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Innovation Radar: Identifying Innovations and Innovators with High Potential in ICT FP7, CIP & H2020 Projects

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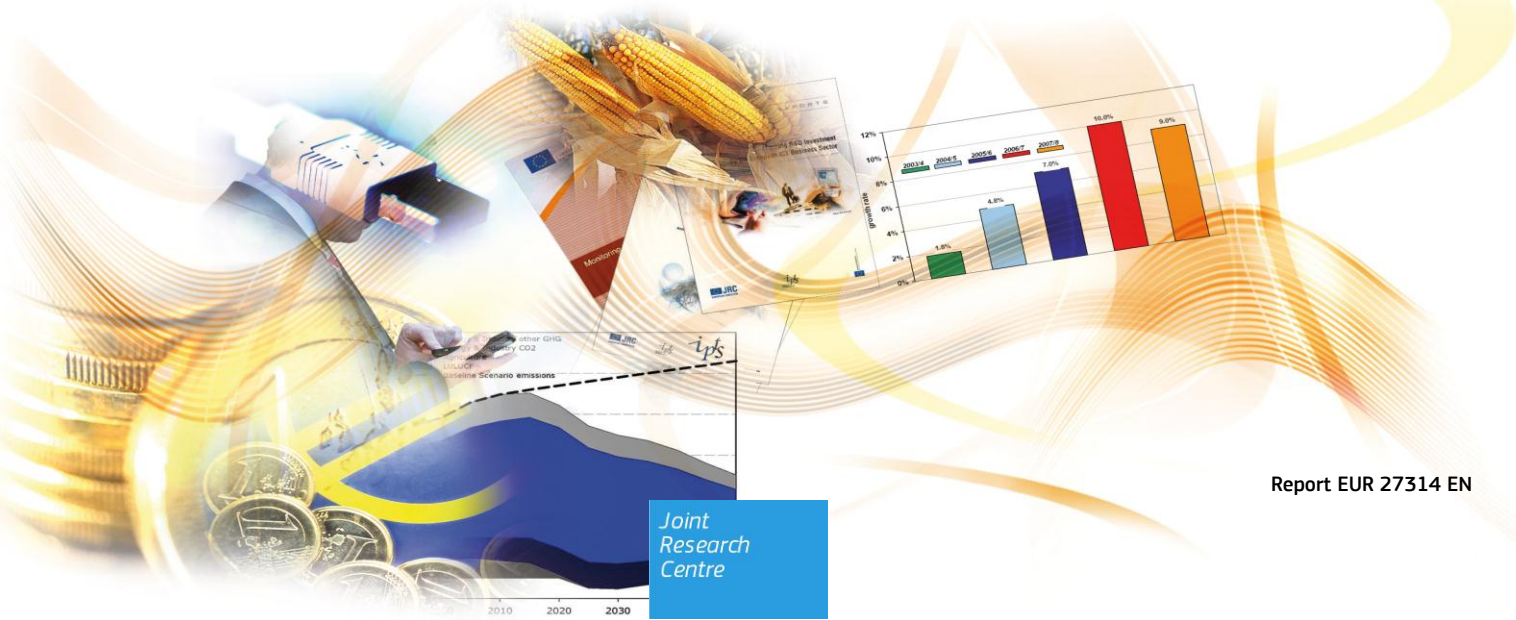

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Abstract
The European Commission's Framework Programme constitutes an important share in R&D expenditures in Europe. A number of FP7 projects certainly produce cutting-edge technologies and a significant percentage of these technologies could be commercialized. However, there is a general feeling that not all these technologies and innovations with commercial potential reach the market. The question is why? The Innovation Radar (IR) is a support initiative that focuses on the identification of high-potential innovations in the ICT FP7, CIP and H2020 projects and the key organization in delivering these innovations to the market. The current report documents the details of the IR methodology and the results of its first application. The results of the pilot exercise show that ICT FP7 projects deliver a substantial number of innovations. On average, there are nearly two new or substantially improved products or services developed within each ICT FP7 project. However, further nurturing is needed to bring them to the market and exploit their commercial potential.

Acknowledgments

This analysis was produced in the context of the European Innovation Policies for the Digital Shift (EURIPIDIS) project, jointly launched in 2013 by JRC-IPTS and DG CONNECT of the European Commission.

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Preface

This report was prepared in the context of the three - year research project on European Innovation Policies for the Digital Shift (EURIPIDIS), jointly launched in 2013 by JRC-IPTS and DG CONNECT of the European Commission. EURIPIDIS aims to improve understanding of innovation in the ICT sector and of ICT-enabled innovation in the rest of the economy.

The project's objective is to provide evidence-based support to the policies, instruments and measurement needs of DG CONNECT for enhancing ICT Innovation in Europe, in the context of the Digital Single Market for Europe and of the ICT priority of Horizon 2020. It focuses on the improvement of the transfer of best research ideas to the market.

EURIPIDIS aims:

1. to better understand how ICT innovation works, at the level of actors such as firms, and also of the ICT "innovation system" in the EU;
2. to assess the EU's current ICT innovation performance, by attempting to measure ICT innovation in Europe and by measuring the impact of existing policies and instruments (such as FP7 and Horizon 2020); and
3. to explore and suggest how policy makers could make ICT innovation in the EU work better.

This study reports the first findings of the Innovation Radar since its launch in May 2014. The Innovation Radar is a DG Connect / JRC-IPTS support initiative which focuses on the identification of high potential innovations and the key innovators behind them in FP7, CIP and H2020 projects.

Glossary

CIP: Competitiveness and Innovation Framework Programme.

H2020: Horizon 2020 is the EU Research and Innovation programme with nearly €80 billion of funding available over 7 years (2014 to 2020).

High Capacity Innovator: Innovators with ICI score with at least one standard deviation above the average ICI score.

High Potential Innovation: Innovations with IPI score with at least one standard deviation above the average IPI score.

IAI (Innovator's Ability Indicator): A composite indicator used in the innovator capacity assessment focusing on the innovation performance of an individual organization that is seen as the key organization behind an innovation.

ICI (Innovator Capacity Indicator): A composite indicator used in the innovator capacity assessment.

ICT FP7: The European Union's Research and Innovation funding programme for 2007-2013 dedicated to Information and Communication Technologies.

IEI (Innovator's Environment Indicator): A composite indicator used in the innovator capacity assessment focusing on the composition and activity of an inventor's partner organizations, the performance of the project in terms of innovation and the commitment of relevant partners to exploit the innovation.

IMI (Innovation Management Indicator): A composite indicator used in the innovation potential assessment focusing on the capability of the management team to execute steps necessary to transform a novel technology or research results into a marketable products and, finally, to prepare its commercialisation.

Innovation: New product, process, service or other type of innovation identified during ICT FP7/CIP project review with the help of the Innovation Radar Questionnaire.

Innovator: Key organization in the ICT FP7/CIP project delivering an innovation identified during ICT FP7/CIP project review with the help of the Innovation Radar Questionnaire.

Innovation Radar: a **DG Connect** / **JRC-IPTS** support initiative focusing on the identification of high potential innovations and the key innovators behind them in **FP7**, **CIP** and **H2020** projects and their needs concerning innovation commercialisation.

Innovation Radar Questionnaire: A questionnaire developed by **DG Connect** / **JRC-IPTS** to identify and analyse innovations in FP7, CIP and H2020 projects.

IPI (Innovation Potential Indicator): A composite indicator aggregating the three indicators, i.e. MPI, IRI and IMI, used in the innovation potential assessment.

IRI (Innovation Readiness Indicator): A composite indicator used in the innovation potential assessment focusing on the technical maturity of an evolving innovation.

Low Capacity Innovator: Innovators with ICI score with at least one standard deviation below the average ICI score.

Low Potential Innovation: Innovations with IPI score with at least one standard deviation below the average IPI score.

Market Potential Indicator (MPI): A composite indicator used in the innovation potential assessment focusing on the demand and supply side of an innovation.

Medium Capacity Innovator: Innovators with ICI score within one standard deviation of the average ICI score.

Medium Potential Innovation: Innovations with IPI score within one standard deviation of the average IPI score.

Strategic Objective (SO): The EU funding programme is focussed on a limited set of Strategic Objectives. They were selected following a consultation process exploring Europe's options at economic, social and technology levels.

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Executive summary

The Innovation Radar (IR) is a **DG Connect** / **JRC-IPTS** support initiative which is part of the EURIPIDIS project, a 3-year joint project between DG Connect and JRC-IPTS, launched in August 2013. The IR focuses on the identification of high potential innovations and the key innovators behind them in **FP7**, **CIP** and **H2020** projects.[1] The IR supports the innovators by suggesting a range of targeted actions that can assist them in fulfilling their potential in the market place. This study reports the findings of the pilot exercise performed between May 2014 and January 2015. The Innovation Radar Methodology was applied to 279 ICT FP7/CIP projects or 10.6% of all ICT FP7/CIP projects. The results presented in this report relate only to those projects.

The IR provides **up-to-date intelligence** on the innovative output of EU-funded research projects and **guidance on how to leverage the innovative output** of the ICT FP7/CIP projects. The IR can become a tool for monitoring the progress of innovations and innovators and for assessing the **effectiveness of policy** for innovations and innovators. As such, it could be extended to the entire FP7 and, at a later stage, to the H2020 programme.

Innovations in ICT FP7/CIP projects

ICT FP7/CIP projects deliver a substantial number of innovations. On average, there are nearly **two new or substantially improved products or services** developed within each ICT FP7/CIP project. However, further nurturing is needed to bring them to the market and exploit their commercial potential. This can be achieved by addressing the shortcomings of the innovations and/ or the needs of the innovators that are vital to deliver these innovations to the market.

Most of the innovations are related to **data processing** or **software development** whereas only a few of them are related to hardware development.

Market potential and **innovation readiness** are among the strongest dimensions of the ICT FP7/CIP innovations, while innovation management has the most room for improvement. Hence, to increase the potential of innovations, project organizations may need to clarify the issues of innovation ownership, prepare business plans and market studies or secure investment for further development and commercialisation of the innovative outputs.

63% of High Potential Innovations belong to projects that are in their **final stages**. Thus, new ideas and technologies that are developed during EU-financed projects mature and increase their potential as projects advance.

In general, **many of these innovations are likely to be introduced to the market** within a short period of time. Nearly 70% of all innovations are brought onto the market **within 2 years**. Commercial exploitation is planned for over 61% of all innovations and all High Potential Innovations. Currently, **10% of all innovations are already being exploited**, either on the market or internally by a partner organization. Moreover, 55% of the innovations developed or being exploited are either new products or significantly improved products. However, 25% of the already mature innovations are not being exploited yet. This includes 50% of the High Potential Innovations.

As a result of the project structure, **ownership of innovations is dispersed**. 61% of all innovations have multiple owners. The question is what implications this has for further innovation commercialization.

[1] Innovation is defined as new product, process, service or other types of innovation as defined by Oslo Manual that are identified during ICT FP7/CIP project review with the help of the Innovation Radar Questionnaire. Innovators are key organization in the ICT FP7/CIP project delivering an innovation identified during ICT FP7/CIP project review with the help of the Innovation Radar Questionnaire.

Innovators in ICT FP7/CIP projects

Innovations produced within ICT FP7/CIP projects are a result of **collaborative work**. On average, there are 1.23 innovators per innovation. In addition, innovators profit from an **innovation-favourable environment**. However, the quality of the innovation environment is not equal for all innovators. The reason for this may be that some projects do not engage end-users in the consortium or that the relevant partners are not committed to exploiting the innovation.

SMEs feature prominently in delivering high potential innovations. 41% of all organizations behind high potential innovations are SMEs. This is nearly threefold the SMEs' share in ICT FP7 participation, i.e. SMEs accounted in FP7 for 16% of total participations and 14% of total EC funding. Hence, it can be assumed that SMEs are important vehicles for co-creating and commercialising innovative technologies developed within ICT PF7 projects.

There is a strong geographic concentration of innovators. Germany, Spain and the UK are the countries with the most organizations identified as key players in delivering innovations. Although 291 cities host organizations have been identified as key organizations in delivering innovations, only 24 cities host 4 or more innovators. Cities with the highest number of organizations include Barcelona, which hosts 19 innovators, and London and Paris, both of which host 17 organizations.

There is **a positive relationship between an innovator's capacity score and innovation potential**. However, a high score in one indicator does not automatically translate into high performance in the other. Often, High Capacity Innovators participate in delivering Low or Medium Potential Innovations and Low Capacity Innovators were identified as key organizations in developing High Potential Innovations. Improving the overall performance of the innovative output requires **focusing on both innovations and the organizations behind them**.

Steps and barriers to innovation commercialisation

When taking innovations to the market, projects tend to **focus on technology-related steps over business-related ones**. For example, 53% of the projects that plan to commercialise their innovations either created, or plan to create, a prototype. In contrast, only 30% of projects have carried out or plan to carry out a market study. Business plan is on the agenda of 27% of projects that plan innovation commercialisation. Hence, in order to increase the chances of successful commercialisation of an innovative output, projects must take into account more than the technological aspects and **introduce business-related elements into their organizations' activities**.

Activities that involve **interactions with actors outside of the projects are relatively uncommon**. For example, only 5% to 6% of the projects have sought or are planning to seek private or public funding. At the same time, one of the most common needs of key organizations trying to deliver innovations is partnership with other companies. This creates a demand for **opening-up projects to more** interactions with external specialised actors, e.g. business coaches or venture capitalist, which could help to improve the commercialisation chances of innovations.

Financing is seen as the major external bottleneck to innovation exploitation. 41.9% of project partners see lack of finance as a barrier to exploiting their innovative products or services. However, there seems to be **a contradiction between what they claim to be a barrier and their actual behaviour**; i.e. **only between 5% and 6% of the projects have sought or are planning to seek private or public funding**. Moreover, between 25% and 30% of the projects do not plan to seek capital or public investment. On the other hand, organizations claim that their primary needs to fulfil their innovations' market potential is partnerships with other companies and expanding to more markets.

1 Introduction

The European Commission's Framework Programme constitutes an important share in R&D expenditures in Europe. For example, the **FP7** has a budget of over €50 billion with €9 billion allocated to ICT for the period from 2007 to 2013 (EC, 2007). In comparison, the ICT sector R&D annual expenditures in the EU reached almost €30 billion in 2011 (JRC-IPTS, 2014). A number of FP7 projects certainly produce cutting-edge technologies and a significant percentage of these technologies could be commercialized. However, there is a general feeling that not all these technologies and innovations with commercial potential reach the market. The question is why?

The Innovation Radar (IR) is a **DG Connect** / **JRC-IPTS** support initiative which is part of the EURIPIDIS[2] project, a 3-year joint project run jointly by DG Connect and JRC-IPTS and launched in August 2013. The IR is a tool that accompanies the standard reviews of the ICT 7th Framework Programme and Competitiveness and Innovation Framework Policy Support Programme (CIP ICT PSP) projects and in the future H2020 projects. During their lifecycle, ICT FP7/CIP and CIP projects go through three review rounds. The reviews are conducted by a panel of independent evaluators, who are recognized specialists in the relevant fields. In addition to the standard reviews, the Innovation Radar Questionnaire (see Section 8.1) was applied to ongoing projects. Hence, the IR covers and assesses innovations and innovators that belong to projects at different stages of their lifecycle.

The IR focuses on the identification of high-potential innovations in the **FP7**, **CIP** and **H2020** projects and the key organization in delivering these innovations to the market. The main elements of the Innovation Radar involve:

- Assessing the maturity of innovations developed within the FP7, CIP and H2020 projects and identifying high potential innovators and innovations.
- Providing guidance during the project on the most appropriate steps to reach the market.
- Supporting innovators through EU-(and non-EU-)funded entrepreneurship initiatives to cover specific needs concerning networking, access to finance, Intellectual Property Rights (IPR), etc.

The current report documents the details of the IR methodology and the results of its first application. In this pilot exercise, between May 2014 and January 2015, 279 projects were reviewed using the IR Questionnaire, i.e. 10.6% of all ICT FP7, e-Infrastructures and CIP ICT PSP projects. As a result, 517 innovations were identified. Information collected during the first application of the Innovation Radar Questionnaire is then organized according to pre-defined criteria that help to assess the potential of innovations originating from the ICT FP7/CIP projects and the innovative capacity of key organizations in delivering these innovations. This procedure permits us to rank individual innovations and innovators. This approach makes it possible to compare results and keep records of the outcomes for further analysis. In addition, it will guarantee that the process is transparent, objective and can be used throughout the H2020 programme.

The current report is structured as follows: Section 2 briefly presents the topic of assessment of innovation and technology-based ventures and positions the IR approach within the commonly-applied methods. Section 3 explains the IR methodology and presents the data used in the current study. Sections 4 and 5 present the results of the innovation potential assessment and the innovator capacity assessment respectively. Section 6 shows the responses to the questions concerning steps that projects consortia take to bring innovations to the market and what kind of obstacles to innovation commercialisation they find. Section 7 summarises the main lessons learned. Section 8 presents the methodological details behind IR, including the original questionnaire and the output of matching survey questions with assessment criteria.

[2] For more details, see: http://is.jrc.ec.europa.eu/pages/ISG/EURIPIDIS/EURIPIDIS.index.html

2 Assessment of innovation and new technology ventures

The principles of the IR are grounded on the ideas of innovation and new technology venture assessment. This type of activity is commonly performed by large research organizations, technology-based companies, universities or venture capitalists screening companies or projects with respect to their new product development, technological readiness and market potential of new products (De Coster & Butler, 2005; Liao & Witsil, 2008). In general terms, one can differentiate between two types of assessment of new innovations and technology projects. One is a process-based and the other culturally-based (Cooper & Kleinschmidt, 1997; Khurana & Rosenthal, 1998). Table 1 provides a synthesis of the main characteristics of the two approaches.

The process-based assessment uses established procedures for assessing proposals for funding. It is mainly used by, for example, banks granting loans to small, technology-based enterprises, or large research organizations, e.g. NASA, when choosing new products to develop from various technological projects. The process-based assessment tends to be a regular process, with proposals arriving and being reviewed on a regular basis. A regular process warrants an investment in methods and tools that lend themselves to comparing several options simultaneously and that keep records so that future opportunities can be compared with past opportunities. In contrast, the culturally-based approach does not assess all projects against a formal methodology. Instead, assessment is based on the assessor's experiences both individually and collectively. Business angels and venture capitalists are the most common users of the culturally-based approach to assessing new technology ventures. The assessment is usually done on a case-by-case basis by a team consisting of experts with different backgrounds.

