

# IIT Deliverable

## 5.3 Toolkit for National Level Stocktaking of Local Company's Innovation Practices and Corresponding Policy Measures

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Abstract
<p>This report documents in detail the research approach and methodology chosen in the IIT project (Industrial Innovation in Transition). The research approach included an extensive survey covering almost 700 innovative European companies based on in-depth semi-structured interviews with high level managers (mostly CTOs, CEOs, R&amp;D managers), accompanied by a number of case studies and a web survey. In parallel, the innovation policy portfolio of the studied countries has been analysed and assessed.</p>

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# 1 Introduction<sup>1</sup>

The Industrial Innovation in Transition (IIT) project builds on the key assumption that the innovation practices and output of a company are important for a company's ability to grow, be profitable and to create employment. Numerous studies conducted over the past decades are supporting this assumption (Kleinschmidt and Cooper 1991, Baldwin and Gellatly 2003, Lööf and Heshmati 2006, Mansury and Love 2008). More broadly, innovation is a key condition for regional, national and European growth, for the creation of new businesses, and for the development of products and services which can be applied for the benefit of its users and society. According to an OECD study (1996), a key finding was that innovative companies are more profitable, grow faster, and employ more people than less innovative companies.

Innovation is by definition about change, about creating new technologies, products, services, and about enabling new practices and social activities, new business practices and industries. What is more, innovation processes themselves are in transition. Major changes include the way how diverse innovation actors relate to each other and interact. As a result, the innovation practices of industry companies are changing, as well as how the companies relate to their broader innovation environment, in particular the expanded network of actors jointly involved in the innovation processes with a particular company, the innovation ecosystem. Open innovation, social media, crowd sourcing, new IPR provisions and public-private partnerships are more and more becoming essential elements of a company's innovation toolbox.

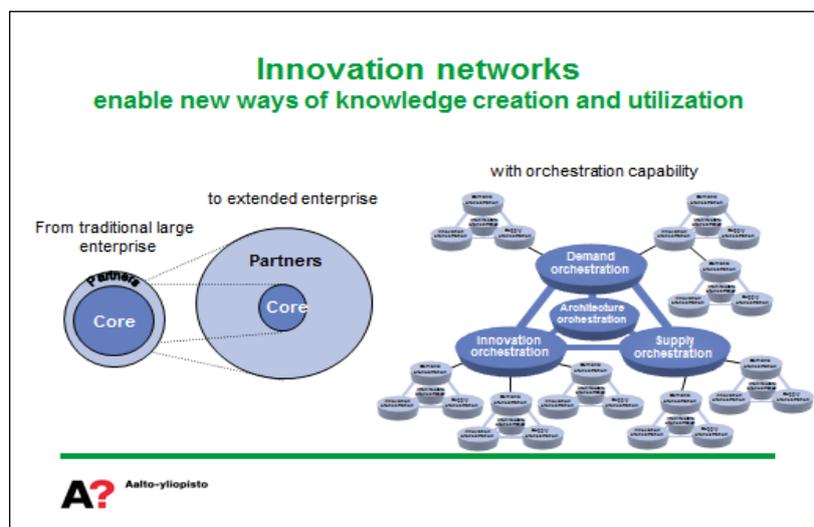


Figure 1. The expansion of innovation networks and ecosystems

These changes are arguably most apparent for many multinational corporations which play a significant role in innovation and have amended their practices to reflect most of these changes. For instance, high tech multinational corporations are actively building innovation networks and are orchestrating the emerging ecosystems to maximize the value generation by acquiring control of the new value chains through advanced

<sup>1</sup> This document may be further updated, if the project team receives comments from external stakeholders indicating that additional explanation may be necessary for any of the research steps described in this documents. Potential updates will be made available via the project website [www.iit-project.eu](http://www.iit-project.eu).

management practices (Figure 1). Also, many SMEs are adapting their innovation processes to reflect the changing environment e.g. by building linkages with larger companies or becoming part of business platforms. Many of these new practices directly or indirectly emerged based on the use of new web-based tools.

By innovation practices we refer to the ways how companies' actually conduct and organize innovation processes along certain recurring patterns. These innovation practices comprise different levels. At the core are innovation processes such as idea generation, information search, product design and market introduction. A second level is to establish the conditions for innovation, for example ensuring the capabilities and resources for innovation, setting in place arrangements for management of IP, and allocating resources to innovation priorities. A third level is the organisation of the innovation process in terms of strategy development, innovation planning and decision making, organising cooperation within the firm and with external partners, and the nurturing of innovation communities. The ambition of our project is, however, not to provide fine-grained observations of practices in action, but rather to work towards a broadly based overview of innovation practices in use, analysing which practices are central for achieving sustainable growth and identifying which practices are relatively new.

The IIT project's research interest therefore concentrates on taking stock of current innovation practices across European companies, of how these innovation practices are changing and why, and in particular to understanding how changes in the way how innovation is organized across a network of companies, public research organizations, civil actors, users and others influence current innovation processes. Furthermore, our aim is to understand which practices work best for the companies, in order to derive at suggestions how the innovation performance of European companies can be enhanced. Building on the derived understanding of current innovation practices and directions of change, we assess which innovation policy instruments are appropriate for supporting and intervening in innovation. Due to the nature of our research interest, a focus is on systemic policy instruments.

Innovation takes place across national borders. The IIT project covered a heterogeneous set of European countries covering innovation leaders, followers and moderate innovators and exhibiting quite diverse economic conditions and political frameworks. From its conception, it aims at broadening further the scope of the dataset to include companies worldwide. Therefore, this report explains how the study has been conducted, in order to permit future partners to conduct a similar study and enlarge our understanding of current innovation practices worldwide.

The report is structured as follows. We first explain the approach and main research questions of the project. Then the approach for sampling, gathering and analysing the data on companies' innovation practices is explained in detail, followed by an explanation of the approach chosen for examining current innovation policy approaches.

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## 2 Approach and main research questions

The IIT project studied the innovation practices of European companies by conducting extensive, semistructured interviews with a large set of 694 high-level innovation managers including CTOs, CEOs and R&D managers. Companies were chosen from five sectors and 11 countries and covered companies of all sizes and operating in national and multinational markets.

Mostly one interview was conducted per company; for a selection of companies additional interviews were conducted to get a more in-depth and multi-faceted understanding of the innovation practices in the firm. The interview addressed five main topics: the company's business environment and strategy, the forms how companies map their future environment, the innovation ecosystem of the company, its innovation management practices and the role of policy for their innovation practices. Interviews were transcribed, coded, and analysed both quantitatively and qualitatively. This comprehensive survey is accompanied by a web survey and a set of case studies, in which certain aspects of the innovation practices of selected companies within our sample were studied in more depth. The results on the innovation practices in the companies are juxtaposed to an analysis and characterization of the innovation policy environment in the studied countries.

The IIT-Project has identified five main research areas in order to provide a holistic picture of ongoing changes in companies' innovation practices: Business environment and company strategy, innovation ecosystem, innovation management, future mapping and innovation policy.

### **The Innovation Ecosystem perspective**

Analysts today regularly refer to the concept of an 'innovation ecosystem' (IES) to describe the interdependencies between firms and their collaborators along the value chain and beyond (Moore, 1993, Buciuni et al. 2013, Adner, Kapoor 2010). Collaborations and exchange with suppliers, customers, public research bodies, finance, regulators, policy makers and providers of infrastructure typically involve flows of knowledge, people, finance and services. These weak and close connections are not limited to national, sectoral or technological borders but include in principle all stakeholders relevant for innovation activities.

The innovation ecosystem approach provides a conceptual framework as well as a useful heuristic for *describing and analysing the systemic character of innovations*, while being able to address this issue from a company perspective. As a conceptual framework it describes structures of the industrial innovation environment and its advantages for companies as well as the position of companies within its IES. Each innovating company has its own innovation ecosystem which is the focus of the empirical IIT-research. In comparison to SMEs, a large company may have more than one IES. Working with and developing the different technologies shape the company specific ecosystem and create synergies and specific capabilities. If being part of different IES, a single company may have different roles referring to its position in the value

chain, their technological competences etc. The empirical IIT-research aims to contribute to our understanding of the role of innovation ecosystems for companies' innovation practices as well as to the ways how companies may actively shape their innovation ecosystems. Who is involved, what do IES stakeholders exchange, how is the exchange organised and which strategies do IES apply to position themselves are the leading questions. At the same time the IES idea describing innovation as a collaborative and strategically planned and organized process builds the common basis for exploring and analysing the other main IIT-research fields. Questions about how collaborative ideas and concepts are applied during the innovation process have been of high importance in every of the four following research fields.

## **Innovation Management**

Innovation processes touch upon different organizational levels, are based on different drivers and draw on different sources (Crossan and Apaydin 2010). Thus, innovation management practices can be seen as configurations consisting of a vast range of managerial tasks in different hierarchical levels, taking into consideration issues such as strategy, structure, and culture, for which different tools, guidelines and concepts have been developed. In our project, we have focused on the main steps, processes and actors involved in the innovation processes of the company and the ways these are managed and structured. Given that the internal processes of innovation management and strategy are two well researched areas, within the IIT project we focused on the main lines of these processes, if and how these have changed and on how internal processes of innovation management relate to or are affected by how a company interacts with its environment. For instance, we have investigated how the openness of closeness or the embedding into ecosystems of a particular type of innovation practice is reflected in innovation management and strategy. Rather than aiming for one best way to manage innovation, IIT aims to provide insights into effective organizational configurations in different contexts which may require different organizational structures and processes (Tidd, 2001).

Special attention goes to the questions if and how innovation management needs to be adapted to different types of innovation practices, the strategic considerations related to choosing for different types of innovation practices, such as balancing between open and closed or radical and incremental innovations, and how these choices have implications for internal organization, external collaboration and innovation processes. A question on the background is how these choices and processes are related to perceptions of and possibilities in the innovation ecosystem. These issues have been mainly addressed in the 'Innovation management and practice' section of the questionnaire, and partly in the 'Business environment and company strategy' section.

In addition, we inquired into the use of and the experiences with **web-enabled tools** such as team-based workspaces and crowdsourcing as means to support effective innovation practices and collaboration, since collaboration is an important precondition for effective and open innovation (Ebersberger et al. 2015).

## **Open Innovation as IES and innovation management strategy**

The concept of **open innovation (OI)** has received high attention in recent years, both from an academic and practitioner's perspective. It is based on the idea that firms can and should use methods, strategies and business models to increase the exchange of knowledge between different parts of organisations, networks,

value chains and markets to improve the success rate of innovations, and in this sense links up with the innovation ecosystem concept elaborated above. Web-enabled tools like crowd sourcing have importantly contributed to the success of this concept as drivers of open innovation practices. The popularity of the OI concept comes from the benefits to firms stressed in many publications from being exposed to ideas external to an organisation, thereby reducing development costs and risks (Chesbrough, 2003; Lichtenthaler, 2011). Sources of these ideas and collaborations include users, suppliers, venture capitalists and competitors (e.g. Enkel et al., 2005; Gassmann and Reepmeyer, 2005; von Hippel, 1986), associating the concept with other practices such as demand-led innovation and supply and value chain management. Despite this longstanding research we experienced that companies have a very diffuse and broad-ranged idea about Open Innovation. For that reason, the IIT project aims at adding to our understanding of the challenges related to practicing open innovation, the variety of its practical manifestations across different companies and its relative importance to different types of firms, and at exploring the technologies, processes and competences required to support it at company and network level. Leading questions are: What do companies understand by OI, when do they apply these practices and in which way do they protect their knowledge?

### **Mapping the future environment of the company**

The perceptions of relevant future developments within the environment of the company can be very influential for the strategic orientation of a company and the innovations it pursues. There are various ways how companies can map and develop an understanding of their future environment, and how they can make use of this for strategy-building and innovation processes. There are various tools supporting corporate foresight, that is, dedicated foresight activities conducted at the level of the firm, partly organized by specialized departments (Rohrbeck, Battistella et al. 2015). Furthermore, recent literature has suggested to pay attention to networked foresight – foresight which is conducted at the level of innovation networks and ecosystems (van der Duin, Heger et al. 2014).

