COOPERATION

THEME 3

ICT – INFORMATION AND COMMUNICATIONS TECHNOLOGIES

D2.4 Update of Impact Assessment and Forecast

Version 2.0

September 21st 2016

Executive Summary

This public deliverable is the final deliverable of WP2, which is devoted to carrying out an ex-ante impact assessment of Phase 3 of the FI-PPP. The report builds on the outcomes of the constant monitoring and assessment of the Phase 3 Accelerator programme performed by the FI-IMPACT team since the start of the project in mid-2014.

The deliverable presents final insights into the efficacy of the FI-PPP Acceleration Programme and builds upon the data presented in the previous deliverables D2.2 and D2.3. Therefore, it supersedes and substitutes the previous deliverables.

The main goal of this report is to present the results of the assessment of the potential success and economic impact of Phase 3 funded initiatives (subgrantees). It also intended to reveal the indirect effects these initiatives are generating in the European economy. It includes analysis and estimations of funded initiatives impact on employment. The Deliverable is based on an impact model to forecast revenues and one to estimate direct, indirect and induced impacts.

At the time of writing, the FIWARE Acceleration Programme is coming to an end. Our analysis provides insights into the profile and characteristics of the approximately 1000 initiatives selected for funding from the over 8,300 applications, which were received by Accelerators.

This deliverable presents details of the funded initiatives' market focus, technology coverage, selection models and the support activities provided by the Accelerators. Through constant monitoring, FI-IMPACT has mapped the evolution of the FIWARE start-ups and SMEs ecosystem throughout the entire duration of the Phase 3. Our analysis shows that Phase 3 contributed to the creation of new European businesses. In fact, 46% of the funded initiatives are start-ups. The A16 community was able to strongly engage with lots of young, eager start-up companies that were born with FIWARE. The Accelerators followed these young companies in their very early phase of growth, supporting the development of their business models and strategic plans. The FIWARE technology platform provided them with the tools to develop innovative solutions, and in line with the latest trends of the ICT market, the offering is strongly focused on the mobility and IoT technologies.

In the second year of the project, FI-IMPACT performed a second round of KPI measurement on 648 funded initiatives up to May 16 2016 with the aim to assess again the market readiness of the funded initiatives and their potential performance. Our KPI framework focuses on five areas: Innovation, Market Focus, Feasibility, Business and Consumer Market Needs. While the 648 subgrantees perform moderately well in the Innovation Focus, Market Focus and Market Needs KPIs, the level of performance for the Feasibility KPI is lower, potentially indicating a weakness in their path towards commercial success. Our assessment also investigates the contribution of these initiatives to a series of social challenges, and whether their solutions are targeting specific groups of users (from disabled people to elderly): the results show that generally the social areas are not their "number one" priority. Data highlights some focus on improving quality of users' life, providing better access to information and data, and improving general wellbeing (health and fitness) and e-inclusions. Besides this, we could also consider that

the most relevant social impact will be the potential creation of new jobs, estimated at up to 100,000 new jobs by 2020.

The current deliverable presents also the 2nd, and final release of the model developed by IDC, for the time horizon 2014-2020 to assess the impacts on the markets where the Phase 3 initiatives are or will soon be operating, in terms of the expected number of companies surviving by 2020 and their potential revenues and users.

By the year 2020, FI-IMPACT expects that Phase 3 will have contributed to the creation of 300 healthy enterprises, which are a subset of the initial 985 funded initiatives. These companies will leverage the FIWARE open-source technology platform to gain approximately 394 €M of revenues in the year 2020, increasing from the 279 €M of the 1st release of our model, which correspond to 1.2 €B cumulative revenues in the 2014-2020 timeframe. The greatest share of the 2020 revenues, 203 €M, will be generated by the providers of hardware and software solutions that will likely exploit the IoT wave of innovation. As such, this is already a very positive direct impact of the 80 €M invested by Phase 3 in the acceleration programme.

To explore the spectrum of future trends, and take into account the potential variations of revenue forecasts to 2020 under different economic and framework conditions, we built two additional scenarios: in the optimistic scenario the revenues would reach 474 €M by 2020 generated by 374 companies, with almost 6,000 jobs created; on the other hand, under the pessimistic scenario we expect reduced revenues of 319 €M generated by 278 companies, with 4,0000 jobs created.

But, what if FIWARE and the Accelerators did not exist? FI-IMPACT analyzed the consequences of this counterfactual scenario. We assume that only 690 new start-ups would have found enough seed capital to start their journey to the market in the same period. The forecast revenues would fall to 110 €M in 2020 generated by 250 surviving enterprises, compared to the 394 €M generated by 325 enterprises in the baseline scenario. Cumulative revenues to 2020 would fall by 71% from 1,204 €M to 348 €M. In other words, the additional direct impact of the FIWARE programme is estimated at 776 €M additional cumulative revenues and 65 additional enterprises by the year 2020.

As anticipated above, FI-IMPACT carried out the economic impact assessment of the Phase 3: the results provide a clear picture of the relevant economic and employment benefits for the European economy for the period 2016-2020. Under the baseline scenario, the economic impacts per year on the EU economy are expected to increase from 2.2 €B in 2016, to 9.3 €B in 2020, with a growth in the jobs created from approximately 9,000 to 32,000 in the same period. The initial 80 €M of EC investments in the Phase 3 will ultimately generate cumulative economic impacts of 28 €B as well as up to 100,000 new jobs in the period 2014-2020.

Since these potential impact are dependent on the evolution of market and framework conditions, we considered 2 alternative scenarios. In the optimistic scenario, cumulative economic impacts could reach up to 43 €B by 2020, corresponding to 150% of expected baseline impact. Under the pessimistic scenario cumulative impacts would only grow to 18.2 €B (65% of baseline).

The FI-IMPACT analysis presented in this deliverable confirms the relevance of the benefits the EU economy will gain thanks to the investment in the FI-PPP Phase 3

initiative: for 1 € invested by the EC, we forecast 350 € of total economic impacts, which is a substantial multiplier. In terms of employment, each new job will have cost only 900 euros in investment by the EC. **The lion's share of impacts** is represented by the additional revenues and jobs created by the business customers of the subgrantees, leveraging the FIWARE-based solutions. According to our estimates, for each euro of revenues of the FIWARE enterprises, their business users will collect 17 Euro of additional revenues, thanks to productivity and competitiveness benefits. The business user benefits were estimated leveraging IDC's database correlating IT investments with revenues growth. This is a sound confirmation of the capability of the FIWARE ecosystem to improve the competitiveness and innovation of the EU industry.

Finally, this deliverable presents an analysis of the Phase 3 Accelerators' Good Practices performed by FI-IMPACT, and their correlation with the subgrantees' performance (presented as an Annex report to this deliverable). Its ultimate goal is to identify good practices that most influenced the chances of success of subgrantees. While the statistical correlation did not provide significant results, the qualitative analysis based on the outcomes of the direct interaction with the accelerators provided interesting insights about their good practices. The massive effort by the Commission to promote common practices among the A16 led to positive mutual learning processes. This approach helped the consortia with a stronger initial focus on SMEs or on start-ups to balance their focus and upgrade their innovation and growth objectives. The presence in the consortia of professional accelerators (with their networks in the investors community) and of technical partners (experts in FIWARE technology) were key success factors underlined by many accelerators.

The success of the accelerators' programme starts with a well-managed and wide-ranging communication campaign, a well-designed and quick selection approach, as well the involvement of experts in the final selection. Among the good practices identified, the analysis shows that the most successful are those with a very practical focus, including mentoring and coaching, teaching how to "pitch" to external investors or potential customers, strong networking, matchmaking and tutoring activities. These same practices are implemented and considered as key success factors by leading international accelerators and incubators, such as Y Combinator (the famous start-up home of Airbnb in the Silicon Valley), as confirmed by studies from various sources such as Cambridge University and the US Department of Commerce.

Disclaimer

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1. Introduction

1.1. Scope of the Deliverable

This is the final deliverable of WP2, devoted to carrying out an ex-ante impact assessment of Phase 3 of the FI-PPP. The deliverable presents FI-IMPACT's final insights into the efficacy of the FI-PPP Acceleration Programme and builds upon the data presented in the previous deliverables D2.2 and D2.3. Therefore, it supersedes and substitutes the previous deliverables.