Table 1: Approaches to innovation and technology-based ventures assessment

	Approach type	
	Process-based	**Culturally-based**
Methodology	Automatic or semi-automatic, deploying pre-defined questionnaires and assessment templates	Individual evaluation based on a set of pre-defined criteria Intensive due-diligence of company, its staff and market
Scope and intensity	A set of pre-defined dimensions with a list of questions	In-depth evaluation of individual cases
Outcome	Selection based on a relative or absolute score	Selection based on the in-depth analysis and consensus of an evaluating team
Number of assessments	Many	Few
Examples	Banks granting loans Evaluations performed by research funding-agencies Large corporations evaluating internal research projects	Venture Capitalist Business Angels

Source: JRC-IPTS, based on (De Coster & Butler, 2005).

Within this framework, the Innovation Radar methodology can be seen as a process-based approach to innovation and new technology assessment. It applies a structured framework to assessing the potential of innovations and innovative capacity of organisations that play a key role in delivering these innovations. The IR methodology includes the following elements:

- A structured questionnaire that is used to review FP7/CIP/H2020 projects with respect to their innovative output,
- The reviews are conducted by external and independent experts appointed by DG Connect.
- The reviews are conducted on regular basis, usually yearly, so that each ICT FP7/CIP project is reviewed three times during its life cycle.
- Information collected during the reviews is organized according to pre-defined criteria that help to assess the potential of innovations originating from the FP7/H2020 projects and the innovative capacity of key organizations in delivering these innovations.
- The procedure allows the results to be compared and records of the outcomes are kept for further analysis.
- The outcome of the assessment is expected to serve as a basis for support to project organizations to further strengthen the potential of their innovations and their innovative capacity.

3 Innovation Radar methodology and data

IR methodology includes two components: the first is the assessment framework for ranking innovations and the second is an assessment framework for ranking of innovators. In the following sections the main components are explained. Further methodological details, including the innovation survey questionnaire, are presented in Section 8.

3.1 Innovation potential assessment framework

The innovation potential assessment framework is the first component of the Innovation Radar. It includes a set of pre-defined criteria and relevant indicators that are expected to assess the strength of each innovation. The assessment framework considers the aspects of innovation readiness, innovation management and market potential. It should answer questions such as: Will it work? Is the innovation ready to be commercialised? How well is the competitive advantage protected?

3.1.1 Innovation potential assessment criteria

In order to provide synthetic comparable results for further analysis and interpretation, the innovation potential assessment framework uses three assessment criteria: Market Potential, Innovation Readiness and Innovation Management.

Innovation readiness: Innovation readiness criterion relates to the technical maturity of an evolving innovation. It aims to define the development phase of the innovation, e.g. conceptualization, experimentation or commercialisation. It also takes into account the steps that were taken in order to prepare innovation for commercialisation, e.g. prototyping, demonstration or testing activities or a feasibility study, and to secure the necessary technological resources, e.g. skills, to bring the innovation to the market. In addition, this criterion takes into account the development stage of an innovation and the time to its potential commercialisation.

Innovation management: Innovation Management criterion addresses the issue of the project consortium and its commitment to bring an innovation to the market, an element that is often seen as the most important success indicator of a technology venture. This concept aims to research or confirm the capability of the project's development and/or management team to execute the necessary steps to transforming a novel technology or research results into a marketable product and, finally, to prepare its commercialisation. These steps may include, for example, clarifying the related ownership and IPR issues, preparing a business plan or market study, securing capital investment from public and/or private sources, or engaging an end-user in the project.

Market potential: Market potential criterion relates to the demand and supply side of an innovation. Regarding the demand side, it concerns the prospective size of the market for a product and the chances of its successful commercialisation. Its aim is to assess how the product satisfies a

market sector and to indicate that there is potential customer base. With respect to the supply side, it aims to assess whether there are potential barriers, e.g. regulatory frameworks or existing IPR issues, which could weaken the commercial exploitation of an innovation. In the current undertaking, the focus is placed on the supply side. This is mostly related to the fact that information on markets for individual innovations is not available.

3.1.2 Innovation potential assessment indicators

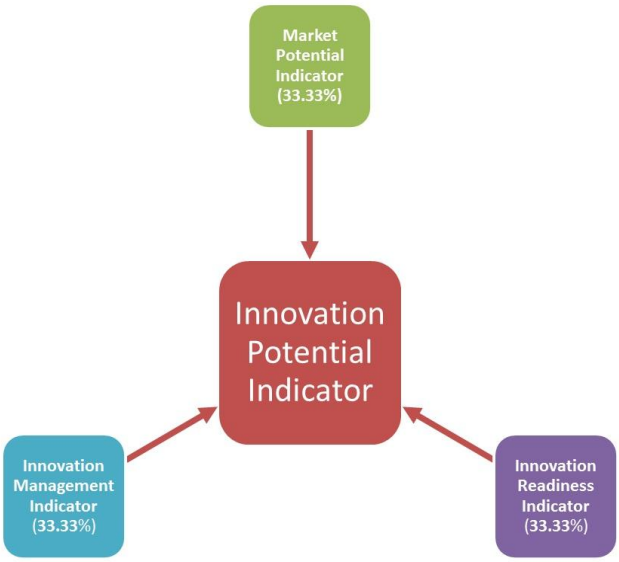
In order to observe and measure the above specified criteria, each of them was matched with relevant questions of the Innovation Radar Questionnaire (8.1). The outcome of the matching process is presented in Table 9 (see Section 8.2.1). In this way, a composite sub-indicator for each assessment criteria was created:

- **Innovation Readiness Indicator** (IRI) is an arithmetic aggregate of all relevant information in the domain of innovation readiness as defined in Section 3.1.1 and scoring system presented in Table 9 in Section 8.2.1.
- **Innovation Management Indicator** (IMI) is an arithmetic aggregate of all relevant information in the domain of innovation management as defined in Section 3.1.1 and the scoring system presented in Table 9 in Section 8.2.1.
- **Market Potential Indicator** (MPI) is an arithmetic aggregate of all relevant information in the domain of innovation market potential as defined in Section 3.1.1 and the scoring system presented in Table 9 in Section 8.2.1.

In the second step, the **Innovation Potential Indicator** (IPI) is constructed. IPI is an arithmetic composite indicator which aggregates the values of the three earlier sub-indicators, i.e. MPI, IRI and IMI.

An important issue related to the construction of composite indicators is the one of weighting. Unfortunately, no agreed methodology exists to weight individual indicators (EC-JRC, 2005). In particular the context of the current study does not make the choice of a weighting scheme easy. All three elements are considered equally important for a successful innovation commercialization. Considering this, it is proposed that equal weighting is applied. Figure 1 visualizes this procedure.

Figure 1: Construction of the Innovation Potential Indicator



Source: JRC-IPTS

3.2 Innovator capacity assessment framework

The second element of the Innovation Radar is an assessment framework for ranking of innovators. It concentrates on two issues. First, what is the innovation performance of organizations considered

as key innovators? Second, in what kind of environment are these organizations located? As in the case of the innovation assessment framework, it includes a set of pre-defined criteria and relevant indicators that are expected to assess the capacity of organizations identified as key organizations in delivering the innovations.

3.2.1 Innovator capacity assessment criteria

In order to provide synthetic comparable results for further analysis and interpretation, two criteria are used to assess the capacity of innovators in ICT FP7/CIP projects: innovator's ability and innovator's environment.

Innovator's ability: Innovator's ability relates to the innovation performance of an individual organization that is seen as the key organization behind an innovation. The ability of an organization is measured mainly by its innovative output within the FP7 activities. By output we mean the number of innovations each organization contributes to and the potential of these innovations, where the innovation potential is a product of the innovation potential assessment, as defined in Section 3.1. In addition, while assessing innovator's ability, factors such as a reviewer's opinion about an innovator's potential or the innovator's independence in fulfilling the market potential of an innovation are taken into account.

Innovator's environment: the innovator's environment criterion aims to capture the overall conditions which an innovator faces. It is mainly related to the overall composition and activity of partner organizations, the performance of the project in terms of innovation and the commitment of relevant partners to exploiting the innovation. Moreover, it also takes into account the presence of organizations that are directly interested in applying or exploiting the innovations, e.g. end-users. It is assumed that a positive environment overall will have a positive spill over effect for the innovator and vice-versa.

In order to observe and measure the above specified criteria, each of them was matched with relevant questions from the Innovation Radar Questionnaire (8.1). The outcome of the matching process is presented in Table 10 (see Section 8.2.2).

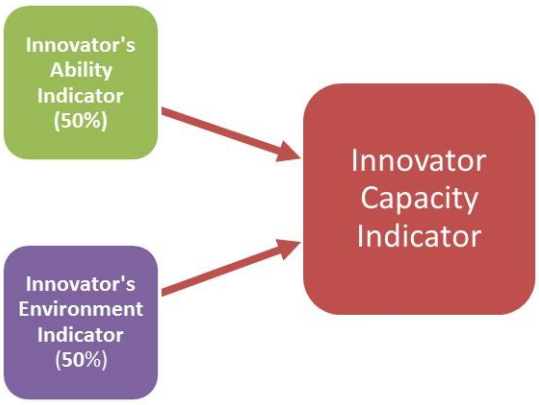
3.2.2 Innovator capacity assessment indicators

In order to create a measure of innovation potential, we proceed in two steps. In a first step, composite sub-indicators are created, one for each of the above defined criteria: Innovator's Ability and Innovator's Environment. This way, two intermediate sub-indicators are used in order to assess each innovation dimension, i.e.:

- **Innovator's Ability Indicator** (IAI) is an arithmetic aggregate of all relevant information in the domain of innovator's ability as defined in Section 3.2.1 and scoring system presented in Table 10 in Section 8.2.2.
- **Innovator's Environment Indicator** (IEI) is an arithmetic aggregate of all relevant information in the domain of innovator's environment as defined in Section 3.2.1 and scoring system presented in Table 10 in Section 8.2.2.

In the second step, the **Innovator Capacity Indicator** (ICI) is constructed. The ICI is an arithmetic composite indicator aggregating the values of the two earlier sub-indicators, i.e. IAI and IEI. Like in the case of innovation ranking, equal weighting is applied. Figure 2 visualizes this procedure.

Figure 2: Construction of the Innovation Capacity Indicator



Source: JRC-IPTS

3.3 Normalization of indicator values

In order to make the values on each indicator among different innovations and innovators as easily comparable as possible, a normalisation procedure is applied. Observed values of each indicator are brought to the scale between 0 and 100 in the following way:

$$Indicator_{Normalized\cdot Score} = \frac{Indicator_{Observed\cdot Score}}{Indicator_{Max\cdot Score}} \times 100. \quad (1)$$

3.4 Categories of innovations and innovators

In order to facilitate the interpretation of the results, the IR study introduces three categories of innovations, i.e. Low, Medium and High Potential Innovations, and innovators, i.e. Low, Medium and High Capacity Innovators. The assignment to a category is based on mean and standard deviation (SD) values of the IPI for innovations and the ICI for innovators and uses percentile ranks as shown in Figure 3.

Ordering innovations and innovators into three different categories based on percentile ranks allows their performance to be compared very clearly with the remaining innovations and innovators in the sample. The percentile rank of an innovation or an innovator is defined as the percentage of innovations or innovators in the same sample that obtained a score at the same level or below that of the innovation's or innovator's score.

In formal terms, for innovations, this can be expressed as follows:

Low Potential Innovation: $$IPI_i < IPI_{Mean} - IPI_{SD}, \quad (2)$$

Medium Potential Innovation: $$IPI_{Mean} - IPI_{SD} \le IPI_i < IPI_{Mean} + IPI_{SD}, \quad (3)$$

High Potential Innovation: $$IPI_{Mean} + IPI_{SD} \le IPI_i, \quad (4)$$

where *i* is the observed IPI score of innovation and mean and SD are average and standard deviation of the IPI.

Following the same logic, the assignment of inventors to three categories is based on the following rules:

Low Capacity Innovator: $$ICI_j < ICI_{Mean} - ICI_{SD}, \quad (5)$$

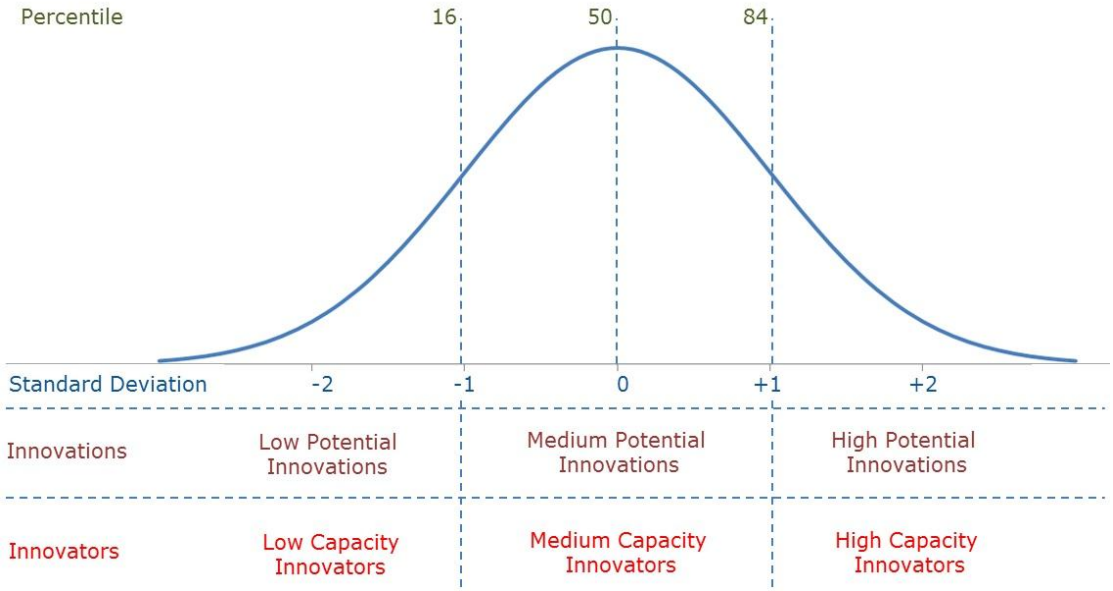
Medium Capacity Innovator: $$ICI_{Mean} - ICI_{SD} \le ICI_j < ICI_{Mean} + ICI_{SD}, \quad (6)$$

High Capacity Innovator: $$ICI_{Mean} - ICI_{SD} \leq ICI_j \,, \quad (7)$$

where *j* is the observed ICI score of innovator and Mean and SD are average and standard deviation of the ICI.

According to this procedure of classifying innovations and innovators, belonging for example to the High Capacity Innovator category indicates that an organization's percentile rank is 84, i.e. that at least 84% of the organizations in the sample scored the same or less than the organization. In other words, the organization's score belongs to the top 16% in the sample. Similarly, a Low Potential Innovation belongs to the group of 16% of innovations in the sample with the lowest values of the IPI.

Figure 3: Categories of innovations and innovators



Source: JRC-IPTS

3.5 Data

The Innovation Radar initiative is an ongoing process that was launched in August 2013 and the data collection process started in May 2014. This report uses the information gathered in the IR's pilot exercise. The data used in the current project was collected during periodic reviews of ICT FP7/CIP projects between 20 May 2014 and 19 January 2015 (see Table 3). The reviews were conducted by external experts commissioned by DG Connect. During this time, in addition to a standard review procedure, DG Connect deployed the Innovation Radar questionnaire (see Section 8.1) to spot innovations originating from the FP7 projects and the key organizations behind them. The research activities monitored are the ICT research actions and the e-Infrastructures activity under the Seventh Framework Programme 2007-2013 (under Cooperation and Capacities themes), and the policy support actions carried out under the Competitiveness and Innovation Framework Policy Support Programme (CIP ICT PSP).

Table 2 shows the distribution of all FP7 projects and projects reviewed using the Innovation Radar methodology by Strategic Objective (SO), including e-Infrastructures and CIP ICT PSP activities (EC-CONNECT, 2013a, 2013b). Overall, the correlation coefficient between the number of FP7 projects and projects reviewed using the Innovation Radar methodology by theme is 0.76, which, together with the absolute number of reviewed projects, i.e. 279 or 10.6% of all ICT FP7/CIP projects, show that the sample of the reviewed projects is representative for the population of ICT FP7/CIP activities. The largest number of projects belongs to the Future and Emerging Technologies (FET) (12.1%), Future Networks and Internet (8.1%) SO and to the CIP ICT PSP (8.9%). Concerning the distribution of the reviewed projects by SO, CIP ICT PSP (10%), Software, Services and internet

connected objects (9.7%) and FET (9.3%) are the largest sub-groups. None of the projects belonging to the International Cooperation SO was reviewed using the Innovation Radar methodology.

