐	☐
Persuaded us to improve and resubmit	☐	☐	☐	☐	☐
Made no material difference to our application	☐	☐	☐	☐	☐

34. What was the single most important benefit that you derived from your engagement with the NCP network during Horizon 2020?

(ROUTING: "No we have not applied and do not intend to do so in future")

35. Please briefly explain why you have not applied to Horizon 2020 and have no plans to do so for the foreseeable future

(ROUTING: All respondents)

SYSTEM OF SUPPORT

36. Please score each of the following types of support available for Horizon 2020 in Ireland, in terms of
    (i) The **relevance** of this type of support to your organisation's needs
    (ii) The **adequacy** of the levels of available resourcing, for each type of support
    (iii) The **effectiveness** of that support, as delivered
    Please use a scale from 1 to 5, where 1 is very low and 5 is very high.

	No view	Relevance	Adequacy	Effectiveness
General information provided by national web sites	☐	☐	☐	☐
Awareness raising events run by NCPs	☐	☐	☐	☐
Information on calls provided by NCPs	☐	☐	☐	☐
Targeted advice and support provided by NCPs	☐	☐	☐	☐
Brokerage services provided by NCPs	☐	☐	☐	☐
Advice on proposal writing	☐	☐	☐	☐
Enterprise Ireland – Coordination support for academics	☐	☐	☐	☐
Enterprise Ireland – Coordination support for ERC applications	☐	☐	☐	☐
Enterprise Ireland – Travel grants for academic researchers	☐	☐	☐	☐
Irish Research Council – New Horizons (Starter Grant)	☐	☐	☐	☐
Irish Research Council – New Horizons (Interdisciplinary Grant)	☐	☐	☐	☐
Science Foundation Ireland – ERC Support Programme (overhead)	☐	☐	☐	☐
Science Foundation Ireland – ERC Support Programme (recruitment)	☐	☐	☐	☐
Science Foundation Ireland – ERC Development	☐	☐	☐	☐
InterTradeIreland – Cross-border Travel Scheme	☐	☐	☐	☐
InterTradeIreland – EU Travel Scheme	☐	☐	☐	☐

37. Please briefly describe any important missing elements in Ireland's support infrastructure, explaining why its introduction may improve Ireland's performance in Horizon 2020.

38. If your colleagues are a member of any Horizon 2020 Advisory Group or other Strategic Committee, please list them here (e.g. European Technology Platform)

LINKS BETWEEN HORIZON 2020 AND NATIONAL AND INTERNATIONAL ENVIRONMENTS

39. Please indicate the extent to which you agree or disagree with **each** of the following statements, comparing Horizon 2020 to previous Framework Programmes, such as FP7.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	No view
The integration of the research and innovation elements within a single programme has made Horizon 2020 more attractive	☐	☐	☐	☐	☐	☐
The use of societal challenges as a key focal point led us to view Horizon 2020 as more attractive	☐	☐	☐	☐	☐	☐
The addition of new instruments (e.g. access to finance, pre-commercial public procurement) has made the programme more attractive	☐	☐	☐	☐	☐	☐
The increase in the support for strategic initiatives (e.g. the Innovative Medicines Initiative 2 and Clean Sky 2) has made the programme more attractive	☐	☐	☐	☐	☐	☐
The increase in the support for co-funding opportunities (Marie Curie Co-fund, ERA-nets, Joint Programming Initiatives) has made the programme more attractive	☐	☐	☐	☐	☐	☐
Ireland's growing interest in other international scientific organisations (e.g. CERN, ESO) will increase the numbers of organisations looking to bid into Horizon 2020	☐	☐	☐	☐	☐	☐
The simplification of various administrative processes and rules has made the programme more attractive	☐	☐	☐	☐	☐	☐
The introduction of a single financial model for indirect costs (overhead) has made the programme more attractive	☐	☐	☐	☐	☐	☐

CO-FUNDING

40. What one practical recommendation would you make to help Ireland capitalise on opportunities for co-funding (Marie Curie Co-fund, ERA-nets, Joint Programming Initiatives) of national programmes?

FUTURE PARTICIPATION

We would like to have your views on several aspects that relate to Ireland's future participation in Framework Programmes. Please feel free to answer only those questions for which you have a view.

- How to improve the effectiveness of Ireland's national support system _____
- How to improve the number and value of awards secured for Ireland through Horizon 2020_____
- How to improve engagement in Horizon 2020 by SMEs_____
- How to improve engagement in Horizon 2020 by government departments and agencies_____

- How to increase Ireland's participation in larger Horizon 2020 projects and strategic initiatives more generally. _____

- Any ideas you may have that would enable Ireland to be more strategic in its engagement with Horizon 2020 overall, capitalising on synergies and maximising leverage _____

41. The study team would like to conduct a number of short follow-up telephone interviews with individuals, based on their responses to this questionnaire. If you would be happy to be contacted for this purpose, please enter your email address below

Please press the button below to submit your answers.

DONE

Thank you very much for your time!

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