In addition to dedicated and rather formalized procedures, companies draw on various other sources to develop an understanding of their future environment. These may be generic reports and commissioned studies of consultancies or other external providers of ‘future knowledge’. Decisive impact for developing an understanding of relevant developments, is most likely not only created by dedicated foresight procedures and reports, which are usually not accessible to all, particularly smaller companies, but information is gathered, interpreted, and made sense of via more informal processes of following various media, scanning of literature, discussions in professional communities, at conferences and fairs etc. (Reger 2001, Konrad, Markard et al. 2012). Within the project we inquired into the use of particular forms of mapping the future environment at the company and network level, into the sort of aspects of the environment considered (technology, regulation etc.) and the use which is made of this knowledge for either general strategy or innovation management.

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## 3 Company interviews

### 3.1 Data gathering

#### *Interview Sampling*

The project aimed to provide both a broad and a deep overview about innovation practices in industry which would allow to account for specific characteristics of companies as size or competitive structure, as well as to cover developments in different sectors. In order to ensure trustworthiness and depth of the data as well as a broad range of information at the same time, the following sampling criteria were chosen:

- **Sectors: five focus sectors**

The IIT project adopted a sectoral approach, recognizing that innovation processes are often contingent of the industrial sector, which leads to sectoral systems of innovation (e.g. Castellacci, 2008; Malerba and Orsenigo, 1997; Marsili, 2001; Pavitt, 1984; Van de Poel, 2003). The relevance of a sectoral perspective on innovation in a European context is also illustrated by a study conducted by the Europe INNOVA consortium (Montalvo and Van der Giessen, 2011). The study shows that there are great differences among sectors in terms of, for example, R&D expenditures and propensity to innovate. It also highlights that sectors differ in terms of their distribution of innovation labour. Consequently, a sample was chosen which reflected areas of innovation rather than traditional sectoral boundaries. It includes both novel sectors (clean technology), which arguably might not be as clearly established as more traditional sectors as manufacturing or agrofood, which were included as well. We have chosen the following five sectors for our empirical analysis (see NACE list in the appendix for further specification):

- Manufacturing
- Agro-food
- Biopharma
- ICT and ICT-services
- Clean-technologies

These sectors, respectively certain subcategories of them, were expected to cover the variety of innovation patterns shown in the literature so far, and at the same time cover a major part of the industry, which is important for the overall goal of IIT to deliver results which are broadly based (see also deliverable 2.1, section 2.2.). The sample covers similar shares of all sectors with the exception of (the rather broad category of) manufacturing, since the manufacturing industry is still one of the most important sources of growth and technological innovation in Europe. The share of companies in a sector varies across countries due to diverging relevance in the national economies, size structure of companies and accessibility.

**Table 1: Sample Distribution by Industrial Sector**

Sectors		
	Frequency	Percent
Agri-food	99	14.3
Biopharma	92	13.3
Clean technologies	116	16.7
ICT	132	19.0
Manufacturing	255	36.7
Total	694	100.0

- **Size: above 10 employees**

In order to figure out how innovation strategies and management has changed the survey focused on companies with established innovation routines and structures. That meant that start-ups and young companies were excluded from the survey as well as very small companies (< 10 employees).<sup>2</sup>

**Table 2: Sample Distribution by Company Size**

Firms' size		
	Frequency	Percent
< 10	17	2.4
10-49	193	27.8
50-249	214	30.8
250-3000	191	27.5
>3000	76	11.0
Unknown	3	.4
Total	694	100.0

- **Number of interviews per country**

The idea of the project was to provide a broad basis for qualitative as well as quantitative analysis in various sectors and companies. To cover this broad range of company sizes and sectors a solid number of interviews is required. We aimed at a sample of 75 companies per country with smaller sizes for some countries (Italy,

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<sup>2</sup> Exceptions were made for some countries, including a small number of companies of less than 10 employees, in order to increase the number of companies in the biopharma sector.

Portugal). However, due to difficulties in the acquisition of interviewees we lowered the number for some countries to around 50.

**Table 3: Sample Distribution by Country**

Interviews per Country		
	Frequency	Percent
AT	75	10.8
CZ	75	10.8
DE	50	7.2
EE	80	11.5
ES	90	13.0
FI	69	9.9
IE	44	6.3
IT	45	6.5
NL	48	6.9
PT	25	3.6
UK	93	13.4
<b>Total</b>	<b>694</b>	<b>100.0</b>

- **Interview partners**

The IIT interview guideline addresses a broad range of aspects of the innovation process. Therefore, we interviewed persons within a company who can be expected to have an overview about and insights into these processes. Thus, most interview partners were CTOs, CEOs or high-level R&D manager.

- **Selection criteria for companies**

The IIT research focuses primarily on understanding current innovation practices and their changes. For that reason we selected companies which demonstrated to be innovative. In order to select such innovative companies we searched for innovation awards or technology leaders. Also company websites were consulted as an indication to what extent and which way a company innovates. However, the objective was not to interview exclusively extraordinarily innovative companies but to collect an interesting sample of divers companies that innovate on a regular basis. In addition, websites of associations, newspaper articles and company databases were helpful sources for concrete company suggestions. Finally, also personal contacts were used to get access to companies.

- **Approaching companies**

Companies can be approached in various ways. One can look for a direct contact through letters, emails or phone calls as well as attending fairs, network meetings or building connections via professional networks such as LinkedIn. It was also very helpful to ask associations, clusters and innovation networks for their support with contacting companies, such as the European Roundtable of Industrialists, Digitaleurope, Orgalime or FoodDrinkEurope (see for example the support letter in the appendix). In many cases we used a combination of different approaches such as sending an email and calling the company afterwards. One should be aware that the more personal an approach the better one can describe and advertise the project. Usually rather non-personal newsletters are not very successful.

The final success of a single approach might vary between different sectors and countries depending on their interests and preferred ways to communicate. It is advisable to provide a letter or a website with general information about the project, the organisation and the persons involved. Additionally, it can be helpful to provide a signed non-disclosure information which explains the use of the gained information.

- **Challenges encountered and how they were addressed**

We experienced that in some countries the companies complain to be “overresearched” and therefore not able to spend more time in supporting research projects. Whenever possible, we tried to use personal networks to support the contacting of interviewees. When approaching companies we tried to build up trust (transparent information, non-disclosure information) and stress the benefit for companies who participate (access to database, reflection on their own practices and new research topics such as innovation ecosystems).

### ***Conducting interviews***

- **Interview guideline and how (strictly) it was used**

The interviews especially seek to elicit information on company innovation practices with a particular focus on what is novel and on the core issue of how a firm mediates its innovation processes to map, respond to and influence the innovation ecosystem. The interview guideline (see appendix) was structured around five main issues:

- 1) business environment and company strategy
- 2) innovation ecosystems
- 3) innovation management and practice
- 4) mapping the environment
- 5) public policy

Interviewees were asked for two-hour slots, in order to be able to cover all questions. For each section, the guideline included a number of detailed prompts that could be followed in more or less detail depending on their relevance for the company and the availability of time. The questions were not necessarily voiced word by word; also the order could be adjusted if this supported to turn the interview into a convenient talk between interviewer and interviewee. In general, questions and order should be as close as possible to the guideline and as flexible as needed to receive comparable in depth answers and information.

- **Interviewer training**

In order to conduct the high number of time intensive interviews, it might be adequate in some cases to have an interviewer team. The advantage on an interviewer team is to be able to conduct the survey faster, to exchange experiences and to consult each other in challenging situations. In order to avoid too heterogeneous interview questions and styles one should offer interviewer trainings to facilitate exchange, go through and discuss the interview questions, train and rehearse the interview situation, give feedback to interview style and provide background information about the interview topics. These measures will help to develop a common understanding of interview styles and content.

- **Interview preparation: information gathered in advance**

In order to dive deeper into specific topics of interest during the interview it is always helpful to collect information about the company and its innovation activities in advance. Checking the company website, newspapers and company databases or collect information about networks, clusters, sector associations helps to learn about the field in which a company moves.

- **Data management**

Usually, interviews should be recorded and transcribed, in order to have a solid and reliable basis for coding and analysis. The transcripts were used for coding only and kept confidential within each national project team. Exceptions were made for testing and harmonizing the coding across project teams (see below). Companies were assured that results would be used for aggregated statistical analysis or as anonymised quotes only, and any attribution of answers would require their specific clearance. In some cases, interviewers did the coding during or directly after the interview, rather than on the basis of transcripts.

- **Challenges encountered and how they were addressed**

When conducting the interviews it is important, especially in larger companies to clarify the level to which the interviewee is referring to – whether it is just one specific business unit or the whole company.

It is advisable to translate interview guidelines and to conduct the interview in first language of the company/interviewee. In most cases this makes it easier for the interviewee to become familiar with the topic, to avoid misunderstandings and to express him-/herself more clearly.

### ***Transcription and data storage***

- **Transcripts**

Whenever interviews are recorded and transcribed, the transcription should be verbatim but usually no slang or dialect specifics are required. The transcription can be outsourced to specific services.

- **Interview summaries**

In addition, we prepared interview summaries, either after the interview or during coding, which provide a quick overview on most important points from the interviews regarding the five main topics (1-2 pages).

- **Company fact sheets as background information**

The IIT research needs background information of the companies targeted for interviews. We recommend to prepare data sheets about the interviewed companies. The data sheet can be given to the interviewee at the end of the interview for fact-checking. For larger entities it will be particularly important to establish whether

the interview responses refer only to the business unit interviewed (in which case the data may need modification to refer to that) or whether they are valid for the entire corporation. The background information on companies targeted for interviews concerned the following:

- a) Industry
- b) Growth over the last five years measured by turnover
- c) Profitability over the last five years measured by EBITDA
- d) Employment creation during last five years measured by personnel
- e) Market share at the group/company level
- f) Share of turnover of those new products/services that have been brought to the market during the past two years
- g) R&D investment and its approximate location (domestic, within EU, outside EU)

## 3.2 Data analysis

### **Coding**

#### Short description

The IIT-Interviews had the specific purpose to learn more about the business environment, innovation management and innovation activities of companies in 11 European countries. Some of the interviews lasted up to 2 hours. This yielded a massive amount of data, which needed to be prepared, structured and analysed to filter out relevant statements. The coding approach has the advantage to store the responses in a relevant, usable, and accessible form to be able to analyse and draw useful results from the volume of data. We developed and applied a joint set of codes (coding tree) which was applied uniformly to all interviews. In so doing, we were able to abstract from the rich qualitative dataset a dataset of variables, which enabled further quantitative analysis across the large number of interviews, while at the same time allowing each project partner to systematically access the qualitative material related to particular codes for further in-depth analysis.

#### Basic Steps in Coding

To structure the coding process in all 11 European countries in a uniform way, we prepared the coding process following certain basic coding steps:

- *Developing a coding tree:* The coding tree should be strongly related to the actual interview guideline. The interlinkage between the interview guideline and the answers is immediately obvious and it allows to provide a more or less standardized tool for all coders. Therefore, we structured our coding tree according to the same five sections as the interview guideline. Each interview question was translated into a superior code. Depending on which section the question belonged to, the superior code was preceded by the acronym of the section and assigned a certain colour (e.g. Business environment and company strategy (BEC); Mapping the future environment (MFE); Innovation ecosystem (IES); Innovation management and practice (IMP); Public policy (PP)). For example, the interview question *'What position does your company occupy in your value chain?'* was translated into the code *'BEC\_Firm position within value chain'*. Each of these superior codes were followed by subordinated codes. These subordinated codes represented the possible interview answers. For example, the subordinated codes for *'BEC\_Firm position within value chain'* were (1) suppliers, (2) assembler or integrator; (3) producers. Some of the subordinated codes of superior codes were

straightforward to define, others were specified after brainstorm sessions and a first review of the interviews. We developed a set of subordinate codes for each superior code, which allowed to code the majority of the interview answers in a valid manner, while still remaining as simple and general as possible (a too detailed coding tree makes it hard to work with). In order to account for cases, where answer did not fit the predefined codes, interviewees could not answer the question or specific questions were not asked, each superior code included 3 subordinated codes, namely: (1) other, (2) did not know; (3) did not ask (no data). This made it possible to use at least one subordinated code of each superior code for every conducted interview. This requirement is necessary to be able to analyse the interviews in a statistical reliable way.