Table 2: Number of FP7 ICT EC, e-Infrastructure and CIP-ICT-PSP projects (cumulated figures 2007 – 2013) and number of reviewed projects by strategic objective

Strategic Objective	Number of projects*	% of Total	Number of reviewed projects	% of Total	Reviewed projects as % of all projects
01 Future Networks and Internet	214	8.1%	24	8.6%	11.2%
02 Software, Services and internet connected objects	114	4.3%	27	9.7%	23.7%
03 Trustworthy ICT	90	3.4%	13	4.7%	14.4%
04 Networked Media	72	2.7%	7	2.5%	9.7%
05 Cognitive Systems and Robotics	150	5.7%	6	2.2%	4.0%
06 Nanoelectronics	66	2.5%	7	2.5%	10.6%
07 Micro/nanosystems	64	2.4%	4	1.4%	6.3%
08 Embedded Systems	150	5.7%	14	5.0%	9.3%
09 Photonics	105	4.0%	5	1.8%	4.8%
10 Organic and large area Electronics	43	1.6%	4	1.4%	9.3%
11 Language Technologies	66	2.5%	16	5.7%	24.2%
12 Intelligent Information Management	69	2.6%	10	3.6%	14.5%
13 ICT for Health	137	5.2%	14	5.0%	10.2%
14 ICT and Ageing	29	1.1%	3	1.1%	10.3%
15 ICT for Inclusion	51	1.9%	6	2.2%	11.8%
16 ICT for Governance and Policy Modelling	26	1.0%	5	1.8%	19.2%
17 ICT for Energy Efficiency	119	4.5%	11	3.9%	9.2%
18 ICT for Transport	93	3.5%	15	5.4%	16.1%
19 ICT for the Enterprise	69	2.6%	7	2.5%	10.1%
20 ICT for Learning	85	3.2%	15	5.4%	17.6%
21 Digital Libraries	15	0.6%	1	0.4%	6.7%
22 FET	318	12.1%	26	9.3%	8.2%
23 International Cooperation	56	2.1%	0	0.0%	0.0%
24 Accompanying Measures	52	2.0%	5	1.8%	9.6%
e-infrastructures	140	5.3%	6	2.2%	4.3%
CIP ICT-PSP	233	8.9%	28	10.0%	12.0%
Total	**2626**	**100%**	**279**	**100%**	**10.6%**

Source: JRC-IPTS

Data: *European Commission DG Connect (EC-CONNECT, 2013a, 2013b)

4 Innovation potential assessment

This section presents the innovation potential assessment results. It covers the following points:

- What is the overall and average innovative output of ICT FP7/CIP projects?
- Overview of innovation performance of innovations,
- Presentation of High Potential Innovations and their characteristics, including the main organizations behind them,
- Distinguishing between innovations by their type, e.g. product, process or service innovations,
- Presentation of plans to commercialise and exploit innovations,
- Presentation of the structure of innovation ownership,
- Overview of innovations by review type and by Strategic Objective.

4.1 In a nutshell

The main findings of the innovation potential assessment can be summarised as follows:

- A typical ICT FP7/CIP project produces 1.85 innovations,
- There are 1.23 innovators per innovation, on average,
- Market potential and innovation readiness are among the strongest dimensions of the ICT FP7/CIP innovations, while the most room for improvement is found in innovation management.
- 63% of High Potential Innovations belong to projects that went through their final review and are therefore in their final stages.
- Majority of innovations are related to data processing or software development and only a few innovations are related to hardware development.
- 75% of key organizations behind the top 10 innovations are SMEs.
- 10% of all innovations are already being exploited, either on the market or by being implemented within a partner organization. However, 25% of innovations that are already mature are not being exploited yet.
- 55% of innovations that have already been developed or are being exploited are either new products or significantly improved products.
- Commercial exploitation is planned for over 61% of all innovations and all High Potential Innovations,
- Nearly 70% of all innovations are to be brought onto the market within 2 years.
- Although 61% of all innovations have multiple owners, the majority of High Potential innovations, i.e. 63% or 10.6% of all innovations, have a clearly defined owner.
- 63% of High Potential Innovations belong to projects that went through their final review and are therefore in their final stages. Thus, it can be assumed that new ideas and technologies that are developed during EU-financed projects mature and increase their potential as projects advance.

4.2 Innovations in the reviewed ICT FP7/CIP projects

According to Table 3, between May 2014 and January 2015, 279 projects were reviewed using the IR Questionnaire, i.e. 10.6% of all ICT FP7, e-Infrastructures and CIP ICT PSP projects (see Table 2). As a result, 517 innovations were identified. This means that, on average, an ICT FP7/CIP project produces nearly 2 innovations. The number of distinct organizations considered as key organisations in the project delivering these innovations amounted to 544. The average number of innovators per innovation was 1.23.

Table 3: Innovations in ICT FP7/CIP projects – key facts

Review period	20.05.2014 and 19.01.2015
Number of reviewed projects	279
Number of innovations	517
Number of distinct innovators	544
Average number of innovations per project	1.85
Average number of innovators per innovation	1.23

Source: JRC-IPTS

Data: European Commission DG Connect

4.3 Overview of innovation performance

Table 4 reports the summary statistics of the three innovation potential assessment sub-indicators, i.e. Innovation Readiness (IRI), Innovation Management (IMI), Market Potential (MPI) and the composite Innovation Potential (IPI), for all analysed innovations and by innovation potential category. Average values of the indicators across innovation potential categories as defined in Section 3.4 are presented in Figure 4. Figure 5 shows the distribution of the IPI values.

The average value of the IPI among all the innovations is 45.52 out of the total 100 points. This number varies between 27.34 and 65.55 for low and high innovation potential categories. The innovation with the highest score obtained 84.17 points, while the lowest-ranked innovation only 14.17 points. When looking at the individual sub-indicators, one can observe that MPI has the highest and the IMI has the lowest average value. The average MPI score is 64.39 and the average IMP score is 35.67 points. The average score of the IRI is 36.49 points.

Table 4: Descriptive statistics of the innovation potential assessment indicators

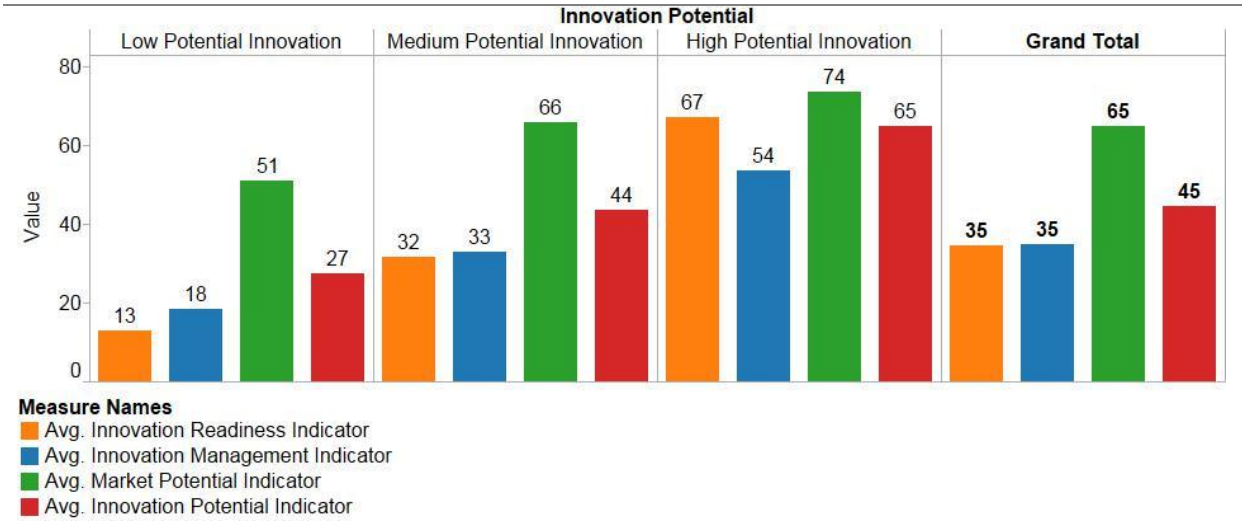
		Nr of innovations	Mean	Std. Dev.	Min.	Max.
Indicator	Innovation Readiness	517	36.49	21.72	2.5	100
	Innovation Management	517	35.67	15.17	0	95
	Market Potential	517	64.39	13.29	27.5	95
	Innovation Potential	517	45.52	12.69	14.17	84.17
Innovation Potential Indicator	Low Potential Innovations	79 (15.2%)	27.34	4.28	14.17	31.67
	Medium Potential Innovations	352 (68.1%)	43.72	6.84	32.5	56.67
	High Potential Innovations	86 (16.6%)	65.55	6.90	57.5	84.17

Calculations: JRC-IPTS

Data: European Commission DG Connect

Note: The table includes computations on innovation potential assessment indicators as defined in section 3.1 and innovation potential categories as defined in section 3.4. Total number of reviewed projects: 279. Total number of innovations: 517. Review period: 20.05.2014 and 19.01.2015.

Figure 4: Average values of indicators by innovation potential category



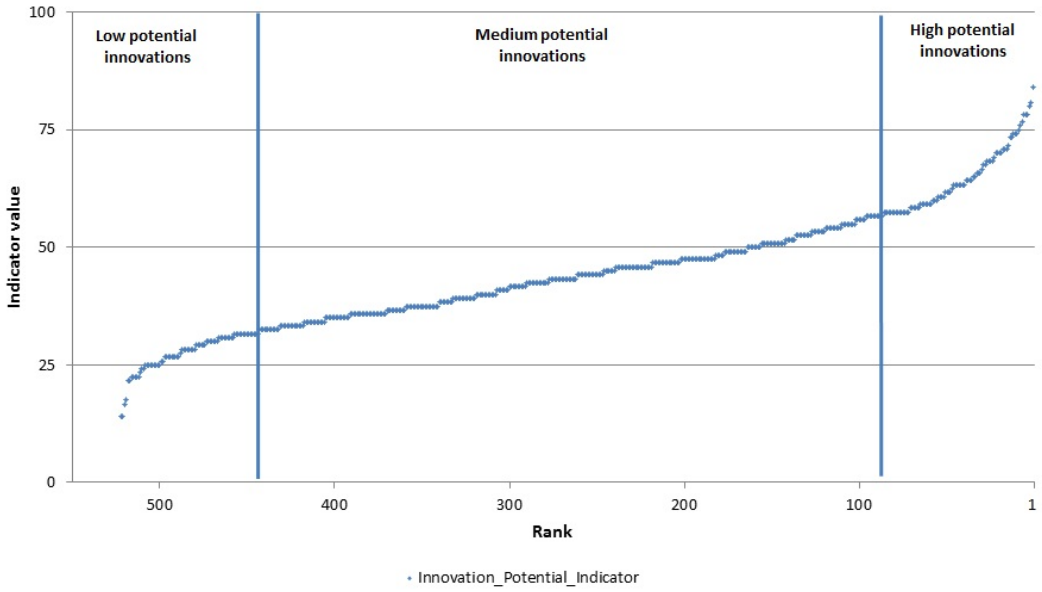
Calculations: JRC-IPTS

Data: European Commission DG Connect

Note: The figure presents average scores across all four innovation potential assessment indicators, i.e. IRI, IMI, MPI and IPI, as defined in section 3.1, across innovation potential categories defined in Section 3.4. Total number of reviewed projects: 279. Total number of innovations: 517. Review period: 20.05.2014 and 19.01.2015.

Based on the presented evidence, it can be concluded that, on average, market potential and innovation readiness are among the strongest dimensions of the innovations coming out of the reviewed ICT FP7/CIP projects. In contrast, innovation management represents the weakest dimension of these innovations. Hence, in order to increase the potential of these innovations, steps such as the clarification of innovation ownership, preparing business plan and market study or securing investment must be taken.

Figure 5: Distribution of IPI values



Calculations: JRC-IPTS

Data: European Commission DG Connect

Note: The figure includes IPI scores of innovations as defined in section 3.1 and innovation potential categories defined in Section 3.4. Total number of reviewed projects: 279. Total number of innovations: 517. Review period: 20.05.2014 and 19.01.2015.

4.4 High potential innovations

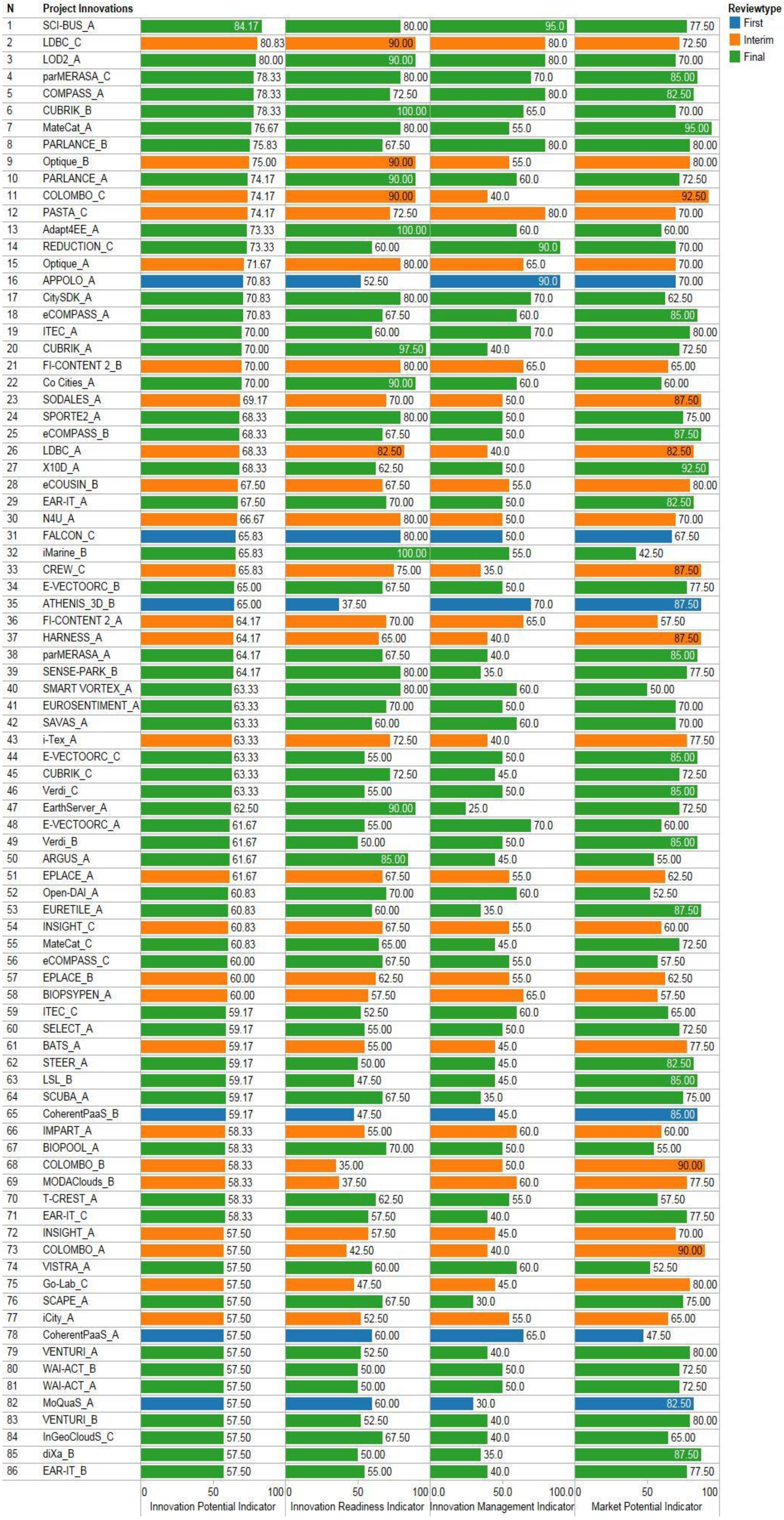
Figure 6 presents the list of High Potential Innovations with their scores by assessment indicators and the review time. According to this list, there are 86, i.e. 16.6%, out of 517 innovations that can be considered as High Potential Innovations (see Section 3.4). The average value of the IPI among all the High Potential Innovations is 65.55 out of 100 points. In comparison, the same value for Medium and Low Potential Innovations is 43.72 and 27.34 respectively (see Table 4 and Figure 4). Concerning the individual sub-indicators, High Potential Indicators score very high on market potential and innovation readiness. The average value of MPI and IRI among High Potential Innovations is 74 and 67 respectively. In other words, while market potential and innovation readiness can be considered as strengths, there is still room for improvement in innovation management.

Regarding the review time, out of the 86 innovations, 54 High Potential Innovations, or 63% of the total, belong to projects that were reviewed for the third and the last time. 30% and 7% of the remaining reviews belong to projects that were reviewed for the second and first time. This can be interpreted as a sign of ICT FP 7 innovations maturing over the lifecycle of the projects.

For illustrative purposes, Table 5 shows detailed descriptions of 10 innovations with the highest IPI score, together with the name and organization type of the key organizations behind them. Regarding the description of innovations, one can quickly see that the majority of innovations are related to data processing, e.g. LOD2_A, or software development, e.g. parMERASA_C. Among the top 10, only one innovation, i.e. PASTA_C, deals with hardware development. Concerning the key

organizations behind the top innovations, there are altogether 12 entities. Only in one case – that of LOD2_A – is more than one organization identified as the key organization behind an innovation. For the remaining innovations, only one innovator was identified. Interestingly, 75% of all organizations in this list are SMEs. Only 2 of the organizations are universities and 1 is a large company.

Figure 6: High potential innovations and their scores across indicators



Calculations: JRC-IPTS

Data: European Commission DG Connect

Note: The figure presents the list of High Potential Innovations as defined in section 3.1. Review type concerns one of the three reviews each FP7 project is subject to during its lifecycle. Total number of reviewed projects: 279. Total number of innovations: 517. Review period: 20.05.2014 and 19.01.2015.