This deliverable has the following objectives:

- Present the latest outcomes of the mapping activity carried out on the 985 FIWARE subgrantees, including:
  - An overview of the results of the Accelerators' calls;
  - An overview of the subgrantees by country of origin, market focus, FIWARE Enabler, use of innovative ICT tools, type of technology;
- Present an assessment of the subgrantees' performance on the basis of the identified KPIs, based on data collected in Year 2 of the project;
- Describe the market context for the FI-PPP Phase III funded initiatives, including the size of their potential market and forecast trends for the markets where the funded initiatives aim to compete by 2020;
- Present an estimate of the potential demand targeted by the solutions developed by the FI-PPP Phase III initiatives by 2020;
- Present the results of the Market model providing estimates of the subgrantees forecast revenues and customers by 2020;
- Present the results of the economic impact model estimating the forecast direct, indirect and induced impacts and jobs created by Phase 3 by 2020;
- Present, in the FI-IMPACT Accelerators' Good Practice Report annexed to this deliverable, the results of the FI-IMPACT analysis of the main practices implemented by Phase 3 Accelerators' and their correlation with the subgrantees' performance, in order to identify good practices which most influenced the chances of success of subgrantees.

1.2. Document Structure

This deliverable is structured in 6 sections plus an Annex, as follows:

- Chapter 1 presents an introduction to the report, and highlights its main objectives;
- Chapter 2 presents of the final results of the mapping of the FIWARE ecosystem and the 985 subgrantees by 16 Accelerators up to May 2016. The results are based on the data collected by FI-IMPACT through multiple sources, including the Impact Assessment Survey at May 15th 2016;
- Chapter 3 presents the second round of the KPIs assessment on 650 subgrantees, updating the results presented in the previous deliverable D2.3;
- Chapter 4 presents an articulated analysis based on IDC data of the potential demand in the market segments addressed by the funded initiatives, including the

market trends, and insights on the potential rate of success and different growth dynamics of the subgrantees.

- Chapter 5 presents the results of the Revenue Forecast model of the funded initiatives to 2020, under 3 scenarios taking into account alternative economic and development conditions;
- Chapter 6 presents the results of the Economic impact model designed to assess the economic and employment impacts of Phase 3 on the European economy to 2020, including direct impacts, indirect impacts on FIWARE solutions users and suppliers, and induced impacts, under 3 alternative scenarios as above;
- Chapter 7, finally, draws the conclusions of the overall analysis and highlights the key findings.
- The Annexes include
    - the glossary reporting the main definitions used in the text;
    - the methodological references listing the sources used for the analysis
    - the detailed methodology of the economic impact model
    - the FI-IMPACT Accelerators' Good Practice Report as a separate document.

2. Mapping of FI-PPP Phase 3 Funded Initiatives

2.1. Introduction

This chapter contains an insight into FI-PPP Phase 3 funded initiatives from calls 1, 2, 3 and 4 and is an updated version of the analysis presented in deliverable D2.3.

FI-IMPACT has been using the collected data to map the FIWARE subgrantees against some identified common characteristics, and across this chapter we provide a comprehensive view of their features, such as country of origin, team size, and target industry sector. In addition, relying on the available IDC data on the real market trends, we provide comparisons and insights on the vertical markets and technology focus of these projects. At first we analyzed the overall bunch of applications submitted to the 16 Accelerators, as shown by the figure below.

As of May 16th 2016, the 16 accelerators received in total more than 8,000 applications[1]. Of these, 985 projects have been selected and received funds since the launch of the FI-PPP Phase 3.

2.2. Comparative analysis of the proposals' submission

Looking at the submission rates shown in the figure below, 49% of all the proposals were submitted to 4 Accelerators: IMPACT (18%), **CeedTech** (12%), European Pioneers (11%) and Soul-FI (9%). Together, they received over 4,000 submissions:

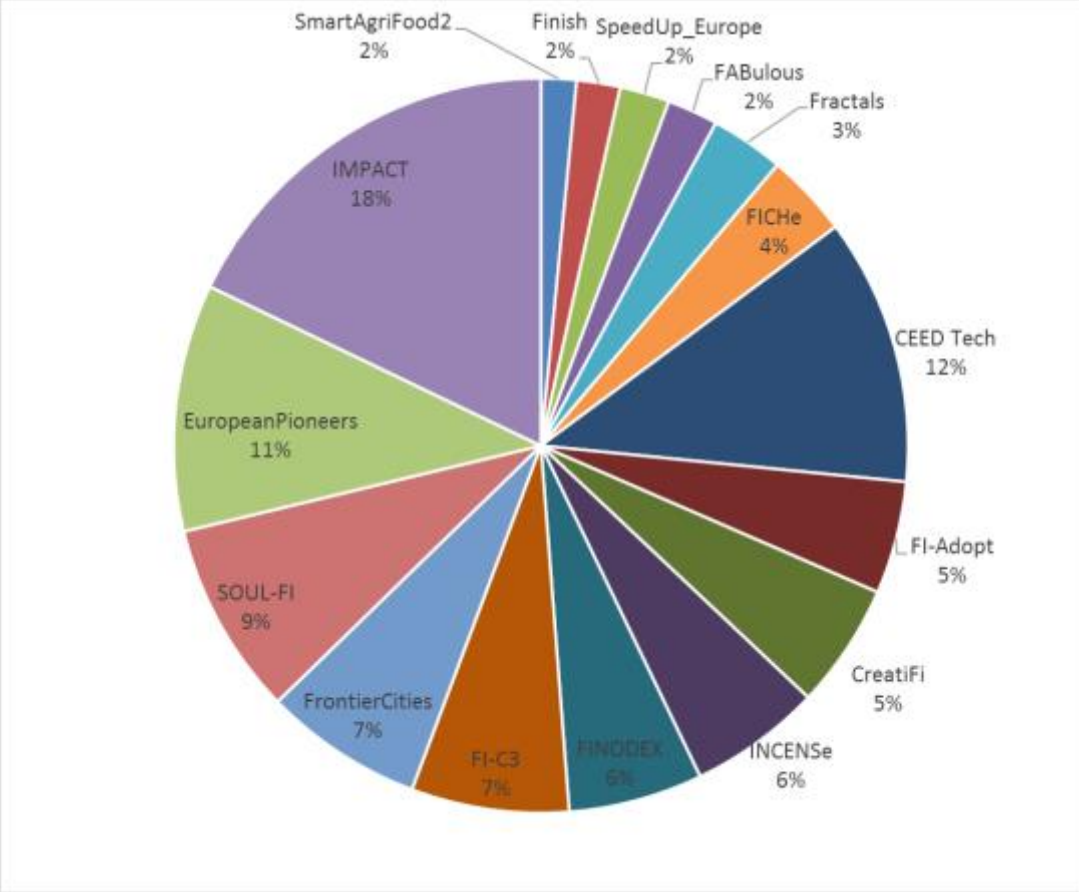
- **IMPACT** received 1,491 applications in three calls, and stands out as the main accelerator applicants submitted proposals to;
- 979 proposals were submitted to **CeedTech** in 2 calls;
- **European Pioneers** received 908 applications in two calls;
- **Soul-FI** received 711 applications in four calls.

However, when we look at the numbers of submitted proposals, we have to take into account that:

- Accelerators may differ in the number of calls for applications they have planned in their programs. Based on this, the overall number of submissions they receive may vary considerably;
- Accelerators may also follow different approach to select their projects (funnel approach vs. step approach): the ones applying the funnel approach, for example, launched only one call for applications.

[1] According to the information available to FI-IMPACT.

Figure 1 Submitted Proposals by Accelerator, %



n = 8,344; all submitted proposals

Source: FI-IMPACT June 2016, based on data provided by accelerators

The map below builds on data available to FI-IMPACT on the geographical origins of submitted proposals, showing from which countries most of the applications were received.

On the basis of the available information, the majority of proposals were submitted by EU-based organizations (95%), but it is quite interesting that the FIWARE Acceleration Programme was able to reach out outside Europe as 5% of applications were originated in other world regions. The FI-PPP Phase 3 has generated global engagement and participation.

Considering the thousands of business ideas submitted to the Acceleration Programme, the FI-PPP Phase 3 has been perceived as one of the most important seed funding sources in Europe in recent years.

FI-IMPACT analyzed 3,085 proposals from EU member states, and 162 proposals from outside the EU.

More specifically, the following map illustrates the country of origin of the initiatives that accelerators received, showing that three countries received almost 50% of all applications:

- **Spain** submitted 800 projects, accounting for 25% of all applications;

- **Italy** submitted 367 projects, accounting for 11% of all applications;
- **Germany** submitted 314 projects, accounting for 10% of all applications.