- *Mixture of deductive and inductive method:* When developing the coding tree, in a first round, we deductively produced codes. Straightforward and general valid subordinate codes were collected for their superior codes. During the coding process additional codes, which proved to be relevant for multiple interviews, were inductively produced and added to the coding tree.
- *Defining the codes and developing memos:* The coding was conducted by 5 different partners and 3 different subcontractors. Therefore, a major challenge of the coding approach was to reduce the margin of interpretation of the single codes to a minimum. Thus, we aimed at defining the codes in an as easy as possible understandable manner and added illustrative examples. These definitions and examples were attached to the codes in form of memos and helped to reduce misunderstandings of codes considerably. We added to each superior code the actual interview question of the interview guideline in form of a memo and to every subordinated code, which could have been misunderstood and was not straightforward, a definition of the code and illustrative examples. For example the subordinated code 'suppliers' of the superior code '*BEC\_Firm position within value chain*' was defined in the following way: '*Supplier of components (e.g. physical components e.g. chip), (immaterial) systems (e.g. software) or services*'.
- *Mutually exclusive codes:* Most of the superior codes were followed by subordinated codes, which were not mutually exclusive, meaning that more than one subordinated code could be used for the same interview if needed. However, some superior codes were identified to be mutually exclusive. This indicated that the number of usages of this code must equal the number of interviews coded. For example the superior code '*BEC\_Stock market expectations*' were followed by mutually exclusive subordinated codes. These codes were (1) Yes; (2) No; (3) Not applicable; (4) Did not know; (5) Did not ask (no data).
- *Testing the Reliability of Coding:* The coding tree was tested through an inter-coding process. 3 anonymized interviews in English language were shared among the partners. Each partner coded these 3 interviews following his/her understanding of the interview text and the coding. Afterwards it was analysed if similar or the same codes were used for certain text segments. Codes, which were used for totally different text segments were redefined again. This process of testing and redefining was repeated 2 to 3 times and was always accompanied with long discussions regarding certain codes and their meaning. Furthermore, partners tested the Coding Framework on a sample constituting 10-15% of the whole sample of interviews. A deep analysis of the interview sections on 'Company Mapping' and 'Web-enabled tools' and later on whole interviews was completed to test whether the coding framework generated useful analysis. The purpose of this exercise was to check that the codes were being interpreted in the same way by each of the partners and that the coding framework

provided full coverage, i.e. it effectively captured all of the variations in the answers given to the interview questions.

#### Advantages:

- Direct observation of the question-answering process
- Producing variables for quantitative analyses of qualitative interviews
- Standard codes enhance comparability across companies, sectors, countries
- Coding tree is replicable for similar interview types
- Coding tree is flexible – inductively produced codes can be added to the coding tree anytime

#### Challenges/Disadvantages:

- Very time consuming approach in its preparation and later on in its analysis (full analysis of the data due to the massive data volume is hardly to obtain)
- Well-defined interview questions needed to guide the interviewee during the interview in the right direction and to obtain the information which is needed (especially when more than one person conducts and later on codes the interviews)
- Coders must be well trained and use the codes consistently
- Additional investigation is needed to follow up on those questions that receive many problem codes
- Harmonization of codes

#### Tips:

- Development of more general codes rather than detailed codes: Straightforward and general codes are easier to apply to a broader range of interviews; too detailed codes add complexity and confusion to the coding tree. Text segments for which no appropriate code exists can be summarized with codes such as 'Other' in a first step and in a second step new codes can be produced from these text segments by going through the text segments inductively.
- Schedule enough time for testing the coding tree, revising and discussing codes internally
- Reduce the margin of interpretation to a minimum through well-defined codes and memos and through adding illustrative examples to the codes
- More in-depth analysis of the qualitative material, possibly using additional codes, can be done in a further step. The coded material allows to access the qualitative data which relates to particular topics.

#### Coding programs:

- In the project we used the programme MAXQDA (Windows, Mac; <http://www.maxqda.com/>). Further programmes include:
- RQDA (Windows, Mac, Linux; <http://rqda.r-forge.r-project.org/>)
- WeftQDA (Windows, Linux; <http://www.pressure.to/qda/#using-weft-qda>)
- Tams Analyzer (Mac Only; <http://tamsys.sourceforge.net/>)
- Open Code (Windows only)
- Saturate (cloud)
- CAT (cloud)

### ***Preparations to transfer coded interviews into database for statistical analysis (UNIMAN)***

In order to allow for a quantitative analysis across all interviews, the codes distilled from each interview had to be transferred into a database, which could then allow for statistical analysis with statistical programmes as SPSS etc. To achieve this, the Team created variables corresponding to each of the item reported in the questionnaire – the main variables plus the different possible thematic or factual answers to the questions. The item/variable is a binary variable and assumes the value of '0' when the respondent does not agree/ does not experience the specific option at hand, or '1' when the respondent experienced it. This is appropriate to the Survey design which does not make use of Likert scale question, e.g.: did not ask to rate perceived levels of intensity. To minimise the amount of missing information, each survey question and corresponding variable in the dataset includes a code for: did not answer; information not available. The purpose of these codes is to avoid excessive negative bias in the analysis as a result of conflating negative responses with missing responses. After integrating all data into the database, a quality check of all the coded data obtained in the interviews was carried by UNIMAN.

## Data cleaning and harmonisation

The table below provides an overview of the process of harmonisation of the different country level interview into the database.

Number of variables	
Before Pre-coding cleaning	890
<b>Variables Removed:</b>	
<b>Ad hoc coding:</b>	Joanneum Twente Uniman
<b>Qualitative coding</b>	
<b>Missing data controls</b>	
<b>Total Removed</b>	361
<b>NEW TOTAL</b>	529

The table describes the steps from the original first amalgamation of the different datasets by country (N=11) into the final database used for the analysis.

The original dataset contained 890 variables (coded as described in the section above). Cleaning and harmonisation was undertaken to address:

- Ad hoc coding: coding developed by each project partner once realising that a pattern in the answers was present but not question item was appropriate for it. The ad-hoc coding reflects recurrences experienced by firms at the country level
- Qualitative coding: coding reporting the answers for open questions
- Missing data controls: these variables were created to avoid missing data, and consists of formulas flagging cells with no values

These three types of variable were removed for the quantitative analysis (N=361) leaving the total number of variables present in the dataset equal to 529.

## Database

### *Project-internal database*

Each interview was coded using either the MAXQDA programme or by directly coding into the excel framework. Each partner ended up with a coding book (an excel spreadsheet), which contained the coding framework in the first column (with a row for each code and sub-code) and further columns for each company. NB. MAXQDA coding can be exported into an excel spreadsheet.

Each partner subsequently sent their (anonymous) codebooks to the University of Manchester team, who then combined them into a single excel spreadsheet. A unique reference number was created for each company, and the merged spreadsheet was re-circulated to all partners to perform a quality check and to 'clean' the data before it was imported into SPSS for statistical analysis. These steps were performed to check the internal consistency of the information and its robustness for the final analysis. The outcome of this process was a 'clean' Excel database that was made available to all partners.

From the cleaned Excel database, the information was subsequently transferred into SPSS, a statistical package widely used in the scientific community for analytical purposes. The differences in data handling between Excel and SPSS required the following steps:

1. Create new variable names suitable to SPSS. SPSS (like other statistical and econometric software) cannot handle strings (letters) unless purposely designed to ensure: no repetitions across the names in the file; no breaks or numerical operators in the variable name. New variable names were generated from the Excel database and a link was created between each variable and the corresponding section and item of the questionnaire following SPSS data handling rules.
2. Replacing alphabetical data with numerical data (e.g. variables providing categorical information - 'Yes' and 'No' – and substitute with 1 and 0 respectively).
3. Labelling numerical values qualifying what they represent.
4. After these changes were implemented, a missing data analysis was run on the SPSS data reporting no missing values (e.g.: no cells without information).

### **Quantitative analysis**

The quantitative analysis run on the data examined the variables created through the coding according to the questions in the interview framework. The initial analysis created cross-tabulations in which each variable was clustered by Country and by industry sector. The result of this analysis (see deliverable D.2.4) is a set of information providing:

- Summaries of the country/sector patterns across the dataset.
- Comparative analysis of countries/sectors in terms of key variables in Business environment and company strategy; Mapping the current and future environment; Innovation ecosystem and its relevance for innovation activities; Innovation management practices; Public policy and innovation.

The output of this first analysis is a series of 59 Tables presenting the results of the interviews (see deliverable 2.4).

This first set of results was complemented by further analyses to develop hypotheses on how differences across the respondents can inform the understanding of innovation behaviour in innovation ecosystems. The task fed into the development of the on-line survey (see D3.4). Specifically, in order to integrate the analysis by sector and by country, the new analyses selects a group of specific variable in the database upon which clustering the survey results. The clustering variables used in this second phase are summarised in the table below.

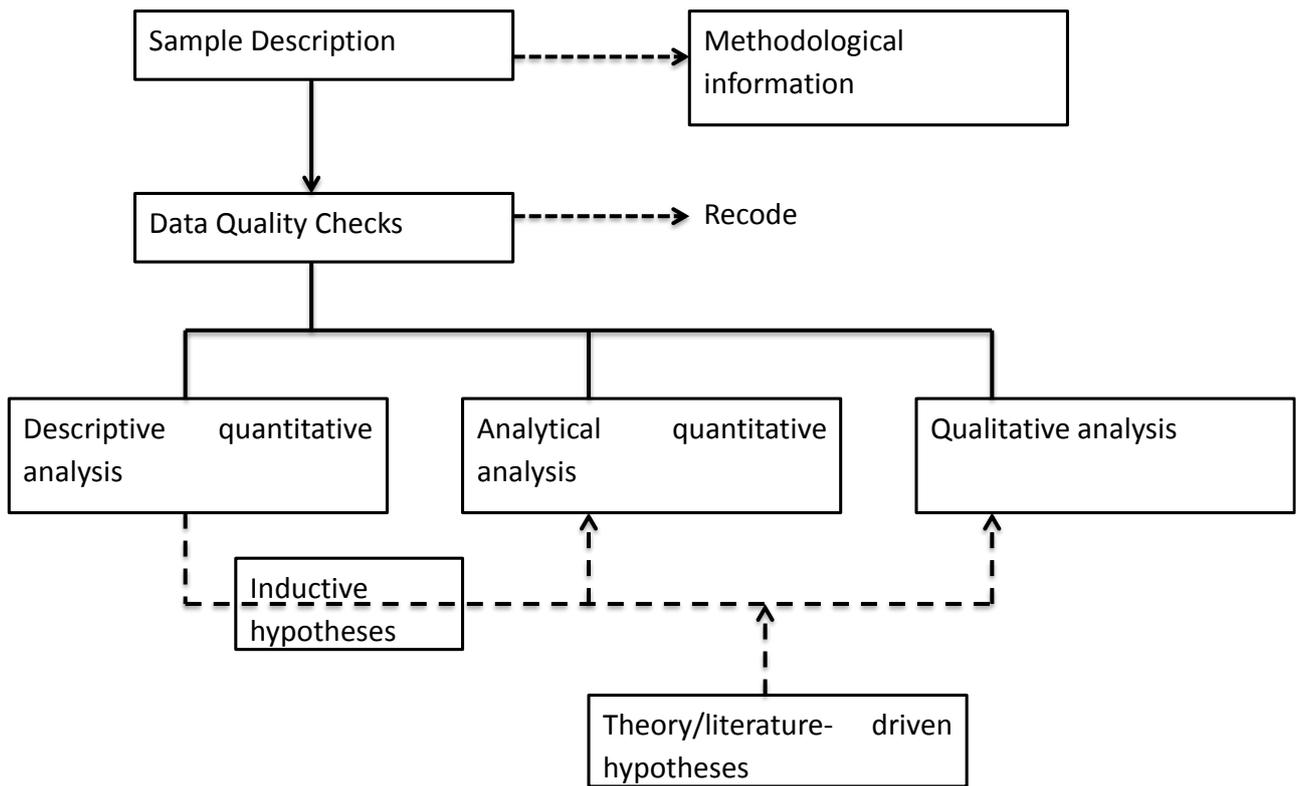
Level	Variable	Variable name	Description
Type of organisation	Firms position in the main market	BEC_Mrk_position	Leader/follower/peer
Type of organisation	Size	Size	Micro (merged to small); small; medium; large; very large (>3000)
Type of organisation	Price competition	Comp.Price.only Comp.Nonprice.only Comp.Price.Nonprice	Three options to capture all the possible effects (including sharing both price and non-price competitive strategies)

Type of organisation	Time horizon – product life cycle	BEC_TH_PLC	Less than 1 year Up to 3 years 4-7 years More than 8 years
Type of innovation	Increase in technical innovation ( N=203) Increase in non-technical innovation (N=170)	BEC_BalanceC_TII BEC_BalanceC_NTII	The two categories are mutually exclusive
Type of innovation	Differentiation of strategies between radical and incremental innovation	IMP_IRD_Yes IMP_IRD_No	The two categories are mutually exclusive
Type of innovation	Time horizon – innovation process	BEC_TH_IP	Less than 1 year Up to 3 years 4-7 years More than 8 years

### ***Qualitative analysis***

Cluster analyses were conducted by the UNIMAN teams of the responses to the open ended qualitative interviews responses. The themes and inductive codes this resulted in were tested by other partners against their own qualitative data and refined. This analysis was reported in Deliverable 2.4 to provide an illustration of the range and quality of responses provided.