Table 5: Description of top 10 innovations and the key organizations behind them

Rank by IPI	Innovation	Innovation description	Key organizations	Organisation type
1	SCI-BUS_A	CloudBroker Platform: one point of connection - unified interface to different commercial clouds, enables users to provide their self-developed applications, workflows, data products and other software to be exploited commercially.	CLOUDBROKER GMBH	SME
2	LDBC_C	During the work on one of the LDBC benchmarks the requirement occurred to provide a way to partition any given graph into its community structure of strongly connected components. As state-of-the art methods did not meet the requirements a new method had been developed.	SPARSITY SL	SME
3	LOD2_A	The LinkedData stack is a comprehensive toolset to manage linked data, covering a number of aspects such as extraction, storage, querying, linking, cleaning and exploration. The stack can be used by companies and large organisations to stablish enterprise data hubs.	OPENLINK GROUP LIMITED	SME
			SEMANTIC WEB COMPANY GMBH	SME
			WOLTERS KLUWER DEUTSCHLAND GMBH	LARGE
4	COMPASS_A	Novel test strategy for automated equivalence class partition testing of complex systems with guaranteed error detection capabilities.	UNIVERSITAET BREMEN	HES/REC
5	CUBRIK_B	The Gamification Framework (GF) enables organizations to add game elements to business applications, to boost customer engagement, activity and loyalty. The GF can be integrated with legacy or new applications and accelerates the development of rich and flexible gamification add-ons.	WEBRATIO SRL	SME
6	parMERASA_C	Enhancements to the Rapita Verification Suite to support analysis, verification and profiling of parallel software running on a multi-core architecture, comprising extensions to the existing tools RapiTime, RapiCover, RapiTask and RapiCheck, and a new tool to support the parallelization process.	RAPITA SYSTEMS LIMITED	SME
7	MateCat_A	The MateCat tool is a Web-based open source computer-assisted translation (CAT) tool, which puts together the best environment for post-editing and translation and a marketplace for outsourcing translation projects. It offers a deep integration with the largest public translation memory and the best machine translation (MT) systems.	TRANSLATED SRL	SME
8	PARLANCE_B	Rapid on-line learning and adaptation of POMDP-based policies for spoken dialogue Management (trainable interaction manager). To be included in the Spoken Dialog System sold by VocalIQ Ltd	THE CHANCELLOR, MASTERS AND SCHOLARS OF THE UNIVERSITY OF CAMBRIDGE	HES/REC
9	Optique_B	Companies collect petabytes of data but struggle to put it to use. We address this challenge by 1) integrating data from hundreds of sources, 2) enabling self-service access for data scientists using agreed-upon terminology and 3) packaging data scientist know-how in end-user apps.	FLUID OPERATIONS AG	SME
10	PASTA_C	The E-Thread® technology is a 3D Chip micro packaging technology allowing electronics for being integrated in textile yarns, and this textile yarn can be used by the textile and plastic industry as any other yarn. RFID and LEDs are the first electronic function on board.	Primo1D	SME

Calculations: JRC-IPTS

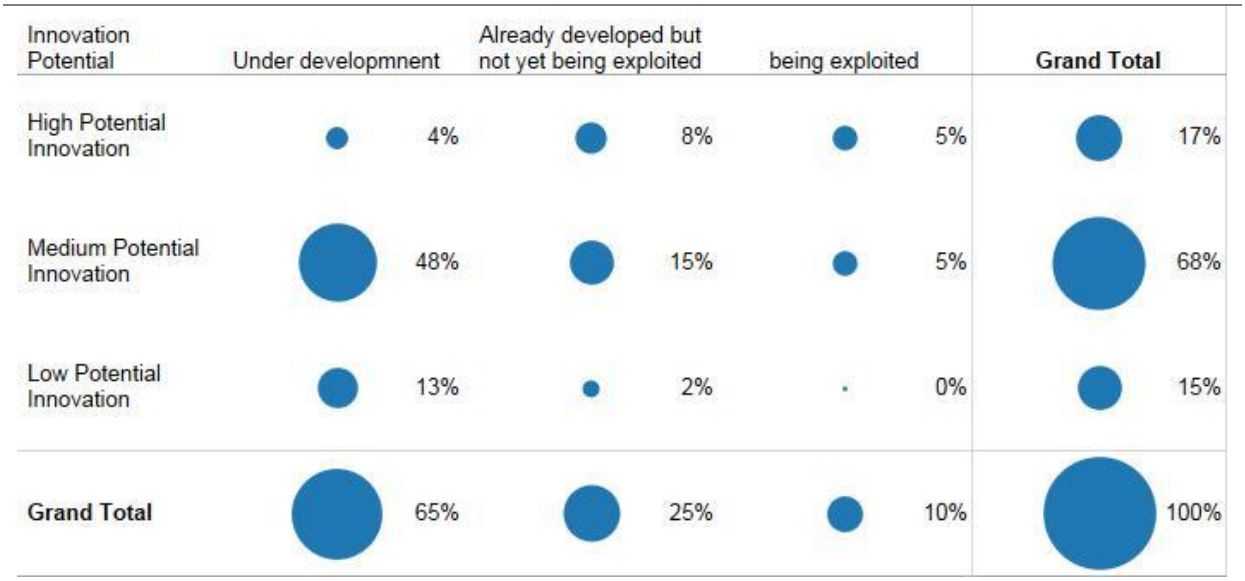
Data: European Commission DG Connect

Note: The table presents the list of 10 High Potential Innovations with the highest score of IPI as defined in section 3.1. Organization classes: HES/REC (High Education and Schools and Research Centres); PUB (Public Bodies); SMEs (Small Medium Enterprise); LARGE (Large companies), NIL (Other organisations). Total number of reviewed projects: 279. Total number of innovations: 517. Review period: 20.05.2014 and 19.01.2015.

4.5 Development stage of innovations

Figure 7 shows the distribution of innovations by stage of development and innovation potential category. According to this information, 65% of all innovations are under development and 10% of innovations are already being exploited: they are ether on the market or are being implemented within a partner organization. However, one quarter of innovations are already developed, but not being exploited. Moreover, around 50% of High Potential Innovations belong to this category. The remaining 50% with the highest IPI score are equally either under development or already being exploited.

Figure 7: Development stage of innovations



Calculations: JRC-IPTS

Data: European Commission DG Connect

Note: The computations were based on the responses to question 2) of the Innovation Radar Questionnaire (see Section 8.1). Total number of reviewed projects: 279. Total number of innovations: 517. Review period: 20.05.2014 and 19.01.2015.

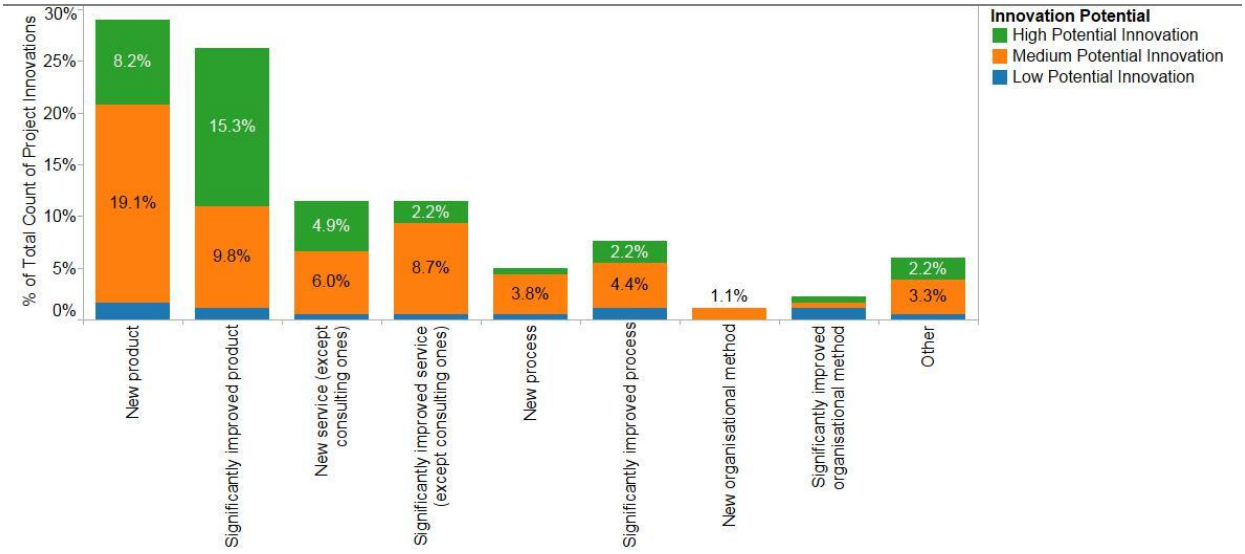
4.6 Type of innovations

Figure 8 shows the types of innovations that are developed or being exploited and Figure 9 shows types of innovations that are still under development. In both cases, a breakdown by innovation potential category is given. According to Figure 8, most of the innovations that are already developed or being exploited are either new products or significantly improved existing products. Altogether, these two types account for 55% of all developed innovations. The second largest group of innovation types represent new services or significantly improved services. These two categories account for 23% of all developed innovations.

Regarding the innovation potential of various types of innovations, one can see that the new products or significantly improved products innovation types include a relatively large share of High Potential Innovations. High Potential Innovations in these two groups account for 23.5% of all developed innovations.

According to Figure 9, most of the innovations that are still under development (62.6%) are product innovations. A very large share of innovations in this group, i.e. nearly 75%, are Medium Potential Innovations.

Figure 8: Innovations developed or being exploited by type and innovation potential category

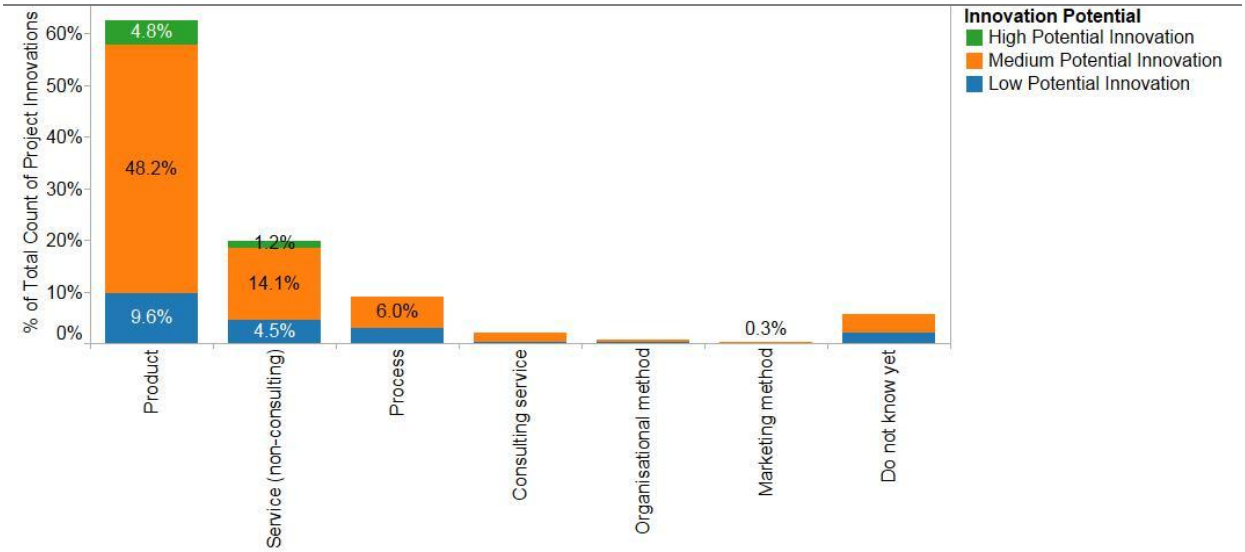


Calculations: JRC-IPTS

Data: European Commission DG Connect

Note: The computations were based on the responses to question 3) of the Innovation Radar Questionnaire (see Section 8.1). The Innovation Potential categories are defined in Section 3.4. Total number of reviewed projects: 279. Total number of innovations: 517. Review period: 20.05.2014 and 19.01.2015.

Figure 9: Innovations under development by type and innovation potential category



Calculations: JRC-IPTS

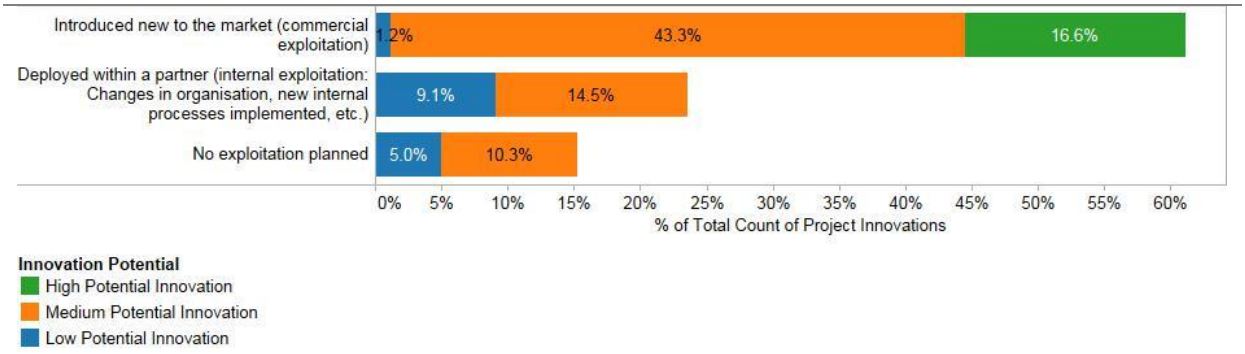
Data: European Commission DG Connect

Note: The computations were based on the responses to question 5) of the Innovation Radar Questionnaire (see Section 8.1). The Innovation Potential categories are defined in Section 3.4. Total number of reviewed projects: 279. Total number of innovations: 517. Review period: 20.05.2014 and 19.01.2015.

4.7 Exploitation and commercialisation of innovations

Figure 10 shows the breakdown of innovations by exploitation and innovation potential category. A distinction between commercial and internal exploitation is made. According to this information, commercial exploitation is planned for over 61% of all innovations and all High Potential Innovations. Nearly 24% of all innovations are said to be exploited through internal exploitation. This is expected to take place through changes in organization, new internal process implementation, etc. The remaining innovations, i.e. 15% are not planned to be introduced to the market or exploited internally.

Figure 10: External vs. internal exploitation by innovation potential category



Calculations: JRC-IPTS

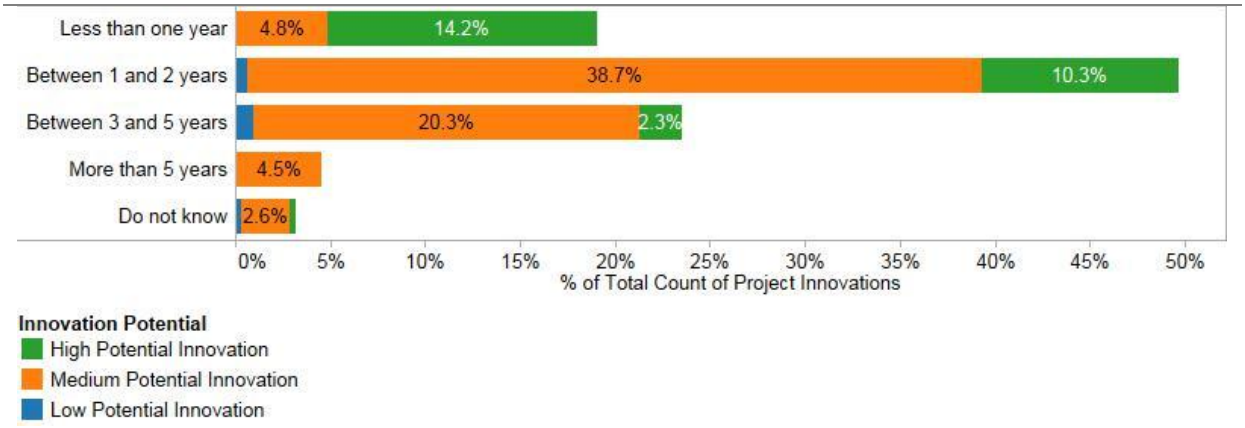
Data: European Commission DG Connect

Note: The computations were based on the responses to question 6) of the Innovation Radar Questionnaire (see Section 8.1). The Innovation Potential categories are defined in Section 3.4. Total number of reviewed projects: 279. Total number of innovations: 517. Review period: 20.05.2014 and 19.01.2015.

Figure 11 presents the responses of project consortia concerning the time to innovation commercialisations that are expected to be introduced to the market or deployed within a partner. Nearly 70% of these innovations will be brought onto the market within 2 years. In addition, 23.60% of innovations that are planned to be exploited in any form are likely to be commercialised within 3 to 5 years.

Concerning the innovation potential category, it can also be seen that High Potential Innovations account for 24.50% of innovations that are expected to be commercialized within 2 years. Most of the remaining innovations that are to be commercialized within 2 years are Medium Potential Innovations.

Figure 11: Time to innovation commercialisation by innovation potential category



Calculations: JRC-IPTS

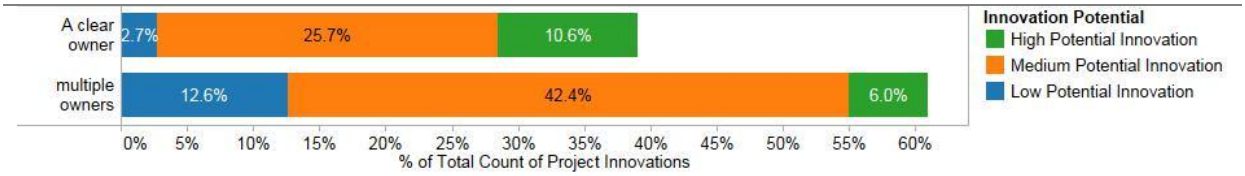
Data: European Commission DG Connect

Note: The computations were based on the responses to question 14) of the Innovation Radar Questionnaire (see Section 8.1). The Innovation Potential categories are defined in Section 3.4. Total number of reviewed projects: 279. Total number of innovations: 517. Review period: 20.05.2014 and 19.01.2015.

4.8 Innovation ownership

Figure 12 presents the information on innovation ownership and innovation potential category. A distinction between innovations with one clear owner and multiple owners is made. 39% of all innovations have a clear owner, while the ownership rights of the remaining innovations belong to multiple owners. The majority of High Potential innovations, i.e. 63% or 10.6% of all innovations, have clearly defined ownership.

Figure 12: Innovation ownership by innovation potential category



Calculations: JRC-IPTS

Data: European Commission DG Connect

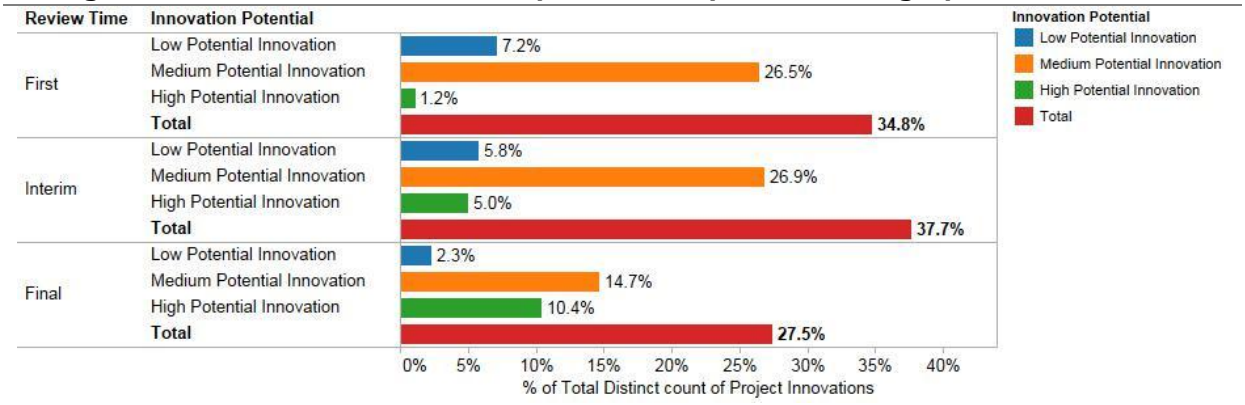
Note: The computations were based on the responses to question 8) of the Innovation Radar Questionnaire (see Section 8.1). The Innovation Potential categories are defined in Section 3.4. Total number of reviewed projects: 279. Total number of innovations: 517. Review period: 20.05.2014 and 19.01.2015.