Figure 2 Applications generated inside and outside the EU, %

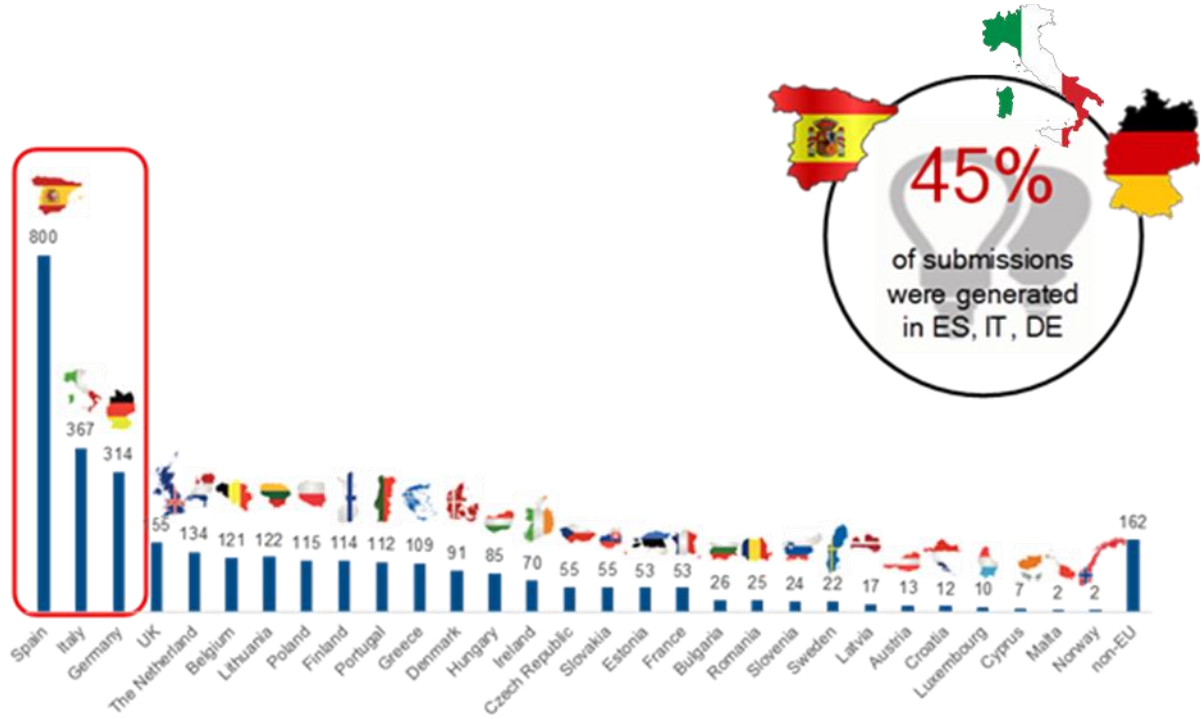
n = 3,247; submitted proposals for which FI-IMPACT received information on their country of origin

Source: FI-IMPACT May 2016, based on data provided by accelerators

One in three applications (36%) originated in Spain or Italy. Considering the countries' relative populations compared to the number of submitted proposals, among the biggest member states only a small amount of applications came from France.

The following bar explains in detail where projects come from. Excluding Spain, Italy, and Germany, one third of applications were submitted from the UK, Netherlands, Belgium, Lithuania, Poland, Finland, Portugal, Greece, and Denmark, while SMEs submitted 1,069 projects (or 33% of all submissions).

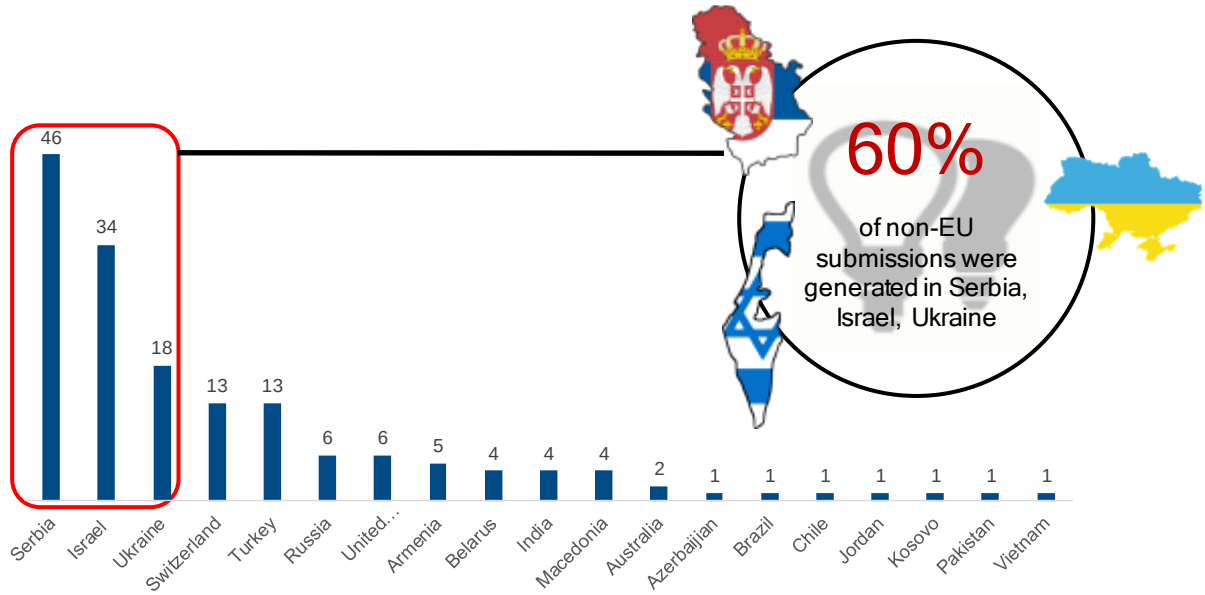
Figure 3 Number of Applications by Country of Origin (EU and non-EU)



n = 3,247; submitted proposals for which FI-IMPACT received information on their country of origin
Source: FI-IMPACT May 2016, based on data provided by accelerators

Marginally, 162 applications originated from non-EU countries. Taking a more detailed look, the bar graph outlines that the non-EU countries which received the largest amount of projects from SMEs are Serbia (46), Israel (34), and Ukraine (18).

Figure 4 Number of Applications from Non-EU Countries



n = 162; submitted proposals for which FI-IMPACT received information on their country of origin
Source: FI-IMPACT May 2016, based on data provided by accelerators

The main findings about the latest outcomes of the Accelerators' call process can be summarized as follows:

- In the period from December 2015 to March 2016 18% of all proposals were submitted.
- As a trend identified in previous analysis, the majority of the applications were generated within the EU territory (95%), meaning that although the reach of FIWARE is global, European SMEs and start-ups are the most interested in accessing the FIWARE platform. This might be due to weak communication and promotion of FIWARE in non-EU countries and / or to the existence of other more competitive sources of project funding in those countries;

The majority of applications were generated in Spain, Italy, and Germany.

2.3. FIWARE Subgrantees: comparative analysis by accelerator

This section provides an insight into funded initiatives (or subgrantees), whose data has been made available to FI-IMPACT. The number of funded initiatives is 985 as of May 16th 2016 and includes projects that have been granted funds in the 1st, 2nd, 3rd and 4th call, as shown in the table below.

FI-IMPACT received information from 16 accelerators. Due to the timing of calls, FI-IMPACT analysis does not include the proposals to be selected by FABulous under the 3rd call, and the 19 winners of the CreatiFi's creative ring challenge.

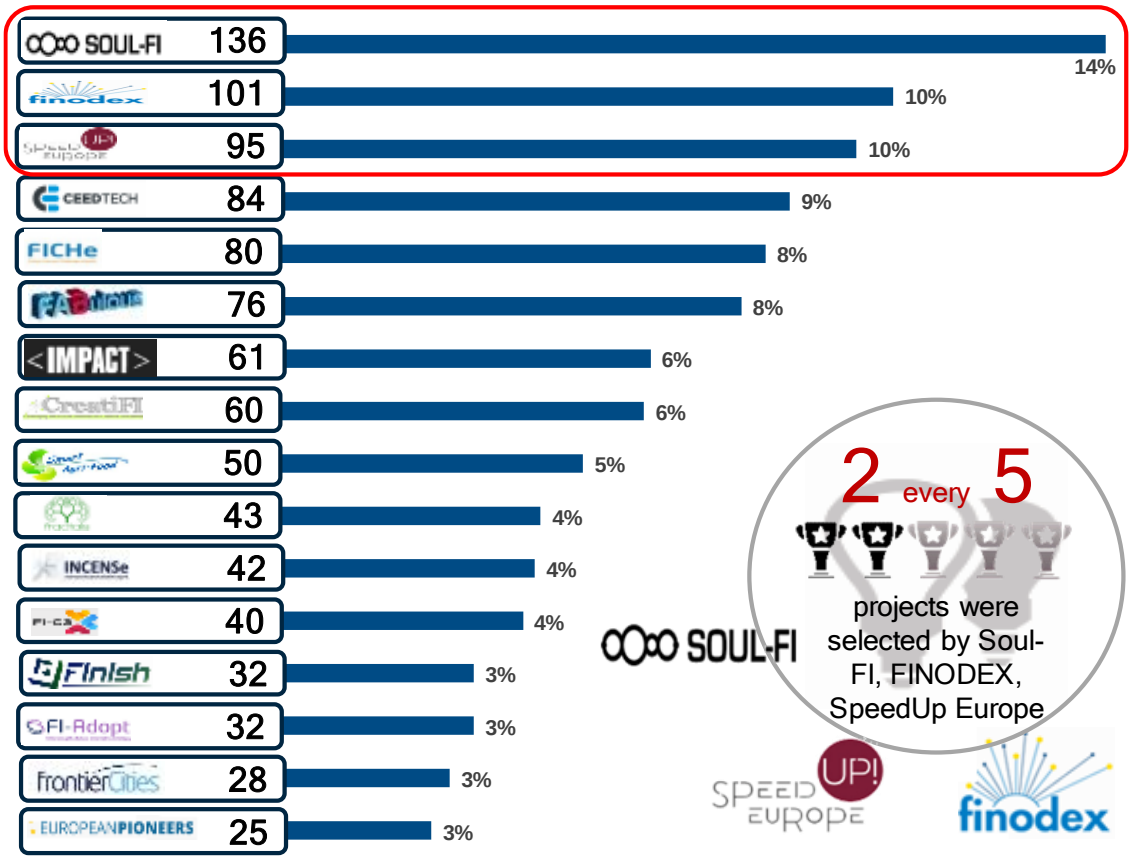
Table 1 FIWARE Subgrantees, View by Accelerator and by Call