The detailed qualitative analysis will be undertaken in groups working on specific thematic papers.



**Figure 1: LOGIC OF ANALYSIS**

**Database**

The IIT Project opted to participate in the Horizon 2020 novelty, the Open Data Pilot. The participating projects are required to provide research data to a research data repository and take measures to enable third parties to access, mine, exploit, reproduce and disseminate the data. This should be free of charge for any user. The data to be deposited is the actual research data, including associated metadata, needed to validate the results presented in scientific publications. The data should be made available as soon as possible. The project participating in the Open Data Pilot needed to create a data management plan (DMP). The IIT Data Management Plan is Deliverable 1.1 of the project and it is a public deliverable available on the project website.

The organisations participating in Horizon 2020 projects have their own processes according to which they decide what data to share and what to protect and exploit. The Aalto University decision-making process is described in Figure 1. The figure also highlights the research data re-use process.

# Managing Scientific Data (Data Mgt Plan)

Inspired by EC Vision for Europe: Open Innovation, Open Science, Open to the World

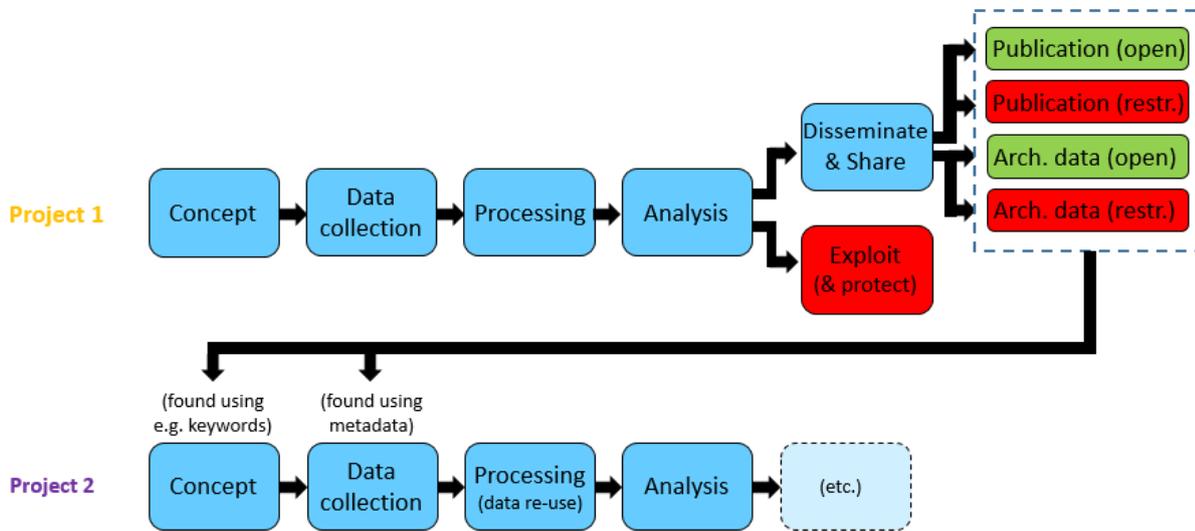


Figure 1. A proposed decision-making process regarding sharing or exploiting and protecting project data (Tuija Heikura, Aalto University).

Zenodo is an open data repository service maintained by CERN, Geneva. It was launched in May 2013 as a creation of OpenAIRE and CERN to provide a place for researchers to deposit datasets. Zenodo is compliant with the open data requirements of Horizon 2020 and OpenAIRE, the EC-funded initiative supporting the Open Access policies of the European Union. Zenodo has gained recognition as a general-purpose open access repository: it has e.g. been recommended by Peter Suber, an expert on open access, and it has been chosen as a Google Summer of Code project in 2017.

The Zenodo repository allows researchers of any field to upload files up to 50 GB. Once stored in the repository the datasets can be located by users via the Zenodo search engine. A digital object identifier (DOI) is automatically assigned to all files stored on Zenodo. For example, the unique identifier (DOI) for the IIT project data will be displayed in the project website. The repository accepts data in any file format. Data uploaded to Zenodo is stored in the CERN cloud infrastructure. The repository has integration with GitHub to make code hosted in GitHub citable.

It is possible to upload data as an entity or as part of a Zenodo community. As the goal of the IIT project is to establish a continuing innovation study tradition, this will be considered.

The Zenodo repository allows the users to attach Creative Commons licenses to the data. The IIT project data is shared under the Creative Commons Attribution and ShareAlike license. The re-users of the data are permitted to share, copy and redistribute the material in any medium or format and also to adapt, remix, transform, and build upon the material, for any purpose, including commercial use. The licensor, in this case the IIT project consortium, cannot revoke these freedoms as long as the user follows the license terms. When the data is used, the user must a) give appropriate credit, provide a link to the license, and indicate if changes were made. The user may do so in any reasonable manner, but not in any way that suggests the licensor

endorses the use. If the user remixes, transforms, or builds upon the material, they must distribute their contributions under the same license as the original. More on the Creative Commons Attribution and Share Alike license can be read at <https://creativecommons.org/licenses/by-sa/2.5/>

### 3.3 Case studies

The interview survey has provided a broad overview and differentiated insights into current innovation strategies and practices of industry companies. The aim of the company case studies is to provide a more dynamic perspective on how companies deal with changing situations and how they develop an understanding about future changes and developments. The results gained in the interview survey have shown the increasing importance of the Innovation Ecosystem for companies' innovation activities. For that reason we linked both topics (change and future mapping) with the IES perspective as described below:

1. Getting access to information and knowledge, implementing strategies and integrating crucial actors are often routinized practices within an established IES especially in mature industry sectors. However, it becomes a challenge when the **IES changes**, e.g. through fundamental technological innovations, or when the companies itself enters a new, unfamiliar IES. In order to increase the understanding of ecosystems and systemic strategies of companies we focused on situations of change rather than a static IES analysis. The change perspective offered opportunities to identify strategies in uncertain situations apart from applying standardized measures in an established environment.
2. The IES analysis not only provides a picture of current interactions and stakeholders but also includes a dynamic perspective: Creating knowledge about future developments (industry, technology, policy, society) and attempts at shaping them requires collaborative future mapping activities between IES actors. **Collaborative forms of future mapping** occur in a formal and organised way, for example in associations and foresight groups. Furthermore, informal networks and meetings also contribute to the creation of future knowledge and strategies which are not limited to specific sectoral knowledge but also include societal and technological trends. The collaborative mapping completes the picture of the systemic ecosystem perspective over time and fills a gap in literature about how ecosystem actors work together to anticipate change and manage innovation systemically.

The case study analyses was guided by the following selection criteria for the companies, amount of interviews and disclosure rules:

- **Sector focus**

In order to avoid a too heterogeneous sample we focused on the sectors ICT and manufacturing for the following reasons: ICT has undergone a fast technological development influencing many parts of economy and society. With concepts of smart home or smart manufacturing ("Industry 4.0") information and communication technologies enter traditional manufacturing industries and require to revise established processes of production and knowledge creation.

- **Company size**

We selected companies with more than 20 employees. Small and micro companies with less than 20 employees are important stakeholders in IES and crucial innovation partners. However, the conditions referring to resources, strategies and policy support differ significantly from larger and established companies which would require a specific research focus.

- **Case study interviews**

For the case study companies were selected that had already been interviewed. As input we used:

- the **interview** that was conducted in the interview survey
- and one or more additional **interviews within the company** with staff responsible for or knowledgeable about the specific research area(s) (change process, future mapping)
- additional documents about the companies (databases, website etc.)

The collected data about each company case were summarized and analyzed in individual case study reports. These reports built the basis for further analysis in an overarching case study report. The results of the case study report(s) feed into further research and publishing activities.

## 4 Web survey

### Short description:

We used a web survey as tool to validate the findings and hypothesis from the qualitative interviews and case studies. The web survey helped us to further widen the respondent base. It contributed to the development of a statistical generalization and did not collect further explorative data. The respondents were asked in their position as experts of their company's innovation activities and business environment.

### Survey content:

We chose the web-survey tool to aim for a triangulation with the company interview based findings. For each topic of the interview guideline we developed a research question with interesting hypotheses. This made it possible to keep the web survey short. The hypotheses were a direct product from the coding process and the quantitative analysis of the coded interviews. The web survey was structured the following way:

1. *Starting page:* It is important that it informs the respondents in a clear and brief way about the topic and the aim of the web survey. It contains the (1) title of the project, (2) the names of the contracting parties, (3) the customer's name, (4) topic & aim of the survey and (5) a note on data security
2. *General information:* The collection of general information on the companies is important to be able to conduct afterwards a meaningful and substantial analysis. Our web survey collected general information on (1) company type; (2) country; (3) industrial sector; (4) size of the company; (6) market orientation of the company; (8) time horizon of innovation process
3. *Testing hypothesis:* From the qualitative interviews interesting hypothesis to (1) business and innovation strategy; (2) innovation management; (3) mapping the environment and (4) innovation ecosystem were collected and tested through web survey questions.
4. *Identifying Policy Gaps:* The last question addressed various policy instruments and its appropriateness for companies' innovation activities.

### Sample strategy:

The web survey followed a two-folded sample strategy. On the one hand the survey was sent to the interviewees of the qualitative interviews; on the other hand for each of the partner countries (Austria, Finland, Germany, The Netherlands, Spain, United Kingdom) an additional sample with at least 1.000 personal contacts was compiled. The contact details were collected through:

- Personal contacts of the project partners
- Orbis company data base

### Survey tools:

The online survey tool used in this project is called SoSci Survey (<https://www.soscisurvey.de/>). It allows sending out personalised links to the respective target groups. Therefore, data security is guaranteed. The Sosci Survey tool collects few meta data for each interview, such as the time and date when the interview started. There are of course other tools which can be used to develop the web survey such as Survey Monkey (<https://www.surveymonkey.de/>), Typeform (<https://www.typeform.com/>) or Google Forms ([https://www.google.com/intl/de\\_at/forms/about/](https://www.google.com/intl/de_at/forms/about/)).

### Advantages:

The project team profited from the survey through:

- widening the respondent base
- testing and validating hypothesis from the qualitative interviews and therefore developing a statistical generalisation

### Challenges/Disadvantages:

The main challenges in conducting a web survey are:

- developing a catchy and still short and general enough survey so that a broad respondent base feels concerned about the survey.
- managing to address the respondents in such a way that they are willing to participate in the survey.

### Tips:

- Keep the web-survey as short as possible
- The covering letter/e-mail should be short, but still cover all the necessary information (Topic + aim of the project, contractor, customer)
- If available attach endorsement letter(s) to the covering letter/e-mail (increases the credibility of the survey)
- Try to avoid open text fields in the survey. This yields to a lot of extra work during the analysis. Use dropdown, checkboxes or slide-controls instead

## 5 Policy analysis

### Short description:

An important task within the IIT project has been a systematic matching and analysis of the interplay between emerging trends in innovation practice and innovation policy design and implementation within and across European Member States. To support this task we have assessed existing innovation policy instruments<sup>3</sup> at national and European levels as a basis for developing recommendations for improving Europe's innovation potential and present and comparative analysis of the policy portfolios of the 11 member states covered by the study.

### Basic steps in the analysis of innovation policy:

The Working Task was divided into two parts: the first part contained the information gathering and the policy survey procedure, the second part contained a report on the overview of eleven member states' innovation policies.