4.9 Innovations by review time

During their lifecycle, ICT FP7/CIP projects go through three review rounds. The reviews are conducted by a panel of independent evaluators, who are recognized specialists in the relevant fields. In addition to the standard reviews, the Innovation Radar Questionnaire was applied to ongoing projects. Hence, the IR covers and assesses innovations and innovators that belong to projects at different stages of their lifecycle. Figure 13 presents a breakdown of innovations by review time and innovation potential category. Nearly 35% of all innovations belong to projects that were reviewed for the first time. Slightly more, almost 38% of innovations were produced within projects that were reviewed for the second time and the remaining 27.5% of innovations originate from projects in their final stages.

Regarding innovation potential and review time, 7.2% of all innovations are classified as Low Potential Innovations and belong to projects that were reviewed for the first time. In contrast, only 2.3% of all innovations are labeled as Low Potential Innovations and belong to projects in their final stages. By the same token, 1.2% of all innovations are classified as High Potential Innovations and they originate from projects that were reviewed for the first time. At the same time, 10.4% of all innovations are recognized as High Potential Innovations and belong to projects in their final stages. Thus, one can observe a relatively clear pattern: While the share of Low Potential Innovations decreases, as projects mature, the reverse is true for High Potential Innovations.

Figure 13: Number of innovations by innovation potential category and review time



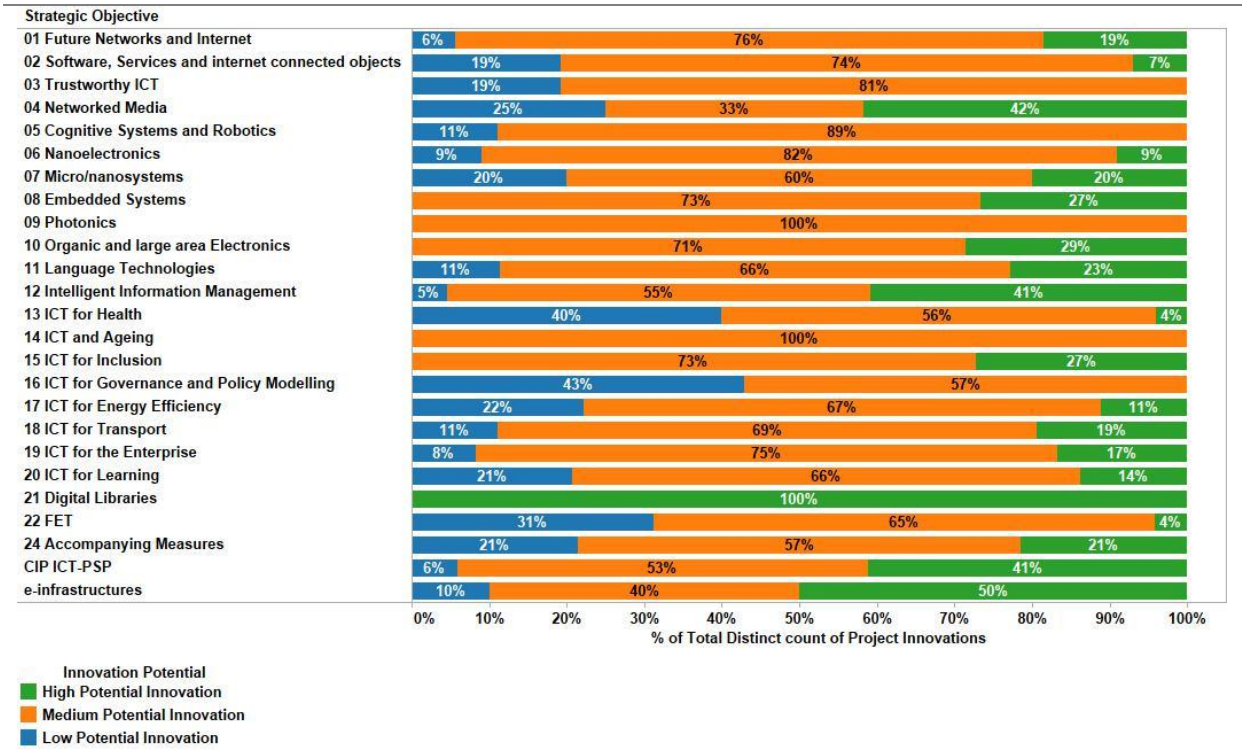
Calculations: JRC-IPTS. Data: European Commission DG Connect. Note: The figure includes the count of innovations based on the project review time and innovation performance according to the IPI as defined in section 3.1. The Innovation Potential categories are defined in Section 3.4. Review type concerns one of the three reviews each FP7 project is subject to during its lifecycle. Total number of reviewed projects: 279. Total number of innovations: 517. Review period: 20.05.2014 and 19.01.2015.

4.10 Innovations by strategic objective

Figure 14 shows a breakdown of innovations by Strategic Objective (SO) to which their project correspond to and innovation potential category. Excluding the Digital Libraries SO, for which only one project was reviewed using the Innovation Radar Methodology, there are no clear patterns with respect to innovation potential and SO to which a project belongs. For example, the share of Low Potential Innovations in all innovations by SO varies from 0%, e.g. Embedded Systems or ICT for Inclusion, to 43% in the ICT for Governance and Policy Modelling. Similar observation can be made for High Potential Innovations, where the share of this innovation category by SO ranges between 0% in the ICT and Aging SO and 50% in e-Infrastructures. In the latter case, this means that 3 out of 6 projects within the e-Infrastructures domain are High Potential Innovations.

A potential explanation of this diversity of innovation potential across SOs is that some SOs are more likely to cover research activities that can lead to marketable outputs.

Figure 14: Innovations by strategic objective and innovation potential category



Calculations: JRC-IPTS

Data: European Commission DG Connect

Note: The figure shows shares of innovations by Strategic Objectives and Innovation Potential categories as defined in section 3.4. Total number of reviewed projects: 279. Total number of innovations: 517. Review period: 20.05.2014 and 19.01.2015.

5 Innovator capacity assessment

This section presents the innovator capacity assessment results. Answers to question 12 in the Innovation Radar questionnaire define innovators as the key organizations behind an innovation (12). The analysis addresses the following points:

- Summary of innovator capacity performance,
- Presentation of High Capacity Innovators and SMEs that are High Capacity Innovators,
- Overview of organizations by their type and innovations,
- Location of innovators,
- Relationship between the scores for Innovator Capacity and Innovation Potential.

5.1 In a nutshell

The main findings of the innovator capacity assessment can be summarised as follows:

- On average, innovators profit from an innovation-favourable environment. However, the quality of an innovation environment is not equal for all innovators. The reason for this is that some projects do not engage end-users in the consortium or there is a lack of commitment of relevant partners to exploit the innovation.
- 41% of all organizations behind High Potential Innovations are SMEs and, in general, there is a positive link between an innovation's potential and an SME being involved in its development. Hence, it can be assumed, that SMEs are an important vehicle for co-creating and commercialising innovative technologies developed within ICT PF7 projects.
- Germany (15.63%), Spain (12.13%), the UK (11.95%) and Italy (10.85%) are the countries with the most organizations identified as key players in delivering the innovations.
- There are 291 cities hosting 544 organizations that were identified as key organizations in delivering the identified innovations. However, only 24 cities host 4 or more innovators.
- Cities with the highest number of organizations include Barcelona (19), and London and Paris, which both host 17 organizations.
- There is a positive relationship between an organisation's Innovator Capacity score and the Innovation Potential score of the innovation to whose development it contributes. However, a high score on one indicator does not automatically translate into a high performance on the other.
- Often, High Capacity Innovators participate in delivering Low or Medium Potential Innovations and Low Capacity Innovators are identified as key organizations in developing High Potential Innovations.
- Improving the overall performance of innovative output requires a focus on both innovations and the organizations behind them.

5.2 Overview of innovator performance

Table 6 summarises the statistics on the two sub-innovator capacity assessment indicators, i.e. Innovator's Ability (IAI), Innovator's Environment (IEI) and a composite Innovator Capacity Indicator (ICI), for all key organizations in delivering the innovations and by innovator capacity category. Average values of the indicators across innovator capacity categories as defined in Section 3.4 are presented in Figure 15. Figure 16 shows the distribution of the ICI values.

The average value of the ICI among all 544 innovators is 56.32 out of 100 points. This number varies between 33.60 and 76.79 from Low to High Capacity Innovators. The innovator with the highest score obtained 90.08 points, while the lowest-ranking innovator obtained only 12.83 points. Looking at the individual sub-indicators, one can observe that IEI has the highest and the IAI has the lowest average value. The average IEI score is 68.29 and the average IAI score is 44.35 points. However, looking at the standard deviation values of both indicators, one can see that IEI scores are much more volatile than those of IAI. In other words, the quality of the innovation environment is not equal for all innovators. This happens as some projects do not engage end-users in the consortium or because the relevant partners are not sufficiently committed to exploiting the innovation.

Table 6: Descriptive statistics of the innovator potential assessment indicators

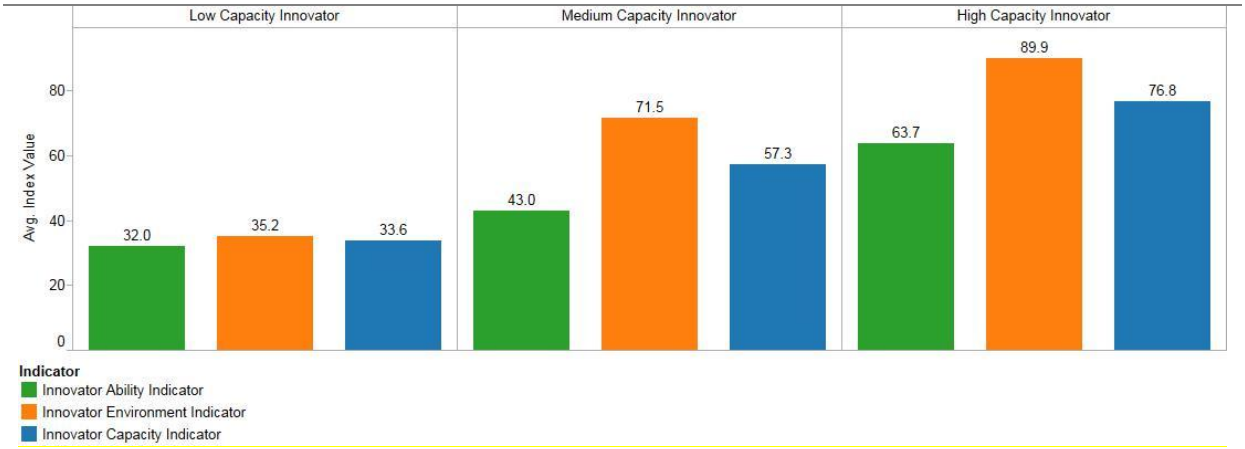
		Nr of innovators	Mean	Std. Dev.	Min.	Max.
Indicator	Innovator Ability	544	44.35	15.23	12.83	89.33
	Innovator Environment	544	68.29	21.13	0	100
	Innovator Capacity	544	56.32	14.16	12.83	90.08
Innovator capacity category	Low	91 (16.7%)	33.60	6.66	12.83	42.17
	Medium	369 (67.8%)	57.26	7.45	42.58	70.41
	High	84 (15.4%)	76.79	4.91	70.58	90.08

Calculations: JRC-IPTS

Data: European Commission DG Connect

Note: The table includes computations on innovator capacity assessment indicators as defined in section 3.2 and innovation potential categories as defined in section 3.4. Total number of reviewed projects: 279. Total number of innovators: 544. Review period: 20.05.2014 and 19.01.2015.

Figure 15: Average values of indicators by innovator capacity category

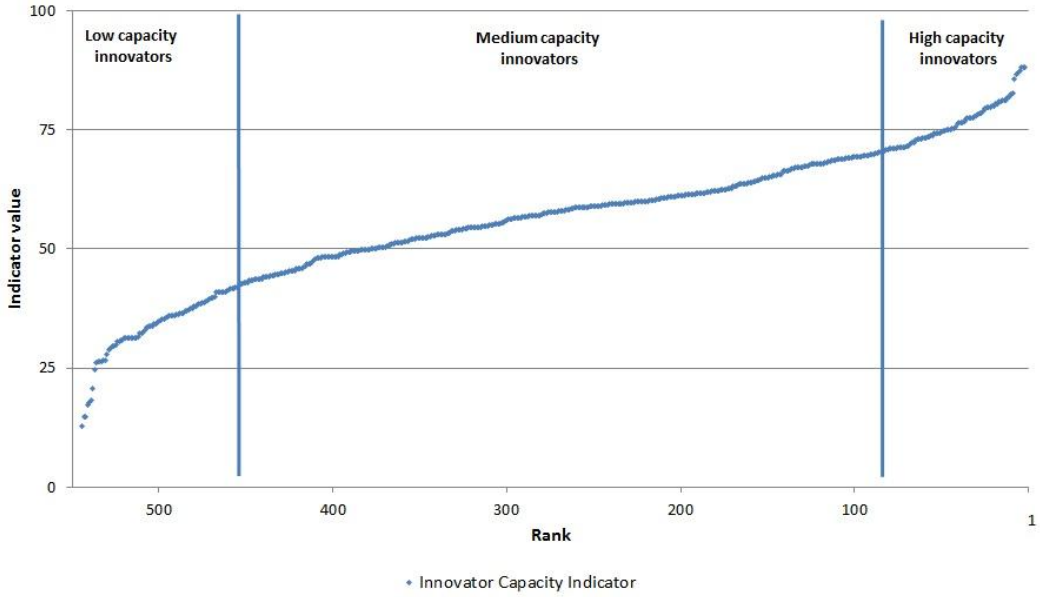


Calculations: JRC-IPTS

Data: European Commission DG Connect

Note: The figure shows the average scores of innovators across three assessment indicators, IAI, IEI and ICI, defined in section 3.2. Innovators are defined as key organization behind the innovation according to the answers to the question 12) of the Innovation Radar Questionnaire (see Section 8.1). Total number of reviewed projects: 279. Total number of innovators: 544. Review period: 20.05.2014 and 19.01.2015.

Figure 16: Distribution of Innovator Capacity Indicator values



Calculations: JRC-IPTS

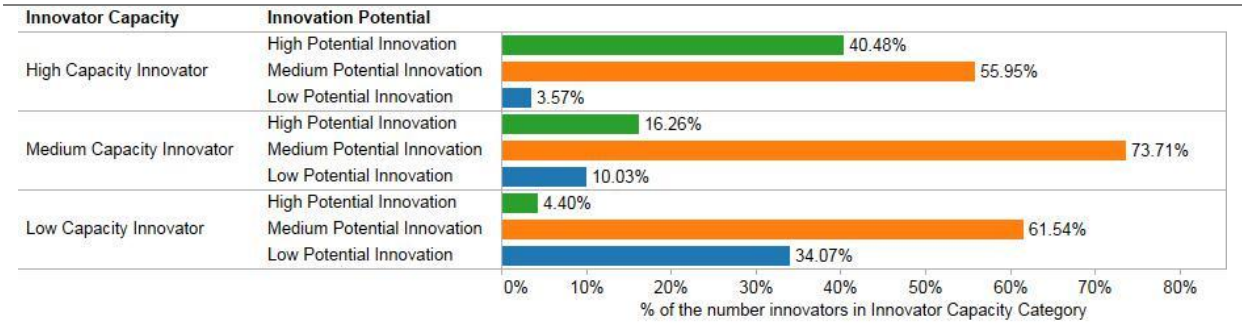
Data: European Commission DG Connect

Note: The figure includes ICI scores of innovators defined as key organization behind the innovation according to the answers to the question 12) of the Innovation Radar Questionnaire (see Section 8.1). Total number of reviewed projects: 279. Total number of innovators: 544. Review period: 20.05.2014 and 19.01.2015.

5.3 Innovators and their innovations

Figure 17 shows the distribution of innovators by Innovator Capacity and Innovation Potential category as defined in Section 3.4. It can be seen that 40.48% of High Capacity Innovators were identified as key organizations in delivering High Potential Innovations. 55.95% of innovators in this category participate in developing Medium Potential Innovations and only 3.57% Low Potential Innovations. Regarding the Medium Capacity Innovators category, 16.26% of organizations were responsible for the development of High Potential and 73.71% for Medium Potential Innovations. The distribution patterns in the last category, i.e. Low Capacity Innovators, are the reverse of those of the High Capacity Innovators category. 4.4% and 34.07% of innovators in this category participate in delivering High and Low Potential Innovations respectively.

Figure 17: % of innovators by innovator and innovation categories



Calculations: JRC-IPTS

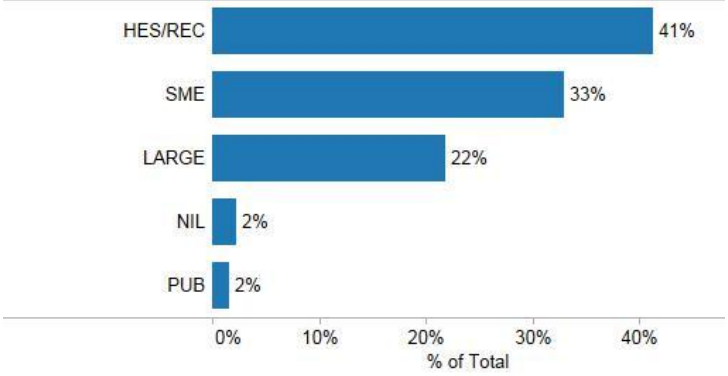
Data: European Commission DG Connect

Note: The figure shows breakdown of innovators by Innovator Capacity and Innovation Potential category as defined in section 3.4. Innovators are defined as key organization behind the innovation according to the answers to the question 12) of the Innovation Radar Questionnaire (see Section 8.1). Total number of reviewed projects: 279. Total number of innovations: 517. Total number of innovators: 544. Review period: 20.05.2014 and 19.01.2015.