Accelerator	Call	Selected	Accelerators	Subgrantees
CEED Tech	1st call	84	16	985
CREAtiFi	1st, 2nd call	60		
European Pioneers	1st call	25		
FABulous	1st, 2nd call	76		
FI-Adopt	1st, 2nd call	32		
FICHe	1st, 2nd call	80		
FI-C3	1st call	40		
Finish	1st call	32		
FINODEX	1st, 2nd call	101		
FRACTALS	1st call	43		
FrontierCities	1st, 2nd call	28		
IMPACT	1st, 2nd call	61		
INCENSe	1st call	42		
SmartAgriFood	1st, 2nd, 3rd call	50		
SOUL-FI	1st, 2nd, 3rd call	136		
SpeedUp	1st, 2nd, 3rd, 4th call	95		

Source: FI-IMPACT May 2016, based on data provided by accelerators

In this phase, among the 985 funded initiatives which provided data to FI-IMPACT, SOUL-FI is the accelerator that selected and funded the most projects (14%). Finodex (10%) and SpeedUp (10%) also selected a significant amount of projects to accelerate.

Figure 5 Number of FIWARE Subgrantees by Accelerator, %



n = 985; all available subgrantees

Source: FI-IMPACT May 2016, based on data provided by accelerators

The 16 Accelerators have a specific focus in terms of vertical industries or technologies targeted, and consequently have been selecting and accelerating projects within their scope. Below we list shortly the scope of each accelerator:

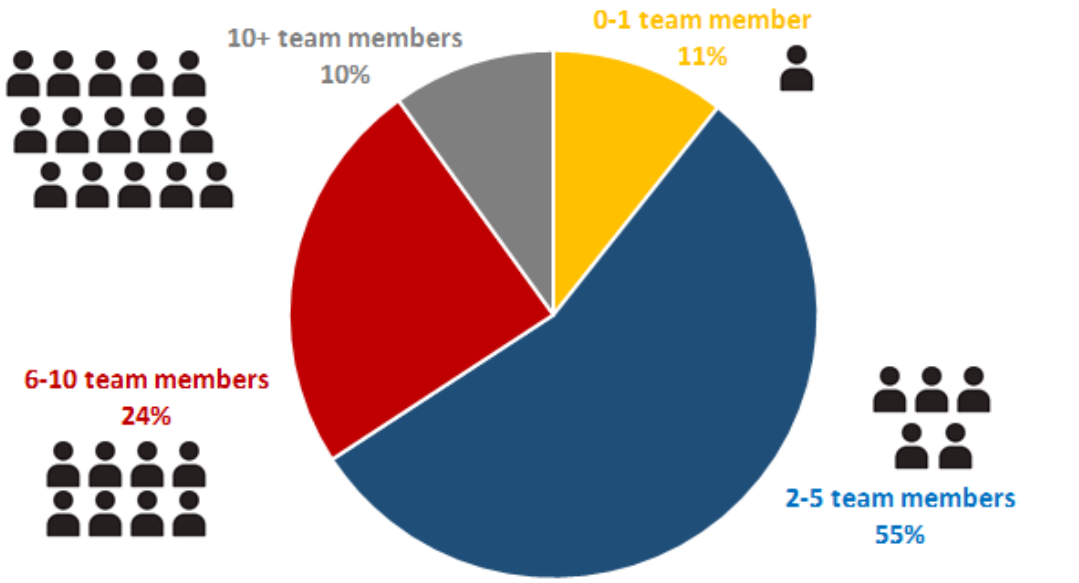
- **SpeedUP! Europe** focuses on the areas of agribusiness, smart cities and clean tech.
- **FICHe** (Future Internet CHallenge eHealth) focuses on the eHealth domain.
- **CreatiFI** focuses on European creative industries and addresses the domains of media & content and smart cities.
- **FABulous** focuses on 3D printing initiatives in the field of design manufacturing, logistics and content-based services.
- **SOUL-FI** initiatives focuses on real time information, open and crowd-sourced data and on the Internet of Things (IoT) with initiatives addressing the domain of smart cities and sustainable mobility.

- **SmartAgri Food2** initiatives focus on farmers and agricultural producers. Projects are expected to address one or more of three farming subsectors (Arable Farming - large-scale, Horticulture, Livestock Farming).
- **Finodex** focuses on a wider range of business sectors: environment, health, transport, finance and others. Applications are open to European SMEs, individuals or groups of individuals up to four members.
- **INCENse** (INternet Cleantech ENablers Spark) focuses on the European energy sector. It selects SMEs and web entrepreneurs intending to develop Internet-based technologies in the Clean Tech sector, focusing on the following categories: Smart Grids, ICT, Automation Solutions, Energy Efficiency, Energy Storage, Electric Mobility, and Renewable Generation.
- **IMPACT** focuses on mobile technologies such as mobile apps or business models based on mobility in the communications areas, social, video, media & advertising; design, education, entertainment, ecommerce, peripheral devices, content, connected TV, infrastructure, security, productivity, finance, smart cities and social networks, among others.
- **FI-ADOPT** focuses on corporate and citizen learning/training, healthy behavior shaping and social integration purposes. They will employ rich media, social networking, and mobile apps and gaming principles.
- **Finish** will support software applications for supply chains of perishable products such as food or flowers.
- **EuropeanPioneers** focuses on the media field of media in Europe and on the development of software applications enriching the media business landscape and improving media usage for end-customers as well as media suppliers. Teams must have a minimum of two members.
- **FI-C3** focuses on three business domains: smart territories (smart city guides; smart city platforms; smart city services), media & contents (multimedia augmented reality; transmedia/cross media devices; video games), and care & well-being (smart home; indoor position; personalized connected media).
- **FrontierCities** will contribute to identify high potential use cases for smart mobility applications, to provide on/offline support to ensure that SMEs are aware of cities interests, to provide technology advice and support to speed up application development, and to provide a full-scale market uptake and commercialization support program.

2.4. FIWARE Subgrantees: Comparative Analysis by Company Size and Experience

Focusing on the team size, FI-IMPACT found that the majority of funded initiatives are run by teams rather than individuals. Most of the projects (55%) involve from two to five members. Projects involving between 6 and 10 individuals have also a significant share (24%) compared to those involving an individual (11%). Projects with larger-size teams (exceeding ten team members) account for 10% of all projects.

Figure 6 FIWARE Subgrantees by Team Size, %



n = 985; all available subgrantees

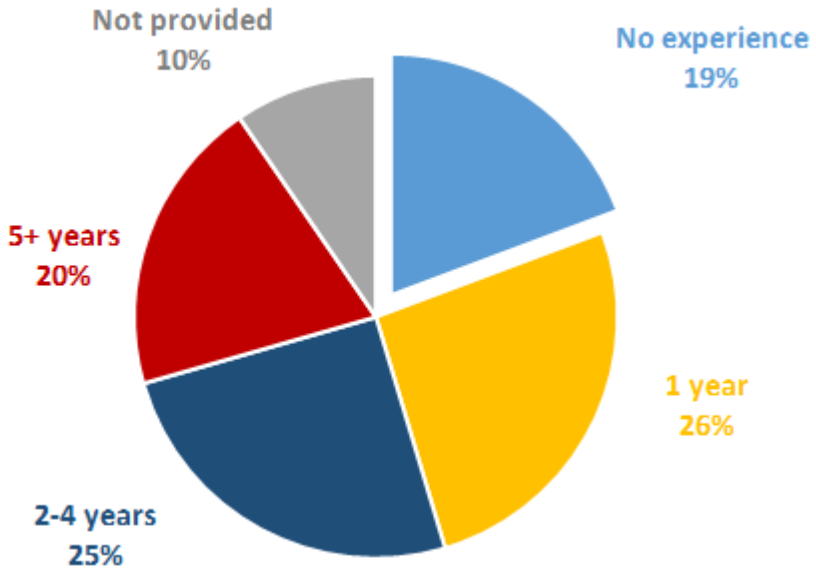
Source: FI-IMPACT May 2016, based on data provided by accelerators

Looking at the experience of subgrantees, FI-IMPACT found that the majority do not have extensive experience of start-ups or running a company. In fact 45% of subgrantees do not have previous experience or have up to one-year experience. Half of the participants (51%) have between one years' experience (26%) and between two and four years-experience (25%).