The first part comprised the following working steps:

- *Classification of the innovation policy instrument*, according to policy goals based on a working paper by NESTA/MIoIR<sup>4</sup>. This paper defined a broad range of supply-side (influencing innovation generation) or demand-side policy instruments (influencing those requesting, buying or applying innovations). Within these two classifications innovation policy instruments are grouped according to seven major innovation policy goals:
  - I., Increasing research and development investment: supported by fiscal instruments: tax incentives, grants and loans etc.);
  - II., Augmenting skills: supported by instruments for improving supply and demand of skills
  - III., Access to expertise: services to support enterprises in adopting innovation and deploying new technologies
  - IV., Strengthening system-wide capabilities and exploiting complementarities: supported by instruments for technology transfer and commercialisation; clusters and Smart Specialisation
  - V., Enhancing innovation demand: supported by public procurement policies
  - VI., Improving frameworks for innovation, including regulation and standards: Supported by instruments for the development and use of innovative standard and regulations

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<sup>3</sup> Appropriate policy measures are critical to support innovation (OECD (2010), "Improving Governance and Measurement", in The OECD Innovation Strategy: Getting a Head Start on Tomorrow, OECD Publishing. doi: 10.1787/9789264083479-9-en) since it may help policy makers in accomplishing the following:

- Assessing the contribution of innovation to achieve social and economic objectives.
- Understanding the determinants of and obstacles to innovation to design policies with higher chances of success.
- Evaluating the effectiveness of different policy approaches, and consequently adapting current policies or designing new ones.
- Benchmarking innovation performance and conditions for innovation to those of other countries.

<sup>4</sup> Edler, J., Cunningham, P., Gök, A., Shapira, P. (2013) Impacts of Innovation Policy: Synthesis and Conclusion. NESTA/MIoIR Working Paper, No. 13/21, <http://innovation-policy.org.uk/compendium/>

- VII., Facilitating exchange and dialogue about innovation: supported by instruments for evaluation or foresight exercises
- *Policy Matrix*: The policy matrix was prepared according to seven major innovation policy goals. The policy matrix includes both instruments that are directly targeted at encouraging innovation or which have indirect effects on innovation while addressing other policy purposes. ( see the Annex: Template and instructions for policy table)
- *Gathering information about policy instruments*: The policy matrix was compiled by the research partners. The partners were asked to rank the importance of each policy instrument in their country based on information about policy-making activity in that category, drawing mainly on data available from public information sources including the annual RIO Reports produced by the European Commission (JRC Science) and the OECD innovation policy platform (for more detailed information see deliverable 3.1). The rankings were: no relevance (0), little relevance (1), moderately relevant (2) or highly relevant (3).
- *Complete the policy matrix*: Where an instrument was relevant (rankings 1-3) the partners were asked to add additional information about the form and content of the policy instrument, including the dates of the policy, sectors covered and any associated performance policy instrument.

The second part of the task, the overview of eleven member states' innovation policies which presents the main STI policy trends for each of the eleven countries, started with :

- a *comparison of the national strategies for STI*: the first section of the report contains a brief indicative analysis of some of the primary similarities and variations in the innovation policy portfolios of the studied countries.
- The *country profiles*<sup>5</sup> are designed to provide an overview of the policy instruments available in each national setting, and highlight some trends and potential gaps in each country's innovation policy profile.
- *Feedback loop*: the individual country profiles were sent to an innovation policy expert in each country for review and comment.

#### Advantages:

- The policy matrix sheet provides a well balanced mixture of quantitative and qualitative indicators
- The policy matrix provides a set of comparable indicators for each policy area
- It allows an identification of barriers and gaps in each policy area
- It allows to develop a typology of countries for each priority area
- Project partners can learn about the range of own and partners relevant public policy instrument
- The country profiles are easy to compare and informative about the trends in the public innovation policy

#### Challenges/Disadvantages:

- Partners must be well informed about the current policy instruments or have a well established expert network to get all relevant information

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<sup>5</sup> Please note: the country profiles contained in this document are largely based on policy data collected in Autumn/Winter 2015 and should be read with this timeframe in mind.

- The defined policy goals in the policy matrix should be understandable for each partner, which seems very challenging given the broad range of national policy instrument
- Rather time consuming in preparation and feedback loops

Tips:

- Reduce the effort of interpretation to a minimum through well-defined policy goals
- Schedule enough time for revising and discussing the policy matrix internally and complete the policy tables
- Schedule enough time for feedback loops from the policy experts both in the preparation phase of the policy matrix as well as by reading the policy reports.
- Please note that comparable data was readily available on policy goals 1-5, which have been completed for nearly all countries. Comparative data relating to policy goals 6 and 7 was less readily available and these sections have only been included when the country correspondent provided significant information relating to that goal.

## 5.1 Policy workshops

Short description:

The aim of the task is to build a two level workshop concept based on the results and question generated on the review of national and European innovation policies and the analysis of policy gaps. The first building block are policy focus-groups at the national level. The outcome of these focus groups feeds into a common policy briefing and input paper for a high level workshop at the European level.

Basic Steps in Policy Workshops

In the first building block working steps include:

- Generate a future oriented policy discussion with high level policy experts at the national level
- *Addressing different stakeholder groups* (representatives from the industrial side, representatives from the policy side and representatives from the research side)
- *Preparing a workshop invitation* and an agenda with:
  1. Opening Session: Introduction into the IIT project
  2. 1st Session: Collecting first comments of workshop participants on the project results
  3. 2nd Session: Grouping the workshop participants in 2-3 working groups and group work on working hypothesis/working questions
  4. Closing Session Collection of the findings from the group work
  5. Discussion of the findings and summing up
- *Creating short input paper* for the high level policy experts before the workshop with:
  1. aim of the workshop (Hypothesis/ Key questions to be answered with help of the workshop participants)
  2. key points of the IIT project,
  3. initial results of the interview analysis regarding innovation policy issues
- During the Workshop a *documentation of the workshop results/findings* should take place

- *Take minutes*
- *Foto documentation*
- Finally *main findings are summarizing in English*, using a standardized form.

Advantages:

- Due to the standardised structure the workshops of the different countries will be comparable.
- With help of the workshops we are able to hearing and gathering the view and opinion of high quality expert group on our hypothesis

Challenges/Disadvantages:

- The coordination partners should determine the workshop's objectives and clearly define its expected outputs
- There is challenging to get the right question and hypotheses as basic for discussion arousing the interest of the policy experts - All participants should be expected to be involved on a full-time basis for the duration of the workshop.

Tips:

- Find the Moderator for your workshop
- Schedule enough time for invitation the experts
- The workshops in the different countries should follow to a great extent the same structure.
- Tools like short questionnaires with standardized questions for all countries could be used during the workshop.

## 6 Further information

This report has been prepared with utmost care to provide sufficiently specific information on the research approach and applied methodology, in order to allow all interested parties to comprehend the approach taken in the study, and – if so wished for – reproduce the study in the same or very similar format elsewhere. In the latter case, please do not hesitate to approach members of the team with requests for further information, explanation or support.

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## 8 Appendix

### NACE codes of sectors included in IIT research

- ICT and ICT services
  - ICT manufacturing industries: NACE 261-264, 268
  - ICT trade industries: NACE 4651, 4652
  - ICT service industries: NACE 5820, 61, 62, 631, 951
  
- Biopharmaceutical sector
  - Biopharma in manufacturing industries: NACE 210
  - Biopharmaceutical research: NACE 7211
  
- Agro-food sector
  - Agriculture: NACE 012, 013, 014, 016
  - Agro-food in manufacturing industries: 101-108, 1101-1104
  - Agro-food in trade and retail trade: 462, 463, 472
  
- Manufacturing sector
  - Whole NACE section “C” 10-33 (excluding the specific ICT, food and biopharma sectors already covered)

## Example for a letter to companies

Dear Sir/Madam,

Industrial innovation practices are changing continuously: many companies use open innovation, the product development has become faster and more flexible, social media offer new opportunities and establishing innovation co-operations becomes more and more important.

The European Horizon 2020 project “Industrial Innovation in Transition” aims to provide a realistic and practice-based understanding of current industrial innovation practices in Europe in order to assess European and national innovation policies. Based on an international comparison a better understanding of current and future challenges emerge. Identifying such challenges is highly relevant for developing and adapting policy measures on the national and European level. The international project consortium – consisting of Aalto University/Finland, Joanneum Research/Austria, University of Manchester/United Kingdom, University of Twente/Netherlands and Zabala Innovation Consulting/Spain – gets the support not only from the European Commission but also from several, large company associations like the European Round Table of Industrialists, Digitaleurope, Food Drink Europe and Orgalime.

The knowledge and experience of innovative and successful enterprises are of essential importance for our research to develop target-oriented policy recommendations. To acquire these insights interviews with 800 selected companies from eleven European Member States will form the basis of this survey. [Your company] is a very innovative company and you are familiar with the challenges of a successful innovation management. We would like to invite you to participate in our project and to share your experiences with us in a personal interview (1.5-2 h). In the interview the following topics are discussed:

- Business environment and innovation strategy
- Experiences with open innovation, innovation networks and co-operations
- Forecast activities and identifying future innovation opportunities
- Innovation management of incremental and disruptive developments
- Experiences with public funding

Furthermore, we value your insights and data. Therefore we guarantee that your data and information will be treated **confidentially**. Only aggregated or anonymised data are open to public so that no individual information about your company can be traced back.

Through your participation you will receive the following **benefits**:

- The possibility for reflection and online **benchmarking** of your own innovation practices by having access to a database based on the aggregated results of 800 interviews in eleven European Member States.
- **Workshops** for discussing our results and policy recommendations.

You can visit our website for further information: [www.iit-project.eu](http://www.iit-project.eu).

We are looking forward to your reply and the opportunity to learn more about your company and your experiences with innovations.

Yours sincerely,

## Example for a support letter of an association

EUROPEAN ROUND TABLE OF INDUSTRIALISTS



Mr Erkki Ormala  
Professor of Practice, Innovation Management  
Department of Management and International Business  
Aalto University School of Business  
PO Box 21210  
00076 Aalto  
Finland

28 May 2014

*Erkki*

Dear Mr Ormala,

We would like to express our support for your work on the subject of European industrial innovation.

Ultimately, the European Union's competitive edge in a globalised economy depends on its capacity to innovate. Therefore we strongly believe that your report is valuable and timely, even more in the context of the new EU legislature and need for a concrete European growth agenda.

We have encouraged ERT Member Companies to contribute to your work and would be very much interested in participating in the analysis and dissemination of the results of your study.

Kind regards,

*Brian*

Brian Ager

Secretary General

EUROPEAN ROUND TABLE OF INDUSTRIALISTS I.V.Z.W./F.A.I.S.B.L.

Place des Carabiniers 18a, B-1030 Bruxelles, Belgique • Karabiniersplein 18a, B-1030 Brussel, België  
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## **Interview guideline**

- Position and role of the interviewee

### ***Business environment and company strategy***

This section seeks to establish the context and factors, which drive innovation strategy.

- What is the competitive structure of your main markets? And your firm's position within this?
- What position do you occupy in your value chain?
- What are your firm's core technological competences?
- How important is innovation in your business strategy?
  - How much do you emphasise each of the following in your business strategy? With what relative effort?:
    - supporting current processes and markets
    - developing next generation products and processes
    - establishing new businesses (in new value domains)
    - developing and implementing new core technological competences
  - What is your firm's time horizon for products (product life cycle) on the market and innovation processes (time to market)? Have these changed in the past 5-10 years?
  - What would you describe as your firm's key innovations in the past five years?
  - By what mechanisms is innovation integrated in your business strategy?
- How would you describe your innovation strategy (scope and concept)?
  - organized around technologies, functionality, product areas/markets, affiliations/locations, customer needs
  - Has the balance between technical and non-technical innovation changed over the last few years?
  - Are stock market expectations taken into account when innovation strategy is formulated

### ***Mapping the future environment***

- Do you 'map' the future innovation environment for your firm? If so, which aspects? (technologies, economic development, policy and regulations, markets or customer behavior, competition)
  - If so what methods do you use? What is the value of these to your mapping?
    - quantitative: patent analysis, bibliometrics, analysis of social media, crowd-sourcing of ideas, big data...?
    - qualitative: scenarios, horizon scanning, roadmaps, surveys, analysis of media, consultants...?
    - informal approaches such as tracking conferences, public information...?
  - How do you apply the results of these analyses? E.g. for developing strategy, initiating innovation projects, or making decisions on innovation projects later?
  - Has your approach to or use of mapping changed in the past 5-10 years?