5.4 Type of organizations and their innovations

Figure 18 presents the distribution of key organizations in delivering innovation that were identified during the reviews by organization type. 41% of innovators are High Education and Schools and Research Centres (HES/REC), 33% are SMEs and 22 large enterprises.

Figure 18: % of innovators by organization type



Calculations: JRC-IPTS

Data: European Commission DG Connect

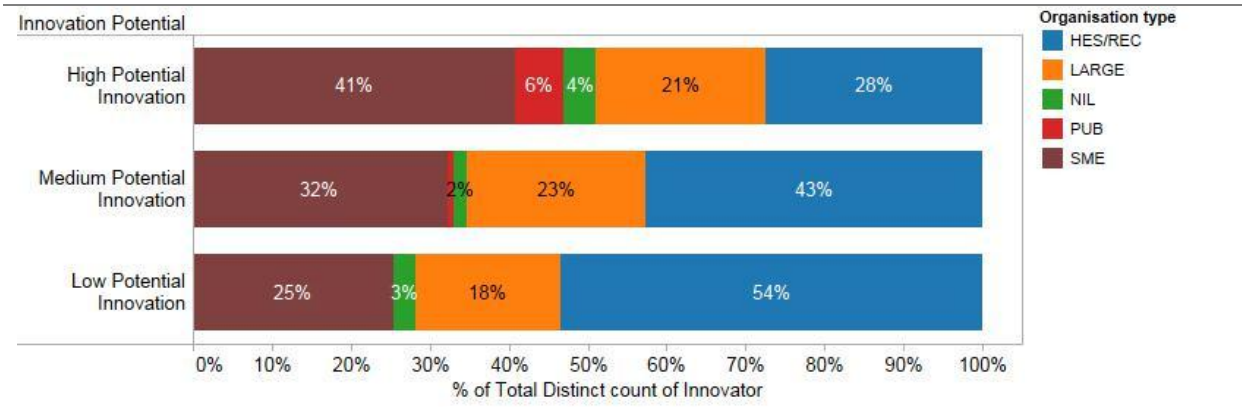
Note: The figure presents the breakdown of innovators by organization type. Innovators are defined as key organization behind the innovation according to the answers to the question 12) of the Innovation Radar Questionnaire (see Section 8.1). Organization types: HES/REC (High Education and Schools and Research Centres); PUB (Public Bodies); SMEs (Small Medium Enterprise); LARGE (Large companies), NIL (Other organisations). Total number of reviewed projects: 279. Total number of innovations: 517. Total number of innovators: 544. Review period: 20.05.2014 and 19.01.2015.

Figure 19 presents the distribution of key organization type for each innovation potential category. Among High Potential Innovations, with 41% of all organizations identified as key organizations behind innovations in this category, SMEs are the largest organization group. This is more than threefold than the SMEs' share in the total participation. SMEs accounted in FP7 for 16% of total participations (2,935 in total) and 14% of total EC funding (€850 million in total) (EC-CONNECT, 2013c). Second in this comparison is the category including High Education and Schools and Research Centres (HES/REC). Altogether, 28% of all key organizations behind High Potential Innovations are universities or research centres. Large companies account for 21% of organizations participating in the development of High Potential Innovations.

In the Medium and Low Potential Innovation categories, the situation is reversed. There, the HES/REC is the first largest type of organizations and SMEs the second. In both categories, large companies remain in third position. For example, HES/RECs account for 43% and SMEs for 32% of all organizations participating in the development of Medium Potential Innovations.

In general, there is a positive link between an innovation's potential and SME being involved in its development. Hence, it can be assumed, that SMEs are an important vehicle for co-creating and commercialising innovative technologies developed within ICT PF7 projects.

Figure 19: % of innovators by organization type and innovation potential category



Calculations: JRC-IPTS

Data: European Commission DG Connect

Note: The figures presents the breakdown of innovators by organization type and innovation potential of their innovations. Innovators are defined as key organization behind the innovation according to the answers to the question 12) of the Innovation Radar Questionnaire (see Section 8.1). Innovation Potential categories are defined in section 3.4. Organization types: HES/REC (High Education and Schools and Research Centres); PUB (Public Bodies); SMEs (Small Medium Enterprise); LARGE (Large companies), NIL (Other organisations). Total number of reviewed projects: 279. Total number of innovations: 517. Total number of innovators: 544. Review period: 20.05.2014 and 19.01.2015.

5.5 High capacity innovators

Table 7 presents the top 10 Innovators from the IR sample with the highest ICI score, together with their names, organization type, place of origin and innovations in which they were identified as key organizations. The organization with the highest ICI score is the University of Cambridge, directly followed by Fraunhofer Gesellschaft. Both organizations belong to the Higher Education and Schools and Research Centres type. Altogether, the top 10 High Capacity Innovators participate in the development of 42 innovations. Fraunhofer Gesellschaft participates in the highest number of individual innovations. This German research organization with 67 institutes spread throughout Germany was identified as a key organization in 26 innovations out of 517, i.e. 5% of all identified innovations. To a large extent, this is related to the fact that the Fraunhofer Gesellschaft is the largest single recipient by number of participations and funding received, with 331 participations, amounting to approximately €189 million of funding, i.e. 3% of the total ICT FP7/CIP funding allocated (EC-CONNECT, 2013c). The German institutes are present - either as coordinators or partners – in more than 300 ICT FP7/CIP projects, which represent 20% of the total number of projects funded by FP7-ICT. However, excluding the innovations in which Fraunhofer Gesellschaft participates leaves 15 innovations of the remaining organizations (see Table 7). This means that there are 1.67 innovations per organization. This is significantly higher than the average number of innovations per organization within the entire sample, i.e. 1.23 (see Table 3).

Regarding the potential of the innovations of the top 10 Innovators, 10 (24%) are High Potential Innovations, 25 (60%) Medium and the remaining 7 (16%) are Low Potential Innovations. In other words, High Capacity Innovators are also associated with innovations with higher potential.

Concerning the organization type among the top 10 High Capacity Innovators, the majority (50%) are High Education and Schools and Research Centres. However, 30% are SMEs and there is only one large company and one other type of organization, i.e. Nordjyllands Trafikselskab. The last one is a public transport company operating in Denmark.

Table 7: Top 10 high capacity innovators and their innovations

Rank by ICI	Organisation name	Organisation type	Country	City	Project Innovation	Nr	Innovation Potential
1	THE CHANCELLOR, MASTERS AND SCHOLARS OF THE UNIVERSITY OF CAMBRIDGE	HES/REC	UNITED KINGDOM	CAMBRIDGE	PARLANCE_B	1	High
					AP@home_A	2	Low
2	FRAUNHOFER-GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V	HES/REC	GERMANY	MUNCHEN	SODALES_A	3	High
					i-Tex_A	4	High
					EAR-IT_B	5	High
					CoLiSA.MMP_A	6	Medium
					Verdi_A	7	Medium
					LASHARE_A	8	Medium
					IQmulus_B	9	Medium
					d-LIVER_B	10	Medium
					PASTA_B	11	Medium
					SUPERTHEME_A	12	Medium
					IQmulus_A	13	Medium
					EUROPRACTICE 2013_A	14	Medium
					REWIND_B	15	Medium
					ML²_A	16	Medium
					ebbits_B	17	Medium
					Policy Compass_A	18	Medium
					STREETLIFE_C	19	Medium
					RASEN_B	20	Medium
					EXA2CT_B	21	Medium
					FutureID_B	22	Medium
					RASEN_C	23	Medium
					COSIVU_A	24	Low
					COSIVU_B	25	Low
					COSIVU_C	26	Low
					FutureID_A	27	Low
3	SPARSITY SL	SME	SPAIN	BARCELONA	LDBC_C	28	High
					CoherentPaaS_B	29	High
4	THE UNIVERSITY OF HERTFORDSHIRE HIGHER EDUCATION CORPORATION	HES/REC	UNITED KINGDOM	HATFIELD	ACCOMPANY_C	30	Medium
					ACCOMPANY_A	31	Medium
					BIOMICS_A	32	Low
5	NORDJYLLANDS TRAFIKSELSKAB	NIL	DENMARK	AALBORG	REDUCTION_A	33	Medium
6	THE UNIVERSITY OF MANCHESTER	HES/REC	UNITED KINGDOM	MANCHESTER	AXLE_B	34	Medium
					ECO2Clouds_A	35	Medium
7	PORTBASE BV	LARGE	THE NETHERLANDS	ROTTERDAM	GET Service_A	36	Medium
8	AIT Austrian Institute of Technology GmbH	HES/REC	AUSTRIA	WIEN	SCAPE_A	37	High
					OrPHEuS_A	38	Medium
					EPiCS_B	39	Low
9	TRANSLATED SRL	SME	ITALY	POMEZIA	MateCat_A	40	High
10	GEIE ERCIM	SME	FRANCE	BIOT	WAI-ACT_A	41	High
					WAI-ACT_B	42	High

Calculations: JRC-IPTS

Data: European Commission DG Connect

Note: The table presents the list and characteristics of High Capacity Innovators as defined in section 3.4 and their innovations. Innovators are defined as key organization behind the innovation according to the answers to the question 12) of the Innovation Radar Questionnaire (see Section 8.1). Organization types: HES/REC (High Education and Schools and Research Centres); PUB (Public Bodies); SMEs (Small Medium Enterprise); LARGE (Large companies), NIL (Other organisations). Total number of reviewed projects: 279. Total number of innovators: 517. Total number of innovators: 544. Review period: 20.05.2014 and 19.01.2015.

5.6 High capacity SME innovators

Table 8 presents the top 10 SME Innovators with the highest ICI score together with their names, place of origin and innovations in which they were identified as key organizations. Altogether, these organizations were identified as key organizations in the development of 14 innovations. Hence, as in the previous analysis of the 10 top High Capacity Innovators, the average number of organizations among High Capacity Innovators that are SMEs is higher than the average of the entire population, i.e. 1.4 vs. 1.23 (Table 3).

The SME with the highest ICI score is Sparsity, a Barcelona-based spin-off of the DAta MAnagement group at Universitat Politècnica de Catalunya (see Box 1). This SME was identified as a key organization in two innovations: the first one, LDBC_C, was developed within the Linked Data Benchmark Council (LDBC) project whose goal was to create the first comprehensive suite of open, fair and vendor-neutral benchmarks for RDF/graph databases. This project belonged to the Intelligent Information Management Strategic Objective (EC-CONNECT, 2013b). The second one, CoherentPaaS_B, was developed as a result of the CoherentPaaS project whose objective was to provide a rich PaaS (Platform as a service) with different "one size" data stores optimized for particular tasks, data, and workloads (EC-CONNECT, 2013b). The CoherentPaaS project belonged to the Strategic Objective for Software, Services and Internet-connected objects. In the course of the innovation potential assessment, both innovations were ranked as High Potential Innovations.

Regarding the potential of the innovations of the top 10 SME Innovators, 8 out of 10 were recognised as High Potential Innovations. The remaining two are Medium Potential Innovations.

Table 8: Top 10 SMEs and their innovations

Rank by ICI	Organisation name	Country	City	Project Innovation	Nr	Innovation Potential	Strategic Objective
4	SPARSITY SL	SPAIN	BARCELONA	LDBC_C	1	High	12 Intelligent Information Management
				CoherentPaaS_B	2	High	02 Software, Services and internet connected objects
9	TRANSLATED SRL	ITALY	POMEZIA	MateCat_A	3	High	11 Language Technologies
10	GEIE ERCIM	FRANCE	BIOT	WAI-ACT_A	4	High	15 ICT for Inclusion
				WAI-ACT_B	5	High	15 ICT for Inclusion
12	RAPITA SYSTEMS LIMITED	UNITED KINGDOM	YORK	parMERASA_C	6	High	08 Embedded Systems
13	HELIATEK GMBH	GERMANY	DRESDEN	X10D_A	7	High	10 Organic and large area Electronics
16	INVERTO NV	BELGIUM	EVERGEM	E-VECTOORC_A	8	High	24 Accompanying Measures
17	EASY GLOBAL MARKET SAS	FRANCE	BIOT	EAR-IT_A	9	High	01 Future Networks and Internet
20	OPENLINK GROUP LIMITED	UNITED KINGDOM	CROYDON	LOD2_A	10	High	12 Intelligent Information Management
				LDBC_A	11	High	12 Intelligent Information Management
23	FLUID OPERATIONS AG	GERMANY	WALLDORF	Optique_B	12	High	12 Intelligent Information Management
				OpenCube_A	13	Medium	11 Language Technologies
24	NETWORK ENGINE FOR OBJECTS IN LUND AB	SWEDEN	MALMO	LDBC_B	14	Medium	12 Intelligent Information Management

Calculations: JRC-IPTS

Data: European Commission DG Connect

Note: The table presents the list and characteristics of SMEs High Capacity Innovators as defined in section 3.4 and their innovations. Innovators are defined as key organization behind the innovation according to the answers to the question 12) of the Innovation Radar Questionnaire (see Section 8.1). Total number of reviewed projects: 279. Total number of innovators: 517. Total number of innovators: 544. Review period: 20.05.2014 and 19.01.2015.

Box 1: Sparsity: the best-performing SME innovator

Sparsity-Technologies (formally Sparsity, S.L.) is a spin-off from the Universitat Politècnica de Catalunya, created in March 2010 to commercialize and provide services based on the technologies developed at DAMA-UPC.

The Sparsity Technologies team has more than 11 years' experience in the investigation of information technologies, in particular the management of large volumes of data. The Sparsity team combines university research with collaborating with industry partners.

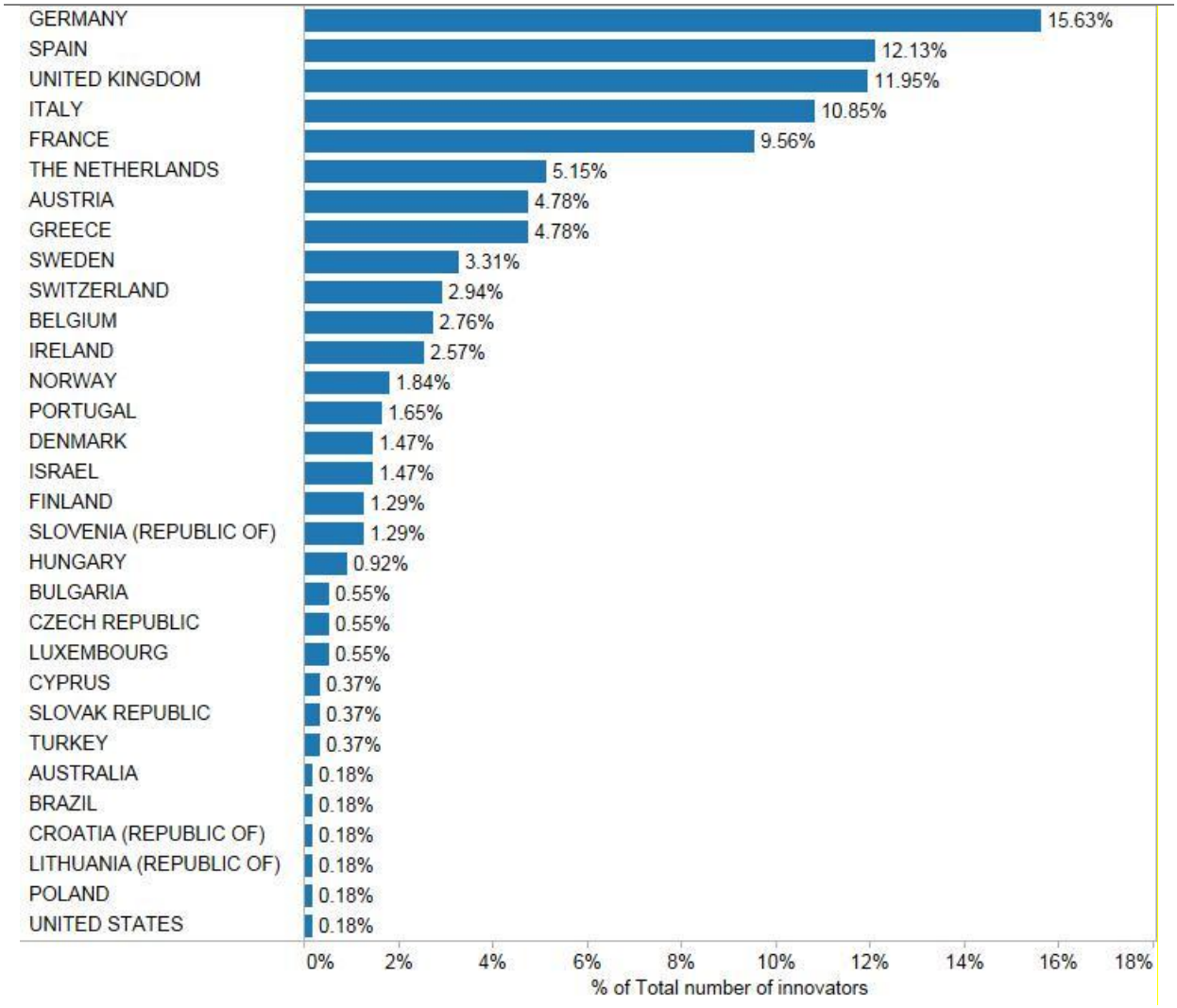
Sparsity-Technologies is located at Barcelona.

Source: http://www.sparsity-technologies.com

5.7 Location of innovators

Figure 20 provides a list of countries with the total number of innovators identified in each. Germany is the country with the most innovators. Over 15.63% of all the key organizations in delivering the innovations are from Germany. In comparison, its share in the participation in ICT FP7/CIP projects is 17% (EC-CONNECT, 2013c). Spain (12.13%), the UK (11.95%) and Italy (10.85%) are further three countries in the ranking, all with above 10% of the total number of innovators. Their shares in the participation in ICT FP7/CIP projects are 8.3% (Spain), 10.2% (the UK) and 11.7% (Italy). Innovators located outside the EU, are from Switzerland, Norway, Israel, Turkey, Australia, Brazil and the US.