Less numerous are projects driven by participants without any experience at all (19%), meaning that in this phase participants with at least some expertise and knowledge are considered by the accelerators to be most likely to run successful projects compared with brand new entrepreneurs.

20% of the projects involve participants with at least five-years' experience. 10% of the funded initiatives have not provided information on the experience of team members.

Figure 7 FIWARE Subgrantees by Years of Experience of the Team, %



n = 985; all available subgrantees

Source: FI-IMPACT May 2016, based on data provided by accelerators

These insights highlight that the FIWARE programme has attracted lots of real start-ups, represented by small teams of young, relatively-inexperienced people, while the rest of the funded projects are SMEs (bigger teams with more years of experience in running business). Looking together at the team dimension and experience, FI-IMPACT found that as experience grows, projects become more and more oriented towards larger teams.

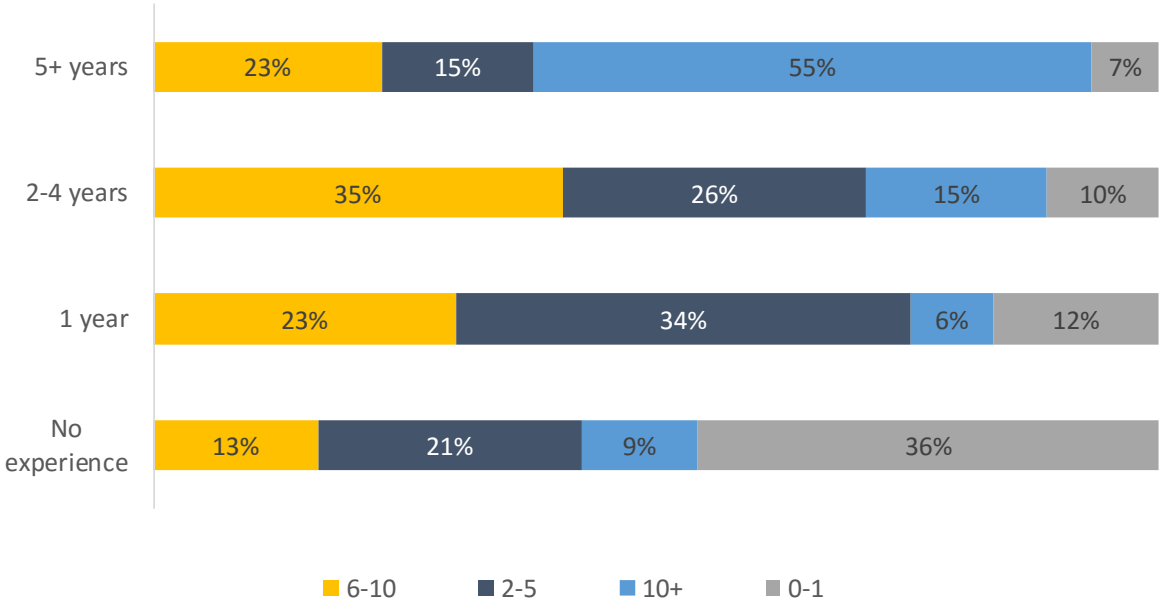
However, we know that this is a snapshot of these companies in their initial phase of development, and this will change over time.

36% of the projects with inexperienced participants are from a company or project with just one employee. This percentage drops to 12% for projects whose participants have at least one year-experience.

Focusing on larger teams, 35% of those with members having two to four years experience are in projects with six to ten team members, while among members with more than ten years of experience more than half are in teams larger than ten employees.

This behavior shows that experienced teams understand the importance of working in bigger teams with the necessary capacity to, share knowledge, skills, and networks to strengthen their business models.

Figure 8 FIWARE Subgrantees by Years of Experience of Team Members and Respective Team Size, %



n = 891; all available subgrantees which provided team size and experience information

Source: FI-IMPACT May 2016, based on data provided by accelerators

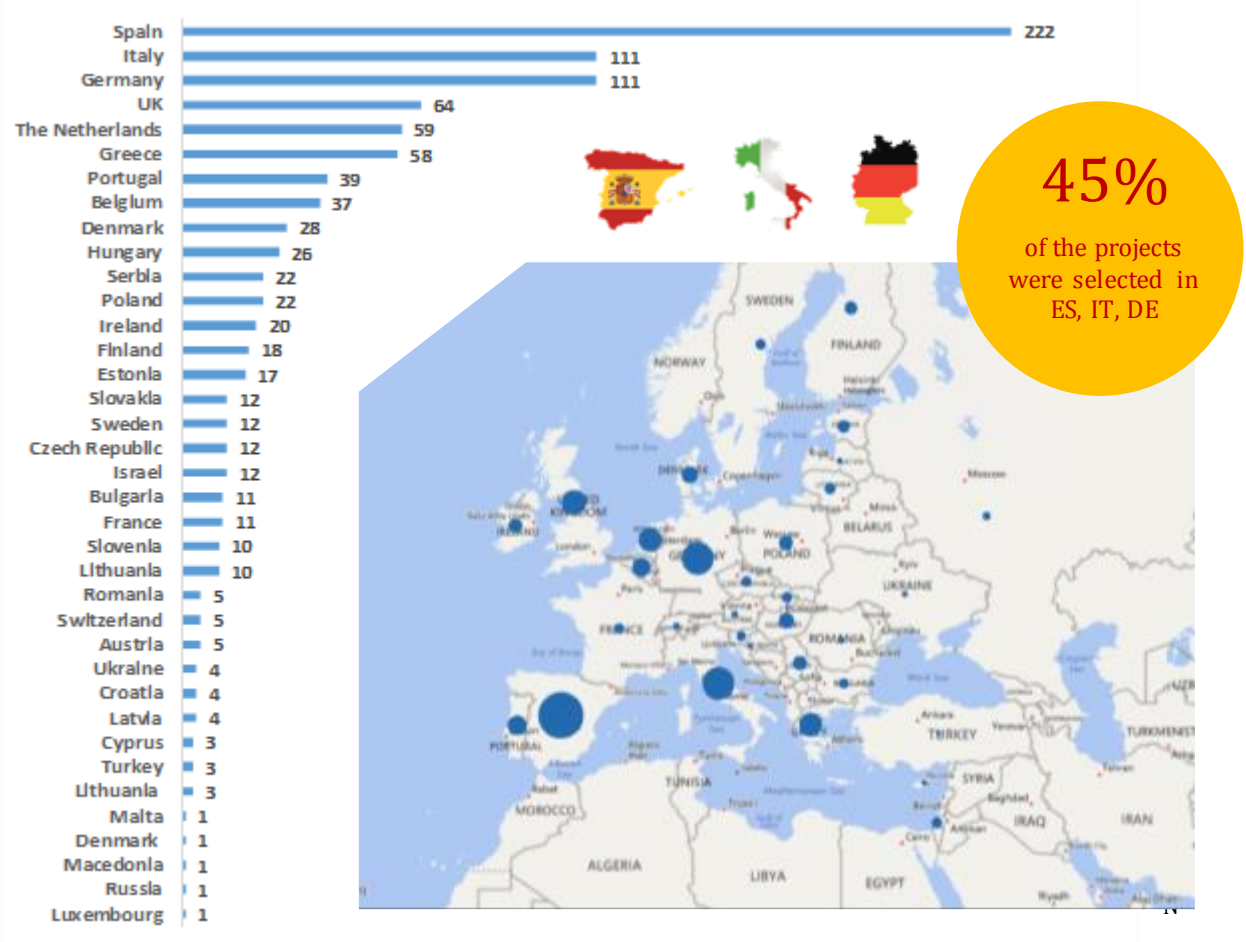
2.5. FIWARE Subgrantees: Comparative Analysis by Country

FI-IMPACT found that 95% of projects granted funds from accelerators were generated by an organization in the EU territory.

Spain, Germany, and Italy are the top three countries with the largest number of successful applications and together account for almost half of all funded initiatives.

In fact, 222 initiatives from Spain (23%), 111 from Germany and Italy (11%) obtained funds. EU-member states such as UK (7%) and The Netherlands (6%) also selected more projects compared with the other countries.