### ***Innovation ecosystems***

- Analysts today regularly refer to the idea of an ‘innovation ecosystem’ to describe the interdependencies firms have with collaborators, suppliers, customers, public research bodies, other infrastructure, finance and regulators. These typically involve flows of knowledge, people, finance and services. These may be international, national, sectoral or specific to a market. We have some questions about our interactions with this extended network:
  - How relevant is this idea for your firm’s innovation activities?
  - Has the relevance/importance changed in the past five years?
  - How important for your innovative activities are: business collaborators (large firms/ SMEs/ start-ups), suppliers, customers, public research bodies (including universities), other infrastructure, finance, regulators, any other players?
  - Which of the above have the greatest influence on the form and direction of the ecosystem?
  - Has this changed in the past five years? If so what were the main drivers of that change? (competition, technological progress, regulation etc.?)
  - What is your firm’s position/role within this ecosystem?
  - How do you maintain/strengthen your position within the ecosystem?
  - Could you describe the most important processes (e.g. knowledge flows, mobility of people, etc.) of the innovation ecosystem(s) in which your firm operates?
- Do you seek to develop the ecosystem as a part of your firm’s strategy?
  - Do you have an explicit strategy for influencing other parts of the ecosystem?
  - How do you respond to the efforts of other players to alter or influence the ecosystem?
  - What are the main levers available for you to do this?

### ***Innovation management and practice***

This section seeks to establish the processes and routines by which the company manages innovations internally with a particular emphasis on what is new.

- Please outline the main stages of an innovation project within your firm from conception to market?
  - What are the main factors involved in beginning an innovation project? What are the main points of handover between the main stages you have identified?
  - How do you manage the progression of a project (e.g. stage-gate, agile, customer-driven, other...)?
  - Which parts/functions of the company are involved? If cross-functional teams are involved how are these coordinated?

How do you manage your innovation process?

- Do you use any standards (e.g. CEN/TS 16555-1:2013, Six Sigma, etc.) to manage your innovation process?
- Do you differentiate between incremental and radical innovations in your management structure or processes?
- How important are web-enabled innovation tools for your innovation process? What are the experiences?
- What about big data? How do you use big data in your innovation activities?
- Do you seek to expand the market prospects for innovations after initial introduction to the market?
  - What actions are taken to do this?
  - What are the roles of partnerships, platforms, standards, regulations, social media, crowd-sourcing etc.?
- Who are the main actors involved in making decisions about innovation within the company? (organizational and individual e.g. business units, corporate or business unit R&D, CTO, planners..)
- How do you report on and assess the overall innovation progress in your company?
  - Who decides on the progress of an individual innovation project?

- What are the main performance criteria? Any formal processes?
- Has your firm's approach to innovation management (organisation, processes and tools) changed in the last 5 or 10 years?
  - If so how?
  - What has the effect of these changes been?
  - What were the drivers of these changes?
- Is open innovation a part of this strategy? How is it used? What are the experiences?
  - To what extent do you rely on outside organizations to provide/augment core technological knowledge?
  - Apart from your core technologies what innovation-related knowledge would you seek to source from outside the company?
  - Do you have start-up or entrepreneurship activities within your company? If so, how are these integrated in the innovation strategy?
  - Does your firm engage in mergers and acquisitions explicitly to enhance innovation or innovation assets?
  - What is the role of Intellectual Property and how do you manage it? What is the role of IP rights?
  - Do you provide R&D and services for and share knowledge with other partners?

### **Public policy**

This section seeks to assess the relevance of policy interventions for innovation in the company. This section distinguishes between **domestic** and **EU level** policies.

- What are your main challenges related to your policy environment when innovating (incremental/radical innovations)? If you find any of the following issue as a barrier, please, specify why and how?
- Do you consider any of the following to be major barriers to successful innovation for your company at the *domestic/EU level*?
  - access to finance
  - access to knowledge
  - access to markets
  - lack of capabilities or skills
  - regulation
  - establishing partnerships
  - establishing standards
  - IP system
  - Any other (please specify)
- Which *domestic/EU level* public policy initiatives have been the most important for your firm in addressing these barriers (grants/loans/fiscal incentives/public procurement/ education and training/ consultancy support/public research organizations/other)?
  - Have these changed from the previous five years?
- What are main gaps in *domestic/EU level* public policy you would like to see addressed?

### **Any other issues**

Are there any other issues you would like to raise about any of the topics we have discussed today, or is there anything we haven't discussed that you would like to raise about changes in the innovation practices of firms and / or the policy environment?

## Factsheets

Short facts about: [company name]



Please select  
(mark with a cross):

Reporting unit		
whole company group	a single business unit or single company of a company group	an independent company
Currency		
EURO	US Dollar	GBP

- Main industry (NACE-Code)

- Growth over the last five years measured by turnover (estimates)

Turnover				
2014	2013	2012	2011	2010

- Profitability over the last five years measured by EBITDA

EBITDA				
2014	2013	2012	2011	2010

- Employment creation during last five years measured by personnel

Employment				
2014	2013	2012	2011	2010

- Market Share

Market share at the group/company level (mark with a cross):				
< 5 %	< 10 %	< 20 %	< 30 %	> 30 %

- Share of turnover of those new products/services that have been brought to the market during the past two years (in %):

- R&D investment and its approximate location (domestic, within EU, outside EU)

R&D investment in 2014	
<b>Total R&amp;D expenditures</b>	
Domestic (> 50 % ?)	-
EU	-
Outside EU	-
<b>Alternativ: R%D intensity</b>	<b>%</b>

# Interview Summary Report



Company code:		Company Size (employees) :	
Company sector:		Channel to approach:	
Company activity:		Company type:	
Listed company (Yes/No):			

(Use codes as specified at the end of the document)

<b>Business environment and company strategy</b>
<i>Business strategy, innovation strategy, horizon of products/services, change in horizon, key innovations in last 5 years, experience of OI...</i>
<b>Innovation ecosystems</b>
<i>Position in Ecosystem, intention to influence the ecosystem, means of maintenance/strength of position, inter-linkages with Stakeholders within the ecosystem...</i>
<b>Innovation management and practice</b>
<i>Differentiation between radical &amp; incremental innovation, innovation stages, methods of innovation &amp; risk management, Web-enabled innovation tools...</i>
<b>Mapping the environment</b>
<i>Why and How does the company map the environment, and How does it apply the mapping findings...</i>
<b>Public policy</b>
<i>Relevance of policy interventions for innovation in the firm, distinguishing between domestic and EU level policies</i>
<b>Optional: if any unusual or emergent topics</b>



*Company code:* following IIT coding procedures

*Company sector:*

- 1 ICT
- 2 Manufacturing
- 3 Biopharmaceutical
- 4 Agro-food
- 5 Clean technologies

*Company activity:* According to classifications established in D2.2 – 3.2 Sector definitions

*Channel to approach:*

- 1 Partner own contacts
- 2 Association / Cluster
- 3 Public data-base (i.e.: patents)
- 4 Business data-base (i.e.: Kompass)
- 5 Other i.e.: industrial directory at local / regional / national level

*Company type:*

- 1 Multinational Company (MNC)
- 2 Part of a MNC
- 3 Independent Company

## Coding tree and memos

Superior Code	Subordinated Code	Memo
BEC_Competitive structure of main markets		Q: What is the competitive structure of your main markets?
	Monopoly	No. of competitors. Only 1 company in market
	Competition in niches	The market is segmented and the competition is different (competitors, number of competitors) in each segment or niche
	Full (open) competition	The market is not segmented and all the companies are disputing the market to each other
	Oligopoly	Oligopoly structure= less than 5 companies in market
	Other	
	Did not know	
	Did not ask (no data)	
BEC_Type of competition		
	Price-based	The price is a clear competition factor (may be low-price or high-price)
	Non-price	Non-price competition means e.g. technological competition, time to market, quality competition, etc.
	Did not know	
	Did not ask (no data)	
BEC_Firm position within main markets		Q: What is your firm's position within this?
	Market leader	The market leader is dominant in its industry. It has substantial market share and extensive distribution arrangements. It is typically the industry leader in developing innovative new products and business methods.
	Follower	A company which enters a particular product market after another firm has become well established in that market. A market follower is in a strong, but not dominant position and is content to stay at that position.
	Peer competition	A company that is somewhere in the middle of the market trying to improve its position. 5 or more companies are in roughly the same position in terms of market share.
	Other	
	Did not know	
	Did not ask (no data)	
BEC_Firm position within value chain		Q: What position do you occupy in your value chain?
	Suppliers	Supplier of components (Distributor of components, physical components e.g. chip), systems (Distributor of systems, immaterial components e.g. software) or services (Distributor of services);

	Assembler or integrator	<p>An assembler is a company that collects different components from different sources, combines them and sells the package as a final product</p> <p>A systems integrator specializes in bringing together component subsystems into a whole and ensuring that those subsystems function together. Subsystems include also knowledge to which is required to develop new innovations. System integrators connect different stakeholders, producers and customers into the same value chain. Usually controls distribution and demand side. Examples</p>
	Producers	Makes products: Collects the components, conducts assembly or orders assembly from an independent assembler and delivers the product or service to a customer
	Other	
	Did not know	
	Did not ask (no data)	
BEC_Firm's core technological competences		Q: What are your firm's core technological competences?
	Did not know	
	Did not ask (no data)	
BEC_Importance of innovation in business strategy		Q: How important is innovation in your business strategy?
	Innovation drives business strategy	As a result, innovation has a decisive influence on the decision-maker of the company.
	Business strategy drives innovation	As a result, decisions based on some business criteria (e.g. profitability at short-term) dominate against investments on innovation, long-term vision (future market needs).
	Other	
	Did not know	
	Did not ask (no data)	
BEC_Innovation in business strategy		Q: How much do you emphasise each of the following in your business strategy? With what relative effort?
	Supporting current processes and markets	This is related to incremental innovations. Try to get the interviewee to give an indicative figure or proportion
	Developing next generation products and processes	This is related to incremental innovations. Try to get the interviewee to give an indicative figure or proportion.
	Establishing new businesses	This is related to radical innovations. Try to get the interviewee to give an indicative figure or proportion. New value domain refers to completely new markets, which do not exist yet e.g. real time health surveillance.
	Developing and implementing new core technological competences	This is related to radical innovations. Try to get the interviewee to give an indicative figure or proportion. Developing and implementing new technologies refers to using radical new

		technologies to address new or old markets e.g. digital maps, digital cameras
	Other	
	Did not know	
	Did not ask (no data)	
BEC_time horizon_ innovation process		Time to market/ innovation process refers to how long it takes BEFORE product is introduced to market
	<1	
	1-3	
	4-7	
	8-15	
	>15	
	Not applicable	E.g. if the company is still developing an innovation (their first) and still does not have a product on the market yet.
	Did not know	
	Did not ask (no data)	
BEC_time horizon_ product life cycle		PLC refers to life of a product in the market from introduction to growth, maturity and decline; how long does the product last in the market?
	<1	
	1-3	
	4-7	
	8-15	
	>15	
	Not applicable	E.g. if the company is still developing an innovation (their first) and still does not have a product on the market yet.
	Did not know	
	Did not ask (no data)	
BEC_Change in time horizon_ innovation process		
	increase	
	decrease	
	no change	
	not applicable	E.g. if the company is still developing an innovation (their first) and still does not have a product on the market yet. Change in time horizon is not applicable if product has not been around long enough or if product is not yet on the market
	Did not know	
	Did not ask (no data)	
BEC_Change in time horizon_ product life cycle		

	increase	
	decrease	
	no change	
	Not applicable	E.g. if the company is still developing an innovation (their first) and still does not have a product on the market yet. Change in time horizon is not applicable if if they are still innovating or if product is not yet on the market
	Did not know	
	Did not ask (no data)	
BEC_Key innovations in last 5 years (1)		"Q: What would you describe as your firm's key innovations in the past five years?  Open coding please; try and use broad categories.  Examples: new product, new service, improved delivery time"
	Did not know	
	Did not ask (no data)	
BEC_Integration mechanisms		Q: By what mechanisms is innovation integrated in your business strategy?
	Structures	Innovation is integrated into the company through specific entities. There may be teams responsible for looking for new ideas or specific departments or units with responsibility for innovation. E.g. Advisory boards, scientific board, Technology councils, an R&D department
	Processes	Innovation is integrated through specific processes and tools - e.g. periodic meetings regarding innovation; opening the integration of innovation to the outside (e.g. formalized open innovation arrangements); brainstorming sessions; innovation suggestion box
	Actors	Innovation is integrated at the level of the individual - e.g. there is an innovation champion or one person that has responsibility for innovation (e.g. Innovation Director, Head of Innovation)
	Other	
	Did not know	
	Did not ask (no data)	
BEC_Scope and Concept of innovation strategy		Q: How would you describe your innovation strategy (scope and concept)?
	Organized around technologies	Technological development drives new functionalities and new product areas and markets
	Organized around functionality	The company is permanently searching new functionalities to generate new products/new product areas /new markets.