Figure 20: Locations of innovators by country



Calculations: JRC-IPTS

Data: European Commission DG Connect

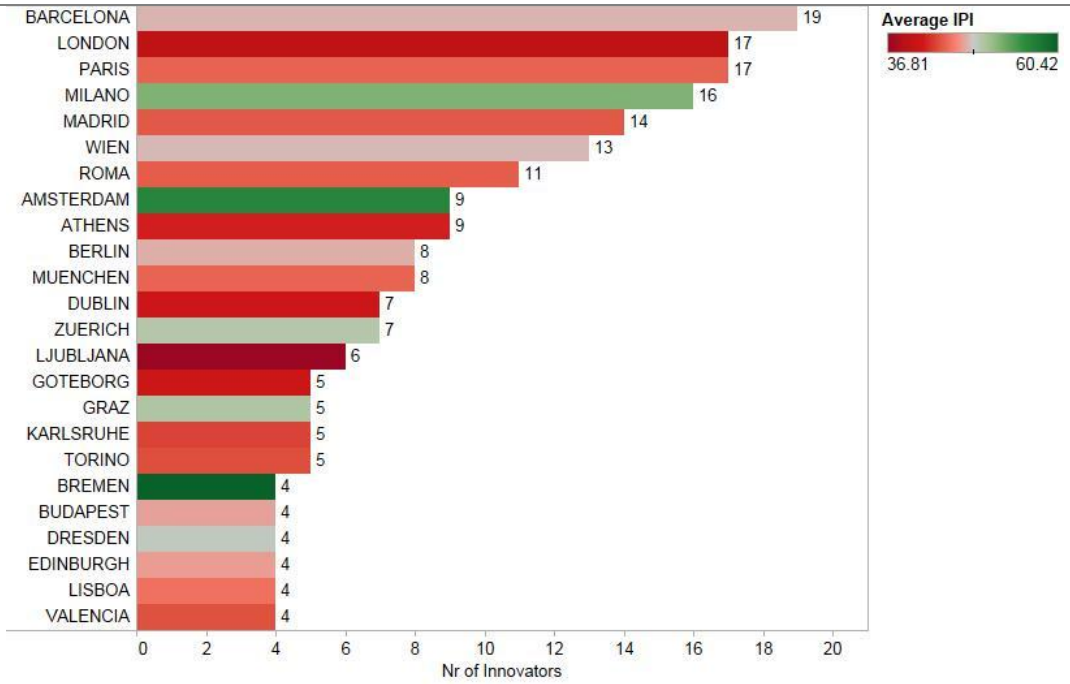
Note: The figure includes locations of innovators by country of origin, i.e. key organizations in delivering innovations identified in the answers to the question 12) of the Innovation Radar Questionnaire (see Section 8.1). Average IPI score, as defined in section 3.1, corresponds to the innovations to which innovators from relevant location contribute. Total number of reviewed projects: 279. Total number of innovators: 544. Total number of innovations: 517. Review period: 20.05.2014 and 19.01.2015.

Figure 22 maps the locations of all organizations that were identified as key organizations behind the analysed innovations, with the average IPI of their innovations. The size of shapes corresponds to the total number of innovators in each location. Altogether there are 291 cities hosting organizations that were identified as key organizations in delivering the identified innovations. However, most of them (73%) are the location of only one organization. Hence, Figure 21 shows the cities hosting at least 4 innovators and the average IPI of their innovations. There are only 24 cities with at least 4 innovators. With 19 organizations based in Barcelona, the Spanish city leads the ranking. The average score of IPI of innovations to which Barcelona-based organizations participate in is 47.9 points. The next positions are occupied by London and Paris. Both cities host 17 organizations. Whereas the average IPI of London is 39.5, the same value for Paris is 44.6.

Concerning the average score of IPI of innovations in which organizations presented in Figure 21 participate, Ljubljana has the lowest score of 36.8 points. Bremen, on the other hand, has the highest average score of IPI of innovations to which organizations based in this city participate. The

average score of innovations to which organizations based in this Hanseatic city participate in is 60.4. One of the four organizations based in Bremen is University of Bremen, which ranks 4 in the overall ranking of the Innovator Capacity (see Table 7). In terms of the overall participation in ICT FP7/CIP programmes, the University of Bremen received over 11 million Euro, or 0.9% of the overall ICT FP7/CIP budget. As a result, it is the 20th largest organizations by the amount of funding received (JRC-IPTS, 2014).

Figure 21: The 24 cities with at least 4 innovators and average IPI of their innovations

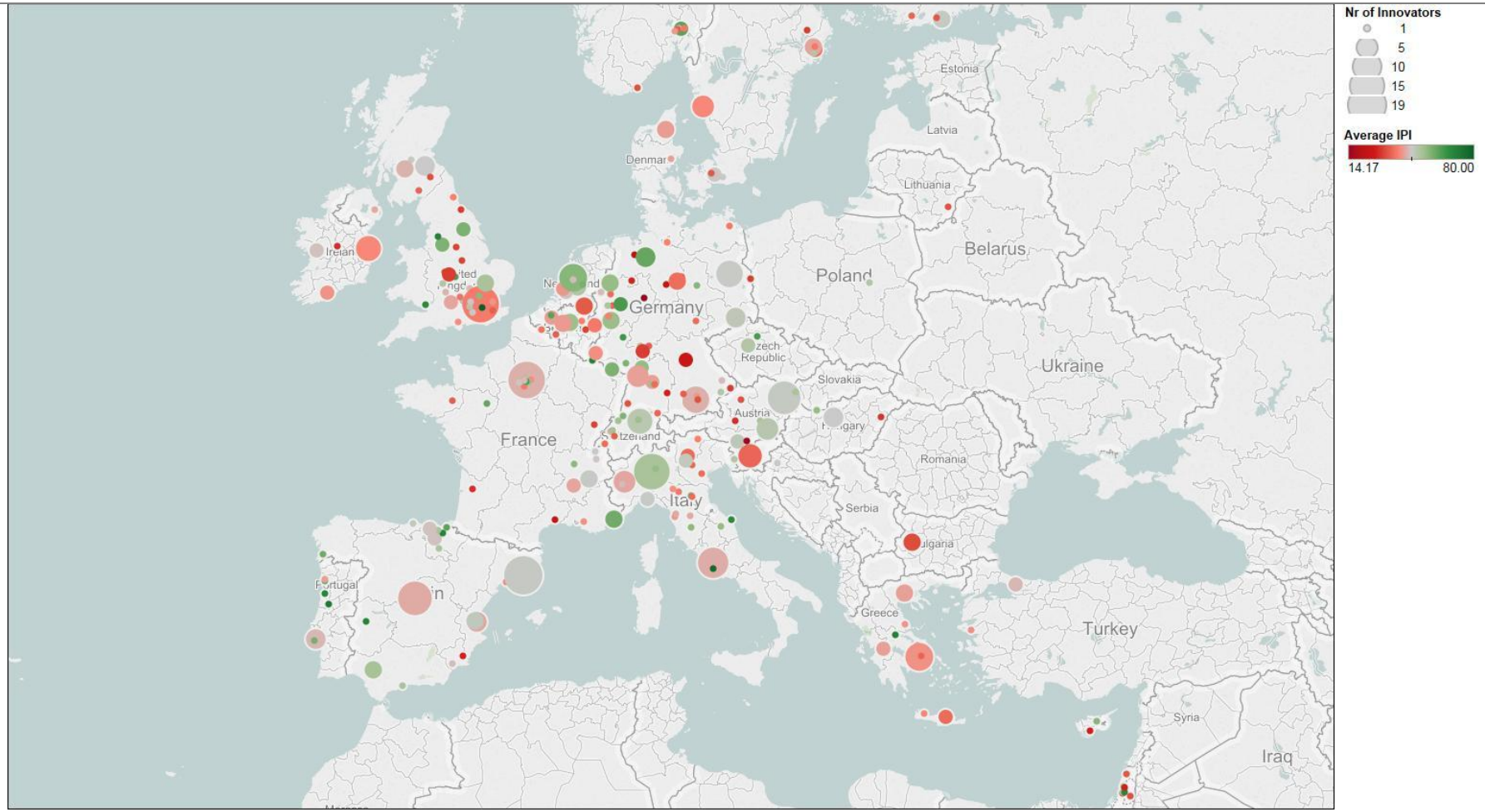


Calculations: JRC-IPTS

Data: European Commission DG Connect

Note: The figure includes locations with at least 4 innovators, i.e. key organizations in delivering innovations identified in the answers to the question 12) of the Innovation Radar Questionnaire (see Section 8.1). Average IPI score, as defined in section 3.1, corresponds to the innovations to which innovators from relevant location contribute. Total number of reviewed projects: 279. Total number of innovators: 544. Total number of innovations: 517. Review period: 20.05.2014 and 19.01.2015.

Figure 22: Location of innovators and average IPI of their innovations



Calculations: JRC-IPTS

Data: European Commission DG Connect

Note: The figure presents locations of innovators, i.e. key organizations in delivering innovations identified in the answers to the question 12) of the Innovation Radar Questionnaire (see Section 8.1). Average IPI score, as defined in section 3.1, corresponds to the innovations to which innovators from relevant location contribute. Total number of reviewed projects: 279. Total number of innovators: 544. Total number of innovations: 517. Review period: 20.05.2014 and 19.01.2015.

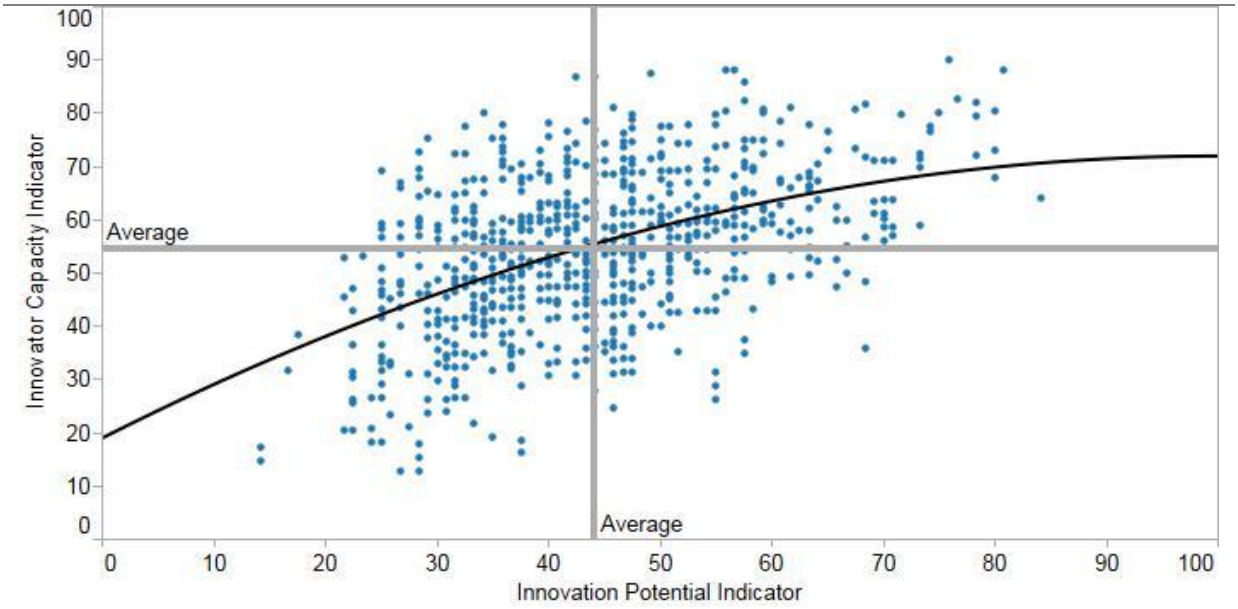
5.8 Innovator capacity and innovation potential

Figure 23 shows the relationship between the Innovation Potential Indicator and Innovator Capacity Indicator values. The correlation coefficient of the two indicators is 0.49. Thus, although overall it can be said that there is a positive relationship between the two indicators, a high score on one indicator does not translate into a high performance on the other. In other words, as demonstrated in Section 5.3, there are High Capacity Innovators that participate in delivering Low or Medium Potential Innovations. By the same token, there are Low Capacity Innovators that were identified as key organizations in developing High Potential Innovations.

The best illustration of the fact that there is no clear-cut relationship between innovator and innovation performance is that Medium Potential Innovations dominate in across all categories of Innovator Capacity. For example, as shown in Figure 17, more than half of all High Capacity Innovators (55.95%) were identified as key organizations in delivering Medium Potential Innovations. This number is even higher for Medium Capacity Innovators (73.71%).

The above observation leads to the conclusion that improving the overall performance of innovative output requires focusing on both innovations and the organizations behind them. In the case of innovations, the focus is on increasing their market potential or improving their management. In turn, expanding innovators capacity requires efforts by an individual organization to increase its performance, but depends also on its environment that can positively or negatively affect its innovative outputs.

Figure 23: Relationship between the Innovation Potential Indicator and Innovator Capacity Indicator values



Calculations: JRC-IPTS

Data: European Commission DG Connect

Note: The figure presents the relationship between innovation IPI score as defined in section 2.1, and the ICI score of the key organization behind the innovation according to the answers to the question 12) of the Innovation Radar Questionnaire (see Section 8.1). Total number of reviewed projects: 279. Total number of innovators: 544. Total number of innovations: 517. Review period: 20.05.2014 and 19.01.2015.

6 Steps and barriers to innovation commercialisation

This section deals with three issues concerning innovation commercialisation. First, it presents the responses to the questions on the steps that organizations undertook or plan to undertake in order to bring the innovations to (or closer to) the market. Second, it provides an overview of innovators' needs to fulfil the market potential of their innovations and, finally, it shows what the most common bottlenecks to innovation commercialization are.

6.1 In a nutshell

The main findings of the analysis of steps and barriers to innovation commercialisation include:

- When taking innovations to the market, projects focus more on technology-related steps than business-related ones. 53% of the projects that plan to commercialise their innovations either created, or plan to create, a prototype. In contrast, only 30% of projects have carried out, or plan to carry out, a market study. A business plan is on the agenda of 27% of projects that plan innovation commercialisation.
- Activities that involve participations or interactions with actors outside of the projects are relatively uncommon. Only 5% to 6% of the projects have sought, or are planning to seek, private or public funding.
- Three of the most common needs are partnership with another company (21.4%), business plan development (17.4%) and expanding to more markets (14.4%).
- The least frequently named needs include incubation (7.2%), investor readiness training (5.9%) and participation in a start-up accelerator (5.6%).
- 41.9% of project partners see financing as the major external bottleneck to innovation exploitation.
- Only 5.4% of the project partners consider trade issues between Member States and the rest of the world as a barrier to exploiting their innovative products or services.

6.2 Steps to innovation commercialisation

Figure 24 indicates what steps were already taken or are foreseen in projects in order to bring the innovations to (or closer to) the market. The presentation distinguishes between technology-related steps, e.g. feasibility study or prototyping, and business-related steps, e.g. business plan or capital investment.

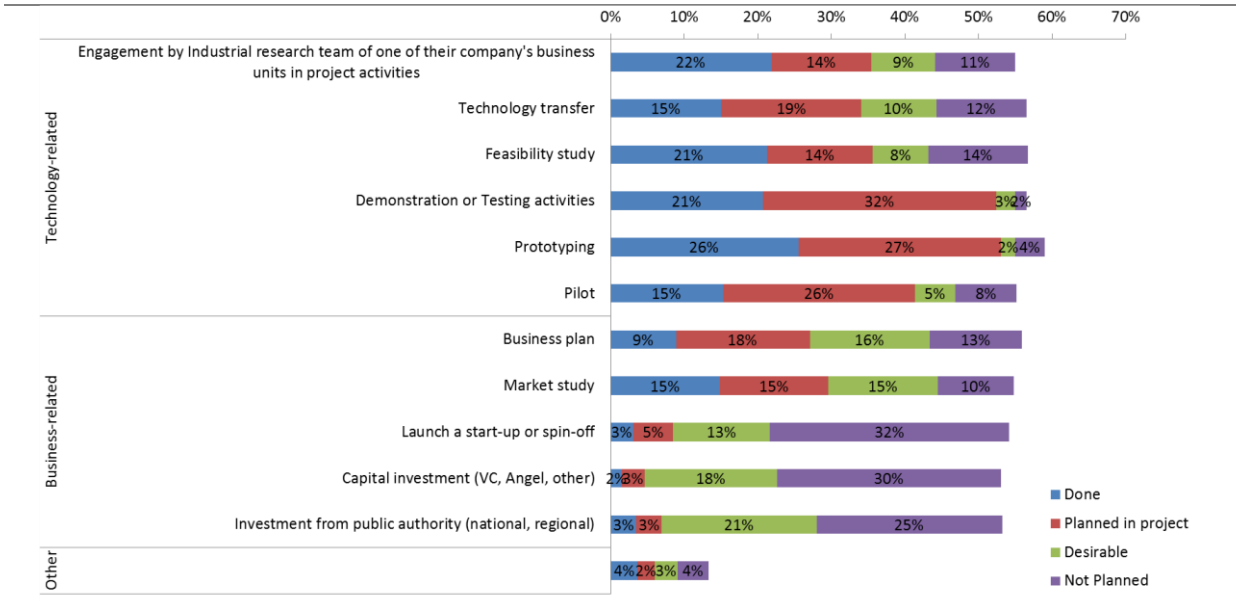
Concerning technology-related steps, prototyping is the most common measure that projects undertake in order to bring innovation to the market. Out of projects that plan to introduce their innovations to the market, 53% either created or plans to create a prototype. Equally common are demonstration or testing activities (52%) and developing a pilot (41%). Among the most desirable steps that have not been done or planned, are engagement by industrial research team of one of their company's business units in project activities, technology transfer and feasibility study. Around 10% of projects that plan to introduce their innovations to the market perceive these activities as facilitating innovation commercialisation.

With respect to business-related steps, Figure 24 shows that carrying out a market study and writing a business plan are among the most common steps that help to commercialise innovations. 30% and 27% of projects have carried out or plan to carry out a market study and write a business plan. At the same time, around 15% of the projects see these steps as desirable and between 10% and 13% do not plan them in the course of innovation commercialisation. A significantly smaller number of projects consider undertaking steps like launching a start-up or a spinoff or seeking funding. For example, between 5% and 6% of the projects have sought, or are planning to seek, private or public funding and between 18% and 21% of the projects consider this step as desirable.

At the same time, between 25% and 30% of the projects do not plan to seek capital or public investment.