Figure 9 Number of FIWARE Subgrantees by Country



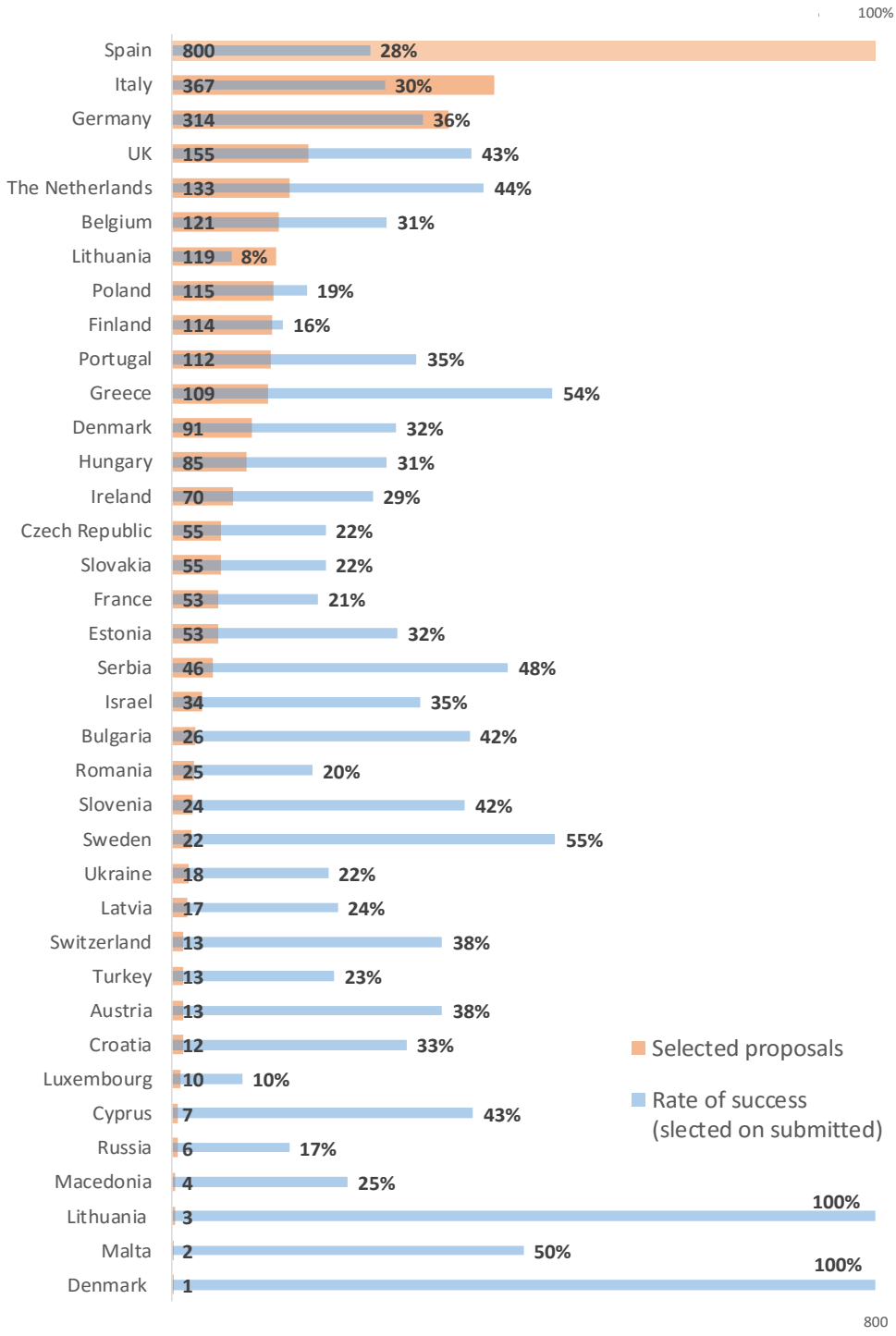
N = 985; all available subgrantees

Source: FI-IMPACT May 2016, based on data provided by accelerators

Taking an in-depth look at the number of funded initiatives, FI-IMPACT found that not all countries have the same rate of success: the bar below outlines the percentages of the funded initiatives with regards to the number of submitted applications in each country (EU and non-EU). Applications coming from Sweden (55%), Greece (54%), Serbia (48%), and the Netherlands (44%) has higher success rates compared with other countries from which at least 20 proposals originated.

The analysis also found that of all the countries, the Netherlands shows a good leve of submitted proposals (133 submissions), as well as a high success rate in terms of number of selected initiatives (59 subgrantees).

Figure 10 FIWARE Subgrantees as a Percentage of Submitted Proposals, by country, %



n = 985; all available subgrantees

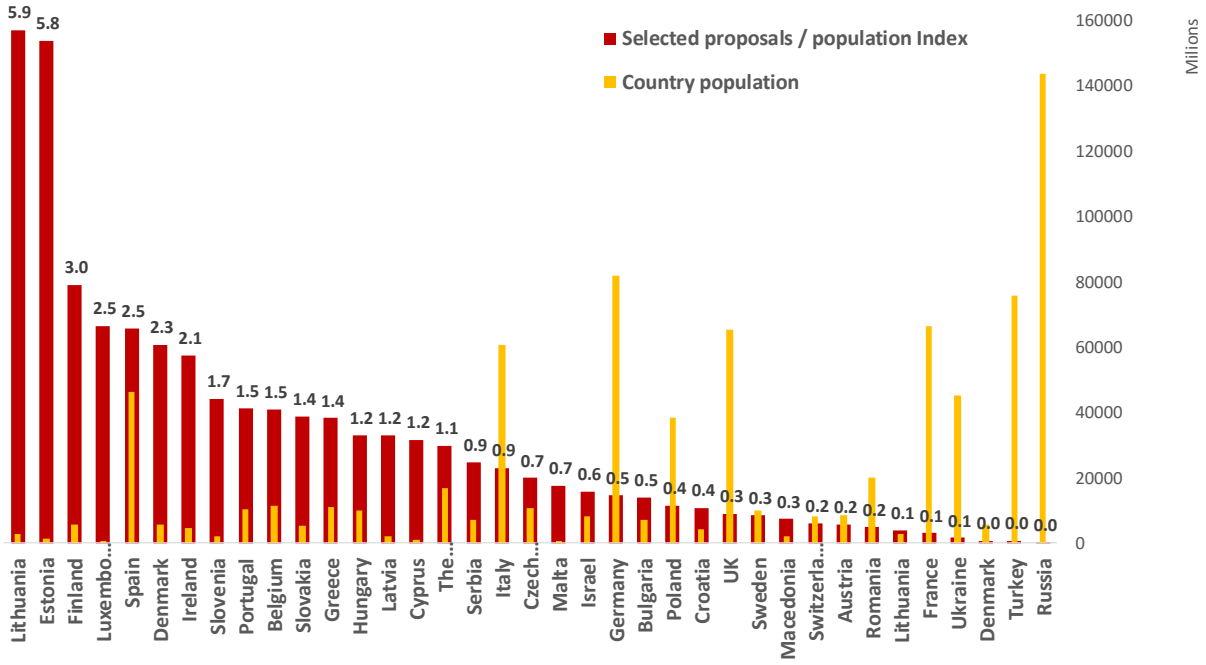
n = 3,217; submitted proposals (which have received at least one subgrantees)

Source: FI-IMPACT May 2016, based on data provided by accelerators

FI-IMPACT analyzed the ratio of both EU and non-EU successful proposals compared to country demographics, based on an index elaborating ranks from 6 (highest success rate) to 0 lowest success rate).

This allows understand if more populated countries generated more successful initiatives. Generally, countries with a high ratio of funded initiatives on population are: Lithuania, Estonia, Finland, Luxembourg, Spain, Denmark and Ireland. Spain is the country that generated the highest rate of successful projects among larger countries.