	Organized around product areas/markets	The company is permanently searching new market needs to develop and offer new products which will cover these needs.
	Organized around affiliations/locations	The innovation strategy highly depends on affiliations-relations with other companies / location factors may be crucial for innovation strategy adopted
	Organized around customer needs	Specific customer needs are highly taken into account to define the innovation strategy
	Other	
	Did not know	
	Did not ask (no data)	
BEC_Change in balance between technical and non-technical innov		Q: Has the balance between technical and non-technical innovation changed over the last few years?
	increase in technical innovation	
	decrease in technical innovation	
	increase in non-technical innovation	Normally non-technical innovation relates to complementary aspects of the product / process. Many times the product is delivered to the customer embedded in a service, and non-technological innovation is related to the service functionalities
	decrease in non-technical innovation	
	no change	
	Did not know	
	Did not ask (no data)	
BEC_Stock market expectations (1)		Stock markets include external investors in non listed companies
	Yes	
	No	
	Not applicable	e.g. for family owned companies
	Did not know	
	Did not ask (no data)	
MFE_Mapping the innovation environment		Q: Do you 'map' the future innovation environment for your firm?
	Yes	
	No	
	Did not know	
	Did not ask (no data)	
MFE_Aspects of mapping the environment		Q: If so, which aspects? (technologies, economic development, policy and regulations, markets or customer behavior, competition)
	Technology	
	Policy & regulations	
	Economic development	
	Customer behaviour	Analysis of (expected future) use of products and customer behavior, including possible more or less radical changes thereof
	Competition	
	Other markets/business sector	
	Other	

	Did not know	
	Did not ask (no data)	
MFE_ Methods of mapping		
	Scenario/horizon scanning	Use of qualitative and quantitative scenarios and systematic efforts to identify developments, be they technologies or other, which may become important in the future
	Roadmaps	Roadmap is a scheduled list of actions to get to a particular future state / scenario
	Consultants	Use of external consultants (mainly reports of consultants envisaged, but if consultants are charged with conducting foresight processes qualifies as well)
	Systematic/formalised future mapping	Foresight (future mapping activities) conducted by dedicated departments / people in the company
	Network foresight with partners	Companies conducting foresight activities together with partners within an innovation network or ecosystem
	Market analysis	Studies the attractiveness and the dynamics of a special market within a special industry
	Patent analysis	Using analysis of patents for future mapping (quantitative or qualitative), for instance analyzing technological trends or activities of firms via analysis of patent databases
	Social media	E.g. face book, twitter, etc. This may also include analysis of social media (may be qualitative or quantitative)
	Surveys, e.g. Delphi	The Delphi method refers to surveys among experts in a particular domain who are asked about their expectations, e.g. regarding when particular technologies may be available. I suggest to use this codes for any attempt at systematically asking a group of people on issues relevant for mapping the future environment.
	Personal contacts with partners	
	Personal contacts with customers	
	Tracking conferences/fairs/meetings	Attending conferences/fairs/meetings to gather information about new technologies, competitors, customers
	Public information	Includes all use of information which is in principle publicly available, also if it may need to be paid. Thus academic literature, legal texts etc. qualify as well. This stands in contrast to non-disclosed company information, e.g. if a company develops its own scenarios, commissions reports which are not publicly shared or sold etc.
	Professional networks	refer to networks related to the profession of people, e.g. professions proper (e.g. engineer's associations, ...), branch organizations, associations for particular technologies, etc. People you meet there are not necessarily partners, whereas partners refers to partners in innovation projects or regular firm activities. So, the latter can be linked to the ecosystem of a company and should by and large cover more informal ways of gathering information relevant for future mapping, whereas 'networked foresight' cover more explicit, dedicated forms of future mapping with partners/in ecosystems.
	Other	
	Did not know	

	Did not ask (no data)	
MFE_Applying findings from mapping		Q: How do you apply the results of these analyses? E.g. for developing strategy, initiating innovation projects, or making decisions on innovation projects later?
	developing strategies	Refers to developing the general strategy of a company or department of a company
	Initiation of new projects	Here insights from future mapping feed into decision processes about starting concrete projects, may or may not be part of formal stage gate processes
	Challenging existing projects	Here insights from future mapping feed into decision processes about stopping or modifying concrete projects, may or may not be part of formal stage gate processes For instance if considered in stage-gate decisions, or other moments when decisions are taken on continuation, cancellation, or adjustments of projects
	Challenging existing processes	Refers to stopping or modifying regular processes rather than circumscribed projects. For instance if considered in stage-gate decisions, or other moments when decisions are taken on continuation, cancellation, or adjustments of processes
	New market possibilities	
	New partners	
	Agenda building	Used to decide on directions and agenda of the ecosystem partners or aimed at enrolling and convincing actors beyond the ecosystem, e.g. by roadmap development
	Other	
	Did not know	
	Did not ask (no data)	
MFE_Changes in approach (1)		Q: Has your approach to or use of mapping changed in the past 5-10 years?
	increased or started	
	more systematic	e.g.: new department, new responsible person
	new aspects	e.g. policy questions, societal development, etc.
	new methods	
	new uses	
	Other	
	decreased or stopped	
	no change	
	Did not know	
	Did not ask (no data)	
IES_Concept of IES known to the company (1)		Q: Does the company know the IES concept?  Attention: The focus of this question is, whether companies know the idea/concept or not. They may not know the concept but they may have an IES and act in it. In this case the answer would be "NO"! However in the following code the answer should be "YES".
	Yes	
	No	
	Did not know	
	Did not ask (no data)	

IES_Relevance of IES for firm's innovation activities (1)		Q: How relevant is this idea (the IES concept) for your firm's innovation activities? Has the relevance/importance changed in the past five years?  Does the company has an IES and how imprtant is it?
	high	Applied daily to business operations
	medium	
	low	Heard of it; roughly applied
	no relevance	
	Did not know	
	Did not ask (no data)	
IES_Change in relevance/importance of IES (1)		Has the importance of the IES changed?
	Yes increased	
	Yes decreased	
	No change	
	Did not know	
	Did not answer (no data)	
IES_Stakeholders of IES and their importance		Q: How important for your innovative activities are: business collaborators (large firms/ SMEs/ start-ups), suppliers, customers, public research bodies (including universities), other infrastructure, finance, regulators, any other players? Code the stakeholders of the IES (e.g. collaborators for innovation projects) and add descriptions of the specific interactions.
	Suppliers	
	Customers	
	Public research bodies (inc. unis)	
	Other infrastructure	E.g. Railway infrastructure, broadband infrastructure (German Telecom), Incubator
	Finance	Investors, Banks, business angels etc.
	Regulators	
	Other	
	Did not know	
	Did not ask (no data)	
IES_Forms of interactions (1)		Please code how companies interact with the stakeholders of their IES, e.g. publicly funded innovation projects, unregular meetings of associations, strong customer involvement, innovation workshops etc.
	Did not know	
	Did not ask (no data)	
IES_Greatest influence on the IES		Q: Which of the above have the greatest influence on the form and direction of the ecosystem?
	Suppliers	
	Customers	
	Public research bodies (inc. unis)	
	Other infrastructure	
	Finance	
	Regulators	
	Interviewed company	
	Other	
	Did not know	
	Did not ask (no data)	
IES_Changes in the influence in IES (1)		Q: Has this changed in the past five years? If so what were the main drivers of that change? (competition, technological progress, regulation etc.?)

	Yes_drivers	please code not only a "Yes"-Quote but also a short description of what has changed Open coding
	Yes_effects	
	No	please code not only a "No"-Quote but also a short description of what has changed
	Did not know	
	Did not ask (no data)	
IES_Position in Ecosystem (1)		Q: What is your firm's position/role within this ecosystem?  Open coding of a short description here.
	Did not know	
	Did not ask (no data)	
IES_Means of maintenance/strength of position		Q: How do you maintain/strengthen your position within the ecosystem?
	cost/price driven	
	quality driven	
	influencing policy(e.g. regulation; standards)	for example: participating in committees and associations setting standards, discussing regulations or deciding on future policy agendas
	developing alliances (e.g. industry association)	building up alliances with business partners, policy makers, universities, associations etc.
	improving publicity	
	engaging in merger/acquisition	
	developing new technology	
	no strategy	No strategy or did not specify
	Other	
	Did not know	
	Did not ask (no data)	
IES_Most important elements of the ecosystem(s)		Q: Could you describe the most important processes (e.g. knowledge flows, mobility of people, etc.) of the innovation ecosystem(s) in which your firm operates?
	knowledge flows	For example: exchange of knowledge in associations or collaborative innovation projects, PhDs working for a company and bringing in new knowledge
	mobility of people	For example: people changing their jobs from one company to the other within the IES, employees and or researchers temporary visiting their collaboration partners
	financial support	Examples: companies giving financial support in times of crisis or for developing new ideas, financing a professorship or PhDs
	services	
	Other	
	Did not know	
	Did not ask (no data)	
IES_Develop the ecosystem as a part of firm's strategy (1)		Q: Do you seek to develop the ecosystem as a part of your firm's strategy?
	yes	
	no	
	Did not know	
	Did not ask (no data)	
IES_Managing ecosystem challenges (influential levers) (1)		Q: How do you respond to the efforts of other players to alter or influence the ecosystem?  Open coding
	Did not know	
	Did not ask (no data)	

IMP_Main innovation stages (1)		Q: Please outline the main stages of an innovation project within your firm from conception to market?
	Did not know	
	Did not ask (no data)	
IMP_Main factors involved in beginning an innovation project		Q: What are the main factors involved in beginning an innovation project? What are the main points of handover between the main stages you have identified?
	employee driven	Innovation ideas originated from any employee in the company, not only management. The employee may not have innovation or R&D in his/her remit
	cost-driven	The cost of an innovation project is a determining factor in beginning it
	customer-driven	Innovation ideas and projects originating from the customer or to satisfy a customer's need
	product-driven	Where an end product (design or functionality) is envisaged and an innovation project is undertaken to reach that final solution
	R&D-driven	Where innovation projects begin due to the (availability of a particular) technology and is driven by the technical ability or component of the product. There may not be a specific customer for whom the innovation is being developed or even demand. It may not even result in a final product. These innovation projects tend to be longer in duration, more uncertain, more risky.
	other	
	Did not know	
	Did not ask (no data)	
IMP_Criteria of handover between main stages		Q: What are the main points of handover between the main stages you have identified?
	cost and time table	
	business case still valid	
	feasibility	
	pre-defined performance criteria	
	other	
	Did not know	
	Did not ask (no data)	
IMP_Management of progression of a project		Q: How do you manage the progression of a project (e.g. stage-gate, agile, customer-driven, other...)?
	stage-gate	
	flexible	open progression of a project, allowing new ideas to flow in during the process as they emerge and become available. Flexible
	customer-driven	
	Other methods	
	Did not know	
	Did not ask (no data)	
IMP_Main parts/functions responsible for managing an innovation		Q: Which parts/functions of the company are involved in innovation projects?
	Research & Development	May include Engineering or Design teams or departments
	Marketing	Includes sales teams
	Business units	Strategic Business Units/ specific product lines
	other	
	Did not know	
	Did not ask (no data)	