The evidence presented above leads to the following conclusions: First, the technology-related steps to bring innovations to the market are seen as more important than business-related ones. Organizations very often focus on making sure that the innovation they develop is ready to be commercialised from the technological point of view. To this end, projects create a prototype or perform demonstrations or testing activities. Relatively often, organizations do not undertake or plan business-related steps. Second, in both cases, i.e. technology- and business-related activities, the emphasis is on what can be done within the project and the participants. Activities that involve interactions with actors outside of the projects or participation by them are less common, particularly as regards seeking external funding. Only a few projects see these activities as relevant to the commercialisation of innovations and many of them do not plan to undertake them at all. This calls for two kinds of support. First, projects should be encouraged to look beyond the technological aspects and introduce business-related elements to their activities. Second, they should be encouraged to increase interaction with external specialised actors, e.g. business coaches or venture capitalists, as this could help them to improve the commercialisation chances of their innovations.

Figure 24: Progress of projects in bringing innovations to the market



Calculations: JRC-IPTS

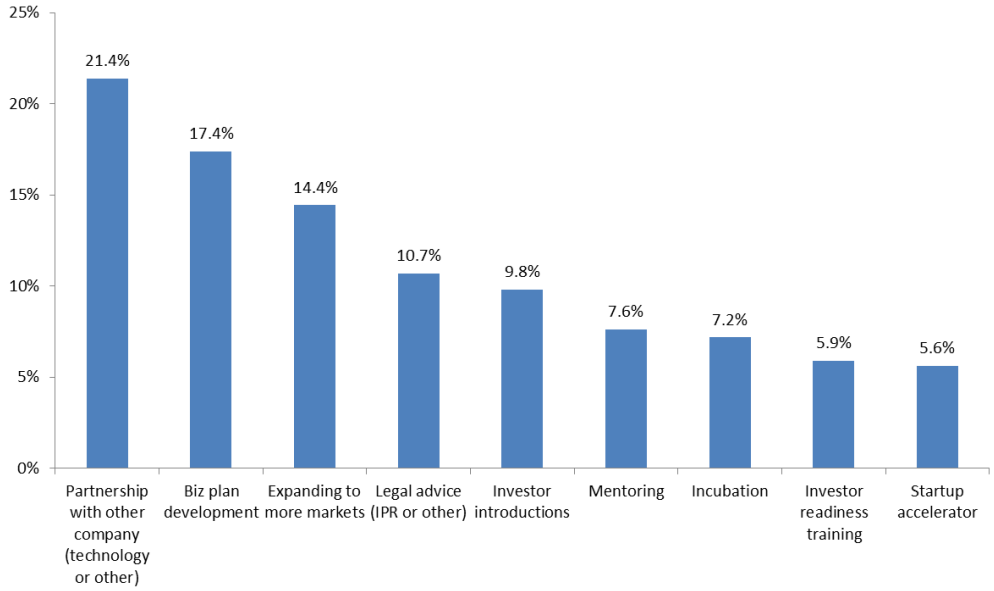
Data: European Commission DG Connect

Note: The computations were based on the responses to question 10) of the Innovation Radar Questionnaire (see Section 8.1). Total number of reviewed projects: 279. Total number of innovations: 517. Review period: 20.05.2014 and 19.01.2015.

6.3 Innovators need to realise the market potential of innovations

Figure 25 presents responses to the question of what do innovators need to realise the market potential of their innovations. The most common needs are seen as partnerships with other companies, business plan development and expanding to more markets. The least frequently named needs include incubation, investor readiness training and participation in a start-up accelerator.

Figure 25: Innovators' needs to fulfil the market potential of their innovations



Calculations: JRC-IPTS

Data: European Commission DG Connect

Note: The computations were based on the responses to question 13) of the Innovation Radar Questionnaire (see Section 8.1). Total number of reviewed projects: 279. Total number of innovations: 517. Review period: 20.05.2014 and 19.01.2015.

6.4 Bottlenecks to innovation commercialization

Figure 26 presents responses to the question of what are the external bottlenecks that compromise the ability of project partners to exploit new products, solutions or services, internally or in the market place. For a majority of project partners (41.9%) lack of financing is seen as the major external bottleneck to innovation exploitation. Besides the generic group "others", regulation and IPR are considered as relatively important. Around 20% of the projects perceive at least one of the two issues as an external factor that could threaten the ability of project partners to commercially exploit innovations. Among the least harmful bottlenecks are trade issues between Member States and the rest of the world. Only 5.4% of the project partners consider these as a barrier to exploiting their innovative products or services.

The comparison of the steps that organizations undertook or plan to undertake in order to bring the innovations to (or closer to) the market (see Figure 24) and the information presented in Figure 26 lead us to observe that there seems to be a contradiction between what are claimed to be barriers to finance and the actual behaviour of project organizations. While 41.9% of project partners see lack of financing as a barrier to exploiting their innovative products or services, only 5% to 6% of the projects have sought, or are planning to seek, private or public funding. Moreover, between 25% and 30% of the projects do not plan to seek capital or public investment. This point is further emphasised by the fact that organizations most commonly declare that they need partnerships with other companies and to expand to more markets in order to realise the market potential of their innovations.

Figure 26: External bottlenecks that compromise the ability of project partners to exploit innovations

Calculations: JRC-IPTS

Data: European Commission DG Connect

Note: The computations were based on the responses to general question 4) of the Innovation Radar Questionnaire (see Section 8.1). Total number of reviewed projects: 279. Total number of innovations: 517. Review period: 20.05.2014 and 19.01.2015.

7 Lessons learned

This section summarises the key lessons learned during the first application of the Innovation Radar methodology and analysis.

Up-to-date intelligence on innovative output of EU-funded research projects

Having completed the pilot application of the Innovation Radar and having analysed the collected information, it can be concluded that, for the first time, policy makers and participants in ICT FP7/CIP projects can obtain up-to-date information on the innovative output of these projects. The IR allows them to characterise innovations with respect to their technical readiness, innovation management and market potential. For innovators, it delivers information on their individual performance and the environment in which they innovate. Finally, it provides guidance on how they can leverage the innovative output of the ICT FP7/CIP projects. This way, the Innovation Radar represents a potential policy tool for innovation management and commercialisation: i.e. it increases the returns on funds invested in research activities. As such, it offers a working tool that with little effort could be extended to the entire FP7 and, at later stage, to the H2020 programme.

Policy support mechanisms

In order to fully utilise the collected information, support mechanisms must be designed that would help projects and organisations to leverage their innovative efforts. This would require a policy toolbox consisting of, for example, training programmes in the area of business development, technology transfer, attracting capital investments and legal advice in the field of IPR or regulation. These programmes would be offered to organizations that are critical in delivery of innovations to the market.

Nurturing business culture among innovators

The current analysis shows that the key organizations behind ICT FP7/CIP-related innovations tend to show high levels of technological involvement, but pay less attention to the business-related dimensions of their innovations. It seems that there is a strong need for projects to look beyond the technological aspects and introduce business-related elements into their activities. This can be achieved by providing incentives for increasing interactions between projects and external specialised actors, e.g. business coaches or venture capitalists, who could help to improve the commercialisation chances of innovations.

Towards a real-time innovation monitoring tool

Today, the Innovation Radar involves collaboration between multiple teams responsible for information gathering, analysis and reporting. Considering that most of the steps can be integrated and automatized, it seems that, in order to fully utilise the potential of the IR initiative, it is necessary to create an automated tool that will help to collect, process and present the information to policy makers and organizations interested in their own performance.

Innovation progress check and assessment of policy support

Each ICT FP7/CIP project is reviewed 3 times during its life cycle: i.e. first, interim and final review. However, in its pilot phase, the IR did not distinguish between various projects and the same questionnaire was applied to all projects. In order to be able to monitor the progress of projects and organizations in maturing and commercialising innovations, it would be advisable to differentiate between projects that are at different stages of their lifecycle. For example, if during the first review a project is found to expect an innovation, in the subsequent review any progress made should be checked. Similarly, if an organization reported any problems with the development and commercialisation of its innovations, in the subsequent review they should be asked if these problems were overcome. Finally, if offered any policy support, organizations should be asked about the impact it had on their progress in delivering innovations to the market. Thus, in addition to identifying innovations, the IR would help to measure the progress of innovations and innovators and to assess effectiveness of the impact of policy treatments on innovations and innovators.

Integration with other data sources

Today, the IR is a stand-alone exercise. However, it would further benefit from linking with other sources of information. The most obvious step would be to link it with the CORDIS database, which is the European Commission's primary public repository of information on all EU-funded research projects and their results in the broadest sense. However, in order to further track the impact of EU funded projects and the innovations resulting from them, further links with information on economic performance of the relevant organizations must be created.

8 Annex: Innovation Radar methodology

8.1 Innovation Radar questionnaire

Innovation Radar Questionnaire by EC DG CONNECT

Note: the first 16 questions below are to be answered for **<u>each</u>** innovation the project develops (up to a maximum of 3 innovations).

1) **Describe the innovation (in less than 300 characters, spaces included):**

2) **Is the innovation developed within the project…:**
   a) Under development
   b) Already developed but not yet being exploited
   c) being exploited

3) **Characterise the type of innovation (only to be answered if 2b or 2c is selected)**
   - Significantly improved product
   - New product
   - Significantly improved service (except consulting ones)
   - New service (except consulting ones)
   - Significantly improved process
   - New process
   - Significantly improved marketing method
   - New marketing method
   - Significantly improved organisational method
   - New organisational method
   - Consulting services
   - Other

4) **If other, please specify:**

5) **Characterise the macro type of innovation (only to be answered if "under development" is selected for Q2):**
   - Product
   - Marketing method
   - Organisational method
   - Process
   - Service (non-consulting)
   - Consulting service
   - Do not know yet

6) **Will the innovation be introduced to the market or deployed within a partner:**
   a) Introduced new to the market (commercial exploitation)
   b) Deployed within a partner (internal exploitation: Changes in organisation, new internal processes implemented, etc.)
   c) No exploitation planned

7) **If no exploitation planned, please explain why no exploitation is planned (answer only if 6(c) is selected)**

8) **Is there a clear owner of the innovation in the consortium or multiple owners?**
   - A clear owner
   - Multiple owners

9) Indicate who is the "owner" of the innovation: …

10) Indicate the step(s) already done (or are foreseen) in the project in order to bring the innovation to (or closer to) the market (answer only if 6(a) is selected)

	Done	Planned in project	Not Planned	Desirable
1. Technology transfer				
2. Engagement by Industrial research team of one of their company's business units in project activities				
3. Pilot				
4. Capital investment (VC, Angel, other)				
5. Investment from public authority (national, regional)				
6. Business plan				
7. Prototyping				
8. Market study				
9. Demonstration or Testing activities				
10. Feasibility study				
11. Launch a start-up or spin-off				
12. Other				

11) If other, please specify

12) Indicate which participant(s) (up to a maximum of 3) is/are the key organisation(s) in the project <u>delivering</u> this innovation. For each of these identify under the next question their needs to fulfil their market potential.

Org1:
Org2:
Org3:

13) Indicate their needs to fulfil their market potential

	Investor readiness training	Investor introductions	Biz plan development	Expanding to more markets	Legal advice (IPR or other)	Mentoring	Partnership with other company (technology or other)	Incubation	Startup accelerator
Org 1									
Org 2									
Org 3									

14) When do you expect that such innovation could be commercialised? (answer only if 6(a) is selected)

- Less than 1 year
- Between 1 and 2 years
- Between 3 and 5 years
- More than 5 years

15) Have any of the project partners…

(only to be answered if "Done" or "Planned in Project" is chosen for 10.5 "Investment from public authority")

a) already applied for support from private investors

b) already applied for investement from public authorities
c) Planning to start discussions with private or public investors

16) Which partners are in discussion with investors (or are planning such discussions)?

(the above questions are to be answered for **each** innovation developed by the project, up to a maximum of 3 innovations)

General Questions

(questions below are to be answered once in the project review, not for each innovation)

1) How does the consortium engage end-users?
- End user organisation in the consortium
- An end user organisation outside of the consortium is consulted
- No end user organisation in the consortium or consulted

2) Are there in the consortium internal IPR issues that could compromise the ability of a project partner to exploit new products/solutions/services, internally or in the market place?
- yes
- no

3) Please provide specifics of the IPR issues:

4) Which are the external bottlenecks that compromise the ability of project partners to exploit new products, solutions or services, internally or in the market place?
- IPR
- Standards
- Regulation
- Financing
- Workforce's skills
- Trade issues (between MS, globally)
- Others

5) Indicate how many patents have been applied for by the project: _____
6) Does the review panel consider the project performance in terms of innovation?
- Exceeding expectations
- Meeting expectations
- Performing below expectations

7) General observations of innovation expert on this project's innovation performance:

8) How would you rate the level of commitment of relevant partners to exploit the innovation?
- Very low
- Low
- Average
- High
- Very High
- None

9) **Please indicate the 1 partner (excluding large enterprises) that the panel considers to be the most impressive in terms of innovation potential:**
10) **Please enter some tag words (comma separated) to represent what "innovation elements" are strong in the project:**
11) **Please enter some tag words (comma separated) to represent what "innovation elements" can be improved (or are absent) in the project:**

8.2 Matching survey questions with assessment criteria

8.2.1 Innovation potential assessment framework

Table 9 presents the result of matching assessment criteria defined in Section 3.1.1 with relevant questions of the Innovation Radar Questionnaire.

Table 9: Innovation potential assessment framework: Market potential

Criteria & questions		Scoring
Market potential	**Question code***	**Max: 10**
Type of innovation (if Q2b or Q2c selected):	Q3	
New product, process or service		1
Significantly improved product, process or service		0.75
New marketing or organizational method		0.5
Significantly improved marketing or organizational method, other		0.25
Consulting services		0
Type of innovation (if Q2a selected):	Q5	
Product or service		0.5
Process, marketing or organizational method		0
Consulting services		0
Innovation exploitation:	Q6	
Commercial exploitation		1
Internal exploitation		0.25
No exploitation		0
External bottlenecks	GQ4	
No external IPR issues that could compromise the ability of a project partner to exploit the innovation	GQ4a	0.5
No standards issues that could compromise the ability of a project partner to exploit the innovation	GQ4b	0.5
No regulation issues that could compromise the ability of a project partner to exploit the innovation	GQ4c	0.5
No financing issues that could compromise the ability of a project partner to exploit the innovation	GQ4d	0.5
No trade issues that could compromise the ability of a project partner to exploit the innovation	GQ4f	0.5
No other issues that could compromise the ability of a project partner to exploit the innovation	GQ4g	0.5
Needs of key organizations	Q13	
No investor readiness training need	Q13a	0.5
No investor introductions need	Q13b	0.5
No biz plan development need	Q13c	0.5
No expanding to more markets need	Q13d	0.5
No legal advice (IPR or other) need	Q13e	0.5
No mentoring need	Q13f	0.5
No partnership with other company (technology or other) need	Q13g	0.5
No incubation need	Q13h	0.5
No startup accelerator need	Q13i	0.5
Number of patents have been applied for by the project	GQ5	
<2		0.25
≥2		0.5

Innovation potential assessment framework: Innovation readiness

Criteria & questions		Scoring
Innovation readiness		**Max: 10**
Development phase	Q2	
Under development		0
Developed but not exploited		1
Being exploited		2
Technology transfer**	Q10.1	
Done		1
Planned		0.5
Pilot**	Q10.3	
Done		1
Planned		0.5
Prototyping**	Q10.7	
Done		1
Planned		0.5
Demonstration or testing activities**	Q10.9	
Done		1
Planned		0.5
Feasibility study**	Q10.10	
Done		1
Planned		0.5
Other**	Q10.12	
Done		1
Planned		0.5
Time to market	Q14	
Less than 1 year		1
Between 1 and 2 years		0.75
Between 3 and 5 years		0.5
More than 5 years		0.25
No workforce's skills issues that could compromise the ability of a project partner to exploit the innovation	GQ4e	1

Innovation potential assessment framework: Innovation Management

Criteria & questions		Scoring
Management		**Max: 10**
There is a clear owner of the innovation	Q8	1
Business plan **	Q10.6	
Done		1
Planned		0.5
Market study**	Q10.8	
Done		1
Planned		0.5
Launch of a start-up or spin-off**	Q10.11	
Done		1
Planned		0.5
No consortium internal IPR issues that could compromise the ability of a project partner to exploit the innovation	GQ2	1
Company's business unit involved in project activities**	Q10.2	
Done		1
Planned		0.5
Capital investment**	Q10.4	
Done		1
Planned		0.5
Investment from public authority**	Q10.5	
Done		1
Planned		0.5
End-user engagement	GQ1	
End-user in the consortium		1
End-user consulted		0.5
No end-user in the consortium or consulted		0
Commitment of relevant partners to exploit innovation	GQ8	
Above average		1
Average		0.5
Below average		0

*GQ – general questions

** - Steps **DONE** in the project in order to bring the innovation to the market.

8.2.2 Innovator capacity assessment framework

Table 10 presents the result of matching assessment criteria defined in Section 3.2.1 with relevant questions of the Innovation Radar Questionnaire.

Table 10: Innovator capacity assessment framework

Criteria & questions		Scoring
Innovator's ability	**Question code***	**Max: 5**
Number of innovations in the project for which an organization is identified as a key organisation(s) in the project delivering this innovation	Q12	
1		0.5
2		0.75
3		1
Score of innovation for which an organization is identified as a key organisation(s) in the project delivering this innovation	Output of the innovation assessment framework	Score between 0-1
Organization is considered as the most impressive in terms of innovation potential	GQ9	1
Organization is the owner of the innovation	Q9	1
Total number of needs to fulfil the market potential of an innovation	Q13	
No needs		1
Between 1 and 2		0.75
Between 3 and 4		0.5
Between 5 and 6		0.25
More than 6		0
Innovator's environment	**Question code***	**Max: 3**
The engagement of end-users in the consortium	GQ1	
End user organisation in the consortium		1
An end user organisation outside of the consortium is consulted		0.5
No end user organisation in the consortium or consulted		0
The project performance in terms of innovation	GQ6	
Exceeding expectations		1
Meeting expectations		0.5
Performing below expectations		0
The level of commitment of relevant partners to exploit the innovation	GQ8	
Very High or high		1
Average		0.5
Below average		0

*GQ – general questions

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