IMP_Involvement of cross-functional teams (1)		Q: Are cross-functional teams involved in innovation projects and how are these coordinated?
	Yes	
	No	These can be further sub-coded into project-leader dominant (autonomous), functional leader dominant (lightweight), matrix (equal responsibility)
	Did not know	
	Did not ask (no data)	
IMP_Use of innovation standards		Q: Do you use any standards to manage your innovation process?
	CEN/TS 16555-1:2013	
	Six Sigma	
	No standards are used	
	Other	
	Did not know	
	Did not ask (no data)	
IMP_Differentiate between incremental/radical innovation (1)		Q: Do you differentiate between incremental and radical innovations in your management structure or processes? Do not stick too much to the terms radical/incremental. Use them as orientation for innovation processes which differ regarding their degree of risk&novelty. E.g. some companies have corporate research departments or institutes for their risky and longterm projects. Rather day-to-day innovations are developed in the business units (BU). More risky innovations may require the "okay" from the CEO, rather incremental innovations can be decided by the BU.
	Yes	
	No	
	Did not know	
	Did not ask (no data)	
IMP_Web-enabled innovation tools_ Creativity and idea generation platforms		Q: How important are web-enabled innovation tools for your innovation process? What are the experiences?  please code not only the level of importance, but also a short description of the experiences
	very important	E.g. online innovation competitions, virtual brainstorming sessions
	not so important	
	not at all important	Occasionally used; not consistent.
IMP_Web-enabled innovation tools_Innovation labs		
	very important	Virtual spaces that enable or support the innovation of those who participate in the space.  E.g. living labs (tend to be user-centred).
	not so important	
	not at all important	
IMP_Web-enabled innovation tools_Collaborative working tools		
	very important	E.g. Wikis, sharing via cloud, using Skype or other collaboration software
	not so important	
	not at all important	
IMP_Web-enabled innovation tools_Community-based innovation		

	very important	Typically used in the integration of consumers into the new product development phase  E.g. Use of online communities.
	not so important	
	not at all important	
IMP_Web-enabled innovation tools_ Crowdsourcing platforms		
	very important	E.g. Problem solving portals
	not so important	
	not at all important	
IMP_Web-enabled innovation tools		
	Never used web-enabled innovation tools	please code not only the level of importance, but also a short description of the experiences
	Other	
	Did not know	
	Did not ask (no data)	
IMP_Big data		Q: What about big data? How do you use big data in your innovation activities?
	Yes	Yes they collect and/or use big data
	No_Lack of skills	No they do not collect and/or use big data because of lack of skills
	No_Lack of IT-infrastructure	No they do not collect and/or use big data because of lack of IT-infrastructure
	No_not useful at this point of time	No they do not collect and/or use big data because of not useful at this point of time
	No_other	
	Did not know	
	Did not ask (no data)	
IMP_Market expansion after introduction (1)		Q: Do you seek to expand the market prospects for innovations after initial introduction to the market?
	Yes	Sub-code if specific examples given. Use any of the following: internet presence, publishing in peer reviewed journals, crowdsourcing, social media, regulations, standards, platforms, partnerships, others.
	No	
	Did not know	
	Did not ask (no data)	
IMP_Main decision making actors about innovation		Q: Who are the main actors involved in making decisions about innovation within the company?
	R&D department	
	General management	Senior executive/ leadership team. Includes company Board of Directors, CEOs, CTOs
	Dedicated central innovation committee/board	Refers to scientific boards or committees, or innovation committee
	Development department only	Please code only development department
	Research department only	Please code only research departments
	Strategic business units	The business units or specific product lines/units are responsible for innovation
	Marketing	Also includes sales
	Other	
	Did not know	
	Did not ask (no data)	
IMP_Innovation progress reporting		Q: How do you report on and assess the overall innovation progress in your company? Who decides on the progress of an individual innovation project?
	To CEO	
	To CTO	
	To BU manager	

	To Technology Board/Review Board	
	Via conferences	
	Via publications	Journals and industry publications
	Via newsletters	
	Other	
	Did not know	
	Did not ask (no data)	
IMP_Changes in innovation management approach		Q: Has your firm's approach to innovation management changed in the last 5 or 10 years?
	Yes_Organisation	Restructure or reorganisation to create a function, unit or individual(s) responsible for innovation
	Yes_Processes	Creating specific processes to manage innovation, e.g. using stage-gate innovation management process, creating bottom-up innovation idea generation schemes, formalised innovation mapping process
	Yes_Tools/methods	Creating or designing specific tools or methods to manage innovation.  E.g. starting to use roadmaps, horizon scanning, conduct market research, etc, using project management tools, new IT system, new collaborative software
	Yes_Other	
	No	Open coding
	Did not know	
	Did not ask (no data)	
	Drivers	Open coding
	Effects	Open coding
	Did not know (drivers/effects)	
	Did not answer/ Did not ask (drivers/effects)	
IMP_OI		Q: Is open innovation a part of this strategy? How is it used? What are the experiences?
	Yes_Expand market prospects	Here it's good to know, the different perceptions of open innovation. Innovation can be called open if external partners are involved, or if results are shared between participants, or if results are public or if companies use crowd sourcing etc. It would be highly valuable to get clarity on how companies define and believe to benefit from open innovation.
	Yes_Solve technical problems	
	Yes_Others	
	No	
	Did not know	
	Did not ask (no data)	
IMP_Inno.-related knowledge sourced from outside the company		Q: To what extent do you rely on outside organizations to provide/augment core technological knowledge?
	rely on a regular basis	please code not only the extent with which companies rely on outside organisations but also a short description why they rely on those organisations
	started to rely on outside organizations	please code not only the extent with which companies rely on outside organisations but also a short description why they rely on those organisations
	do not rely on outside organizations	
	Did not know	
	Did not ask (no data)	

IMP_Start-up or entrepreneurship activities (1)		Q: Do you have start-up or entrepreneurship activities within your company? If so, how are these integrated in the innovation strategy?
	yes	
	no	
	Did not know	
	Did not ask (no data)	
IMP_Merger/acquisition (1)		Q: Does your firm engage in mergers and acquisitions explicitly to enhance innovation or innovation assets?
	Yes	
	No	
	Did not know	
	Did not ask (no data)	
IMP_Role and use of IP		Q: What is the role of Intellectual Property and how do you manage it? What is the role of IP rights?
	Patents	national as well as international patents
	Confidentiality	examples: non-disclosure agreements or specific contracts to keep information within the collaboration
	Other	E.g. licensing, trade secrets
	Did not know	
	Did not ask (no data)	
IMP_Contract research (1)		Q: Do you provide R&D and services for and share knowledge with other partners?
	Yes	
	No	
	Did not know	
	Did not ask (no data)	
PP_Main challenges related to policy environment (1)		Q: What are your main challenges related to your policy environment when innovating (incremental/radical innovations)?
	Did not know	
	Did not ask (no data)	
PP_Barriers to successful innovation_access to finance		Q: Do you consider any of the following to be major barriers to successful innovation for your company at the domestic/EU level?
	Yes national/regional level	
	Yes EU level	
	Yes_global level	
	Yes Did not specify at what level	
	No	
	Did not know	
	Did not ask (no data)	
PP_Barriers to successful innovation_access to knowledge		
	Yes_national/regional level	
	Yes_EU level	
	Yes_global level	
	Yes_Did not specify at what level	
	No	
	Did not know	
	Did not ask (no data)	
PP_Barriers to successful innovation_access to markets		
	Yes_national/regional level	
	Yes_EU level	
	Yes_global level	
	Yes_Did not specify at what level	
	No	

	Did not know	
	Did not ask (no data)	
PP_Barriers to successful innovation_lack of capabilities or skills		
	Yes_national/regional level	
	Yes_EU level	
	Yes_global level	
	Yes_Did not specify at what level	
	No	
	Did not know	
	Did not ask (no data)	
PP_Barriers to successful innovation_regulation		
	Yes_national/regional level	
	Yes_EU level	
	Yes_global level	
	Yes_Did not specify at what level	
	No	
	Did not know	
	Did not ask (no data)	
PP_Barriers to successful innovation_establishing partnerships		
	Yes_national/regional level	
	Yes_EU level	
	Yes_global level	
	Yes_Did not specify at what level	
	No	
	Did not know	
	Did not ask (no data)	
PP_Barriers to successful innovation_establishing standards		
	Yes_national/regional level	
	Yes_EU level	
	Yes_global level	
	Yes_Did not specify at what level	
	No	
	Did not know	
	Did not ask (no data)	
PP_Barriers to successful innovation_IP system		
	IP system	
	Yes_national/regional level	
	Yes_EU level	
	Yes_global level	
	Yes_Did not specify at what level	
	No	
	Did not know	
	Did not ask (no data)	
PP_Barriers to successful innovation_Other		
	Yes_national/regional level	
	Yes_EU level	
	Yes_global level	
	Yes_Did not specify at what level	
	No	
	Did not know	
	Did not ask (no data)	
PP_Public policy initiatives		Q: Which domestic/EU public policy initiatives have been the most important for your firm in addressing these barriers?
	R&D grants	
	R&D loans	

	Tax incentives	
	Public procurement (including PCP?)	
	Education and training support and schemes (demand and supply o	
	Consultancy support (to enable access to expertise, exploit com	
	Public sector research organisations	
	Others	
	Did not know	
	Did not ask (no data)	
PP_Changes in public policy initiatives (1)		Q: Have these changed from the previous five years?
	Yes	
	No, remained more or less the same	
	Did not know	
	Did not ask (no data)	
PP_Gaps in public policy (1)		Q: What are main gaps in domestic/EU level public policy you would like to see addressed?
	Did not know	
	Did not ask (no data)	
AOI_Any other issues		

Template for the analysis of policy instruments

			Name of policy instrument	Implementation (0=no relevance, 1=a little relevance, 2=moderately relevant, 3=highly relevant or "999" = no information!	Time of implementation	Background and rationale	Geographic coverage	Beneficiaries of the measure (All companies, SMEs, Higher education institutions Scientists / researchers (as	Explanatory notes/ Comments	Sources	
<b>(1) National Policies for increasing research and development investment</b>	<b>Fiscal measures: tax incentives</b>	Corporation tax incentives (early stage R&D)									
		Corporation tax incentives (later stage commercialization) of									
		Payroll and social contributions tax incentives									
	<b>Fiscal measures: grants and loans for industrial R&amp;D</b>	Subsidised loans (including interest allowances)									
		Grants for R&D (early									
		Grants for R&D (later stage commercialisation and production of									
		Reimbursable loans									
		Innovation Inducement Prizes									
		Small project grants, awards									
		Studentships, Fellowships, cluster awards.									
	<b>Fiscal measures: providing equity support</b>	Publicly Supported Venture Capital									
		Guarantees									

		Support risk capital										
		Supporting development pilot lines/prototype creation										
		Mixed or subsidised private venture funds										
	Fiscal measures: supporting public sector research	University funding										
		Laboratory funding										
		Collaborative grants										
		Strategic Programmes for Industry										
		Equipment sharing										
	(2) augmenting skills and enabling access to expertise	Measures for improving and increasing the supply of skills	Policies for Training and Skills on Improving Innovation Capabilities in									
			Schemes and activities supporting structured innovative doctoral									
Schemes and activities supporting career prospects of PhD												
Schemes or activities to expose PhD students to industry												
National policies fostering the adoption and higher degree of												
Measures for improving demand for skills		Strengthening market valuation of training and competences										
		Skills formation policies (e.g. STEM policies)										
		Schemes and support actions for industrial PhDs (e.g. placement,										

		Support to hire professors or staff whose primary occupation is in									
		Recruitment of researchers (e.g. fiscal incentives)									
	Measures for enabling access to expertise	Technology advisory services provide information, technical									
		Schemes/policies to advise firms on innovation management									
(4) National Policies for strengthening innovation eco-system capabilities and exploiting complementarities	Measures for exploiting complementarities	Cluster Policy on Innovation									
		Schemes supporting R&D cooperation between business and higher									
		Schemes supporting Knowledge Transfer projects									
		Schemes supporting Knowledge Transfer networks									
		Support for technology transfer between firms									
		Support for technology transfer between sectors/platforms									
		Schemes/policies targeting specific sectors									
		Schemes/policies targeting KETs									
		Schemes/policies targeting specific Research and Technology									
		Schemes/policies supporting the creation of a favourable									
Measures supporting capabilities:	Support the creation, management and/or follow-up of spin-offs										

	entrepreneurship policy	Promotion of entrepreneurship/start up (including incubators)									
		Promotion of innovative start-ups incl Gazelles									
	Measures supporting capabilities: exploiting Intellectual Property	Schemes supporting commercialisation of innovation (including									
		Schemes supporting the use of consultancy to exploit IP									
		Schemes supporting the use of financial incentives to exploit IPR									
		Schemes to advise firms on innovation management and									
	(5) enhancing innovation demand	Measures for triggering innovation-driven competition	Support measures for public procurement of innovation								
Pre-Commercial Procurement											
Measures to Stimulate Demand for Innovation		Public Sector use of Policy Advisory services (e.g. technology									
		National Public Procurement Policies (e.g. procurement									
		Sectoral Public Procurement Policies (e.g. procurement									
		Support for the use of innovative/state of the art standards in public									
(6) improving frameworks for innovation, including regulation and standards	Measures for improving innovation framework	Support for the development and use of									
		Regulation									
		Funding linked to an assessment/evaluation exercise that conforms to									

		Evidence of evaluations that conform to international peer-									
(7) Facilitating exchange and dialogue about innovation.	Measures for facilitating exchange and dialogue	Awareness raising amongst firms on innovation									
		Support for networking and communication activities with the private									
		Policy Advisory services (e.g. technology foresight)									
		Schemes and support actions for international networking (e.g.									
		Schemes and support actions fostering interdisciplinary									