Figure 11 Number of FIWARE subgrantees on their country population



n = 985; all available subgrantees

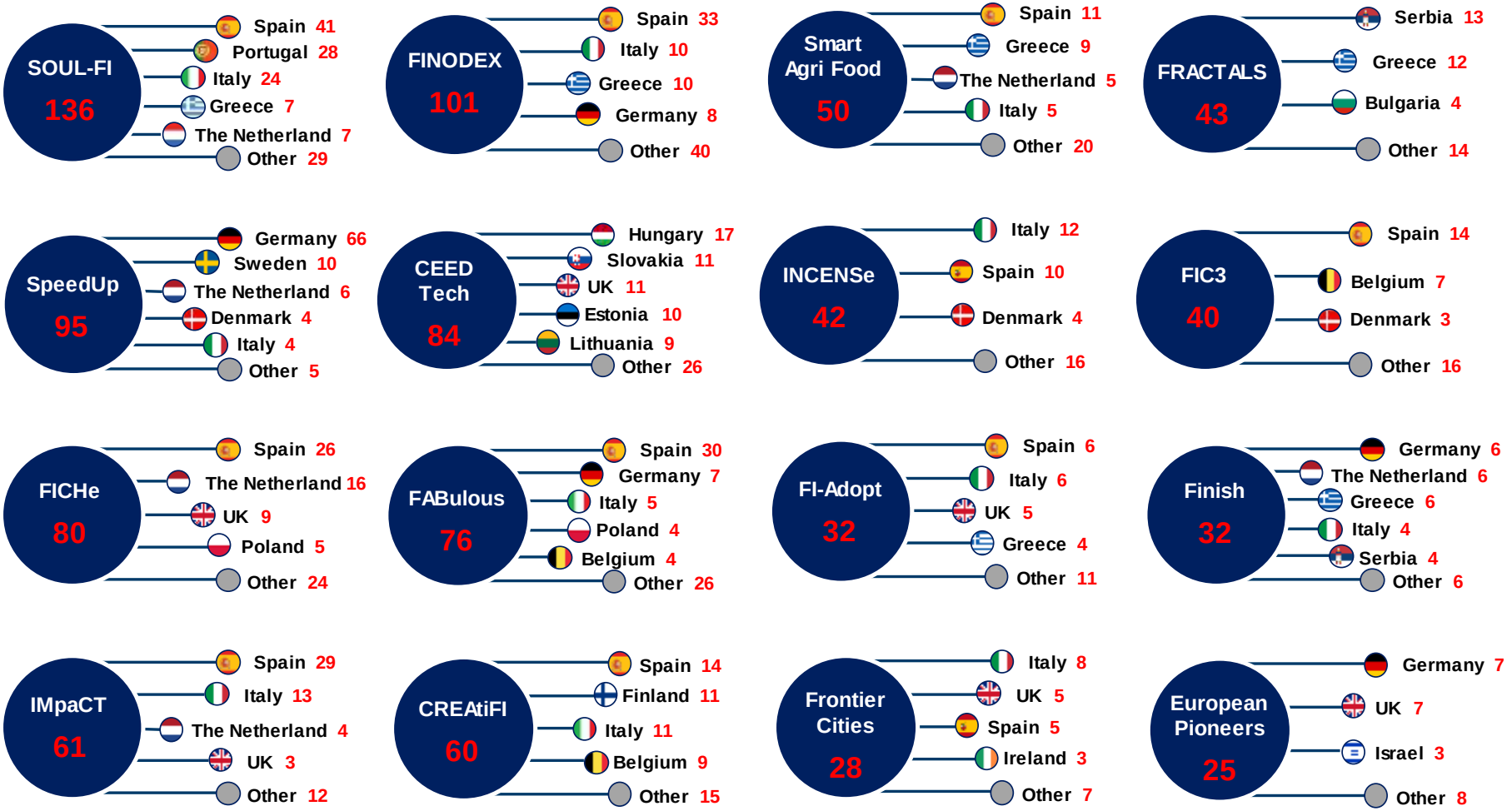
Note: The index (6 to 0) ranks the ratio of funded proposals on country population from largest to smallest

Source: FI-IMPACT May 2016, based on data provided by accelerators

There is a strong correlation between the home country of the accelerator coordinator and the geographical origin of subgrantees. This means that communication efforts are particularly strong in countries where accelerators are based. This has benefited SOUL-FI (Spain), FINODEX (Spain), SpeedUp (Germany), CEED Tech (Hungary) and FICHe (Spain).

The figure below shows the countries of origin of funded initiatives per accelerator.

Figure 12 Number of FIWARE Subgrantees by Accelerator and by Country



n = 985; all available subgrantees
Source: FI-IMPACT May 2016, based on data provided by accelerators

2.6. FIWARE Subgrantees: Comparative Analysis of Market Focus

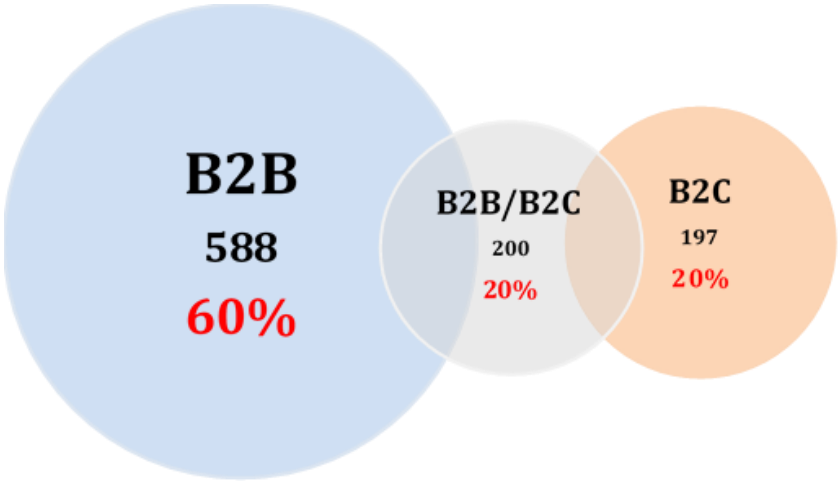
We also looked at the type of markets funded solutions are targeting.
First we took into account their type of customer, then we classified these initiatives by the industry they plan to sell their solutions to.
This paragraph shows some insights from our analysis.

FI-IMPACT found that each initiative may target either the business-to-consumer market (B2C), the business-to-business market (B2B) or both (B2B/B2C).

Projects classified as B2B can target one or multiple industry sectors. Some of the solutions in this category do not have a vertical focus, so we adopted the classification "cross-sector solutions", meaning that their offering is appropriate for all industries.

As shown in the figure below, most of the granted proposals are developing solutions addressed to the business market. 20% of the funded initiatives target both the business and consumer market, while 20% address purely to the consumer market. Compared to our previous analysis, we found that the new initiatives that have been selected from August 2015 to May 2016 are more consumer-oriented rather than business-oriented. In fact, the B2B target market dropped by 2%, while the B2C target market increased by 3%.

Figure 13 FIWARE Subgrantees by Target Market, %



n = 985; all available subgrantees

Source: FI-IMPACT May 2016, based on data provided by accelerators

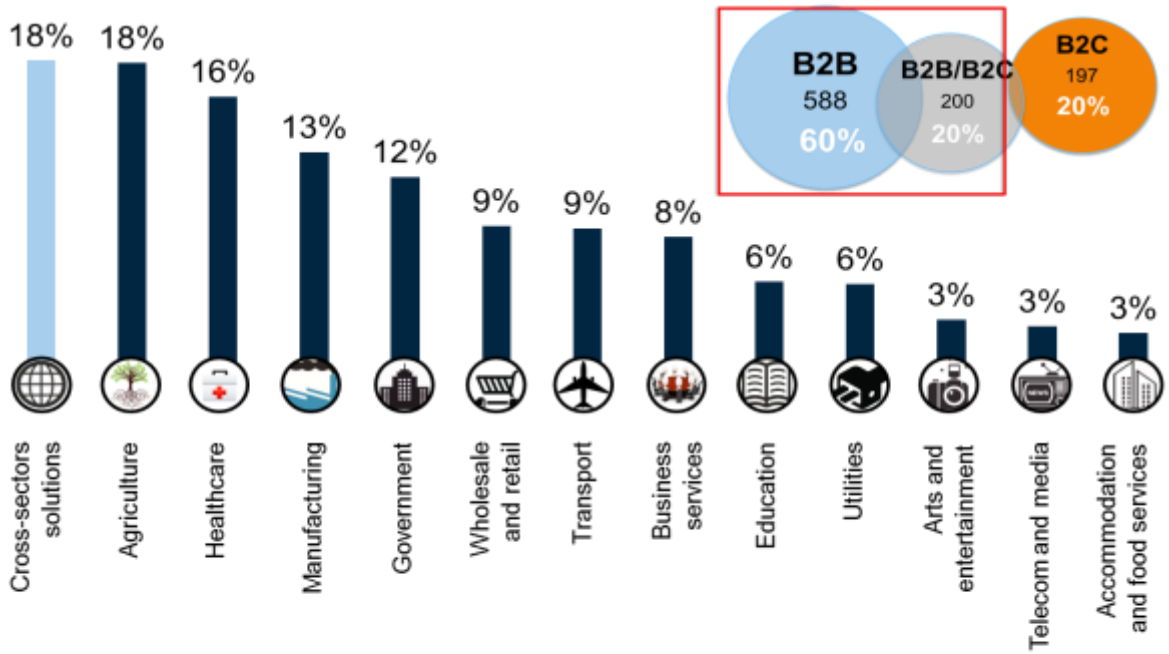
Looking at the B2B and B2B/B2C initiatives (784 proposals), IDC analyzed which industries are targeted more frequently. They are:

- **Cross-sector solutions (143 projects):** within this category we put 18% of the subgrantees that are developing solutions with a horizontal scope rather than industry-specific, so they are addressing a wide range of sectors. These solutions are suitable for any type of business;
- **Agriculture (142 projects):** solutions addressing the agriculture, forestry, and fishing industry are the most recurrent. 18% of the B2B and B2B/B2C initiatives address to businesses operating in agriculture and are aimed to provide solutions or services to enhance cultivation of products, crop management, and other activities related to this sector. The high percentage of agriculture-oriented solutions might be due to the strong focus towards this industry of some

accelerators. It is the case of Smart AgriFood2, which funded all 50 initiatives in the agriculture industry, and FRACTALS, which funded all the 42 initiatives in the same industry sectors;

- **Healthcare (127 projects):** healthcare is the second most targeted as 16% of the funded initiatives cover this market. A great number of initiatives are aimed to provide tools to shrink the distance between patients and doctors, and facilitate real-time communication and information exchange between doctors. Guaranteeing a quality care is a strong need in the sector, this is why some accelerators such as FICHe, which accelerated 75 out of the 77 subgrantees in the healthcare industry, are targeting this market;
- **Manufacturing (102 projects):** 13% of the funded initiatives are manufacturing-oriented and include a wide range of sub-sectors such as automotive, aeronautics, furniture, textile and clothing, or plastic. Projects targeting this industry include both the discrete and process manufacturing sector, and are aimed to streamline and improve operations and enhance quality of products through a wide range of solutions. These might include intelligent transport devices, innovative internet-based solutions, or improved supply chain and logistics services.

Figure 14 FIWARE Subgrantees by Target Industry Sector (B2B) %



n = 788; all available subgrantees targeting the B2B/B2C and B2B market

The 'cross-sectors solutions' segment includes solutions that are transversal to all markets and not industry-specific.

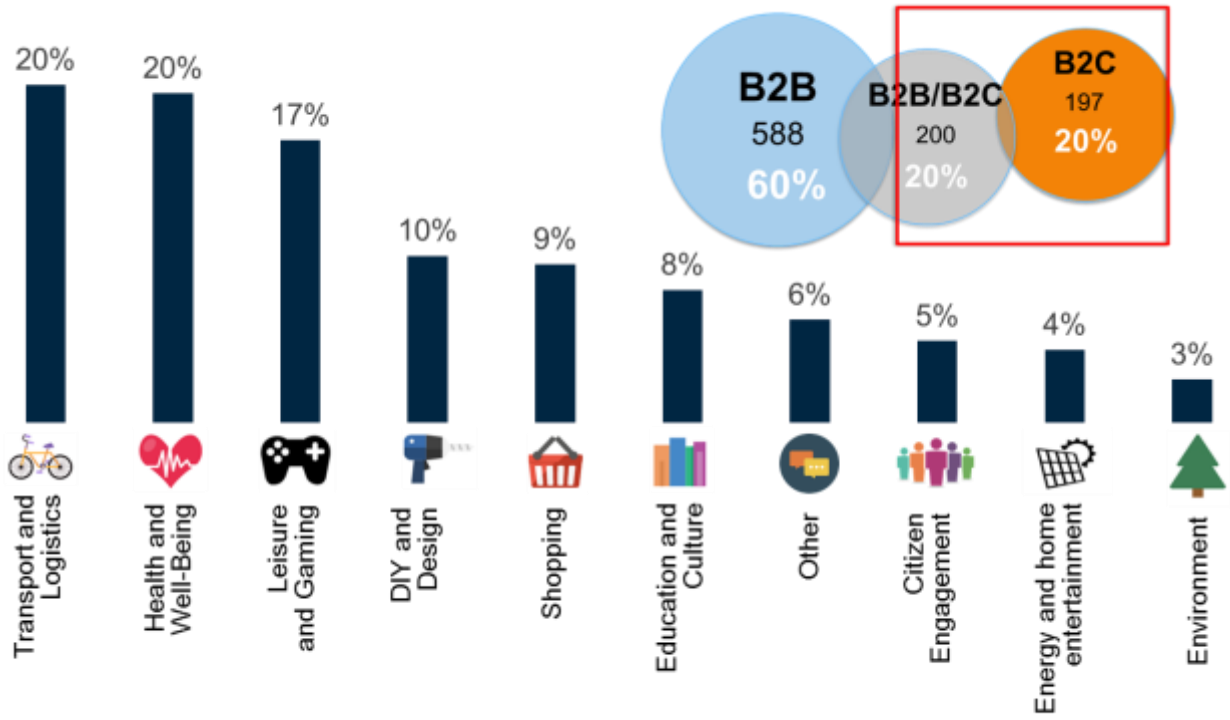
Percentage do not sum up to 100% as multiple answers were allowed.

Source: FI-IMPACT May 2016, based on data provided by accelerators

initiatives targeting the consumer market (397) fall in the following industries:

- Transport and logistics;
- Health and wellness;
- Leisure and gaming;
- DIY ("Do It Yourself") and design;
- Shopping;
- Education and culture;
- Citizens engagement;
- Energy and home automation;
- Environment and nature
- Other (solutions that do not fall into any of the other mentioned categories).

Figure 15 FIWARE Subgrantees, by Target Consumer Segment (B2C), %



n = 397; all subgrantees targeting the B2B/B2C and B2C market

Multiple answers were allowed

Source: FI-IMPACT May 2016, based on data provided by accelerators

The first two categories (transport and logistics, health and wellness) are the most recurring. Apps and devices to improve citizens' life style from wellness, and transportation and logistics are the most common (20%).

2.7. FIWARE Subgrantees in the Smart City Ecosystem

We define Smart Cities as encompassing all technological city-life related solutions. A Smart City solution is aimed at developing an ecosystem based on elements such as

sustainability, innovation, and citizen engagement. These are essential to drive change in the urban setting and to create an advanced environment.

Through the deployment of what IDC calls 'four pillars' (Cloud, Mobility, Social Media, and Big Data/Analytics) and Internet of Things solutions, many cities have become tech-savvy and have introduced technologies or services to promote an improved quality of life (intelligent transportation, smart classrooms, connected healthcare, smart grids, and so on).

FI-IMPACT found that Smart City area is well addressed by the bunch of projects analyzed: in fact, 25% of the subgrantees use a specific technology to provide citizens or local businesses with new products or services to improve their life.

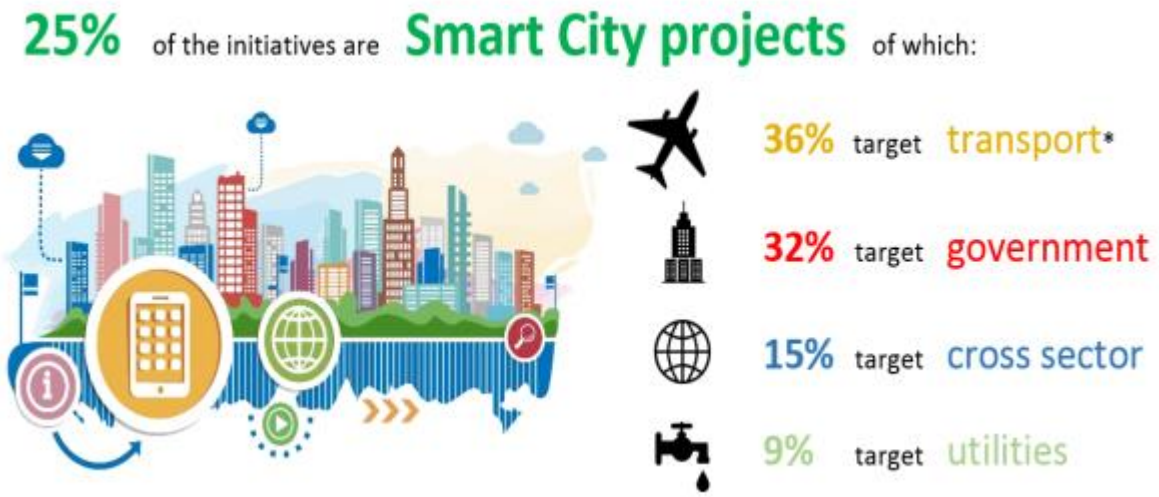
Smart Cities is one of the hottest topic in FIWARE, with 13 Accelerators supporting projects in this area. It is also important as one of FIWARE goals is to become an open standard platform for smart cities also through the Open and Agile Smart Cities Initiatives, already signed by at least 31 cities across Europe and outside aiming at "kick-start the use of FIWARE standards to foster the development of Smart City applications and solutions"[2].

This happens more frequently in sectors such as public administrations, where out of 244 initiatives, 78 target the government sector (i.e. open data initiatives, defense and public safety solutions, land use and environmental management tools, but also citizen movement and traffic monitoring systems).

Some of the Smart City projects address the consumer transport and logistics B2C segment (22%) as well as the transportation and storage B2B segment (14%), meaning that improving transportation through smart solutions is one of the main focus of the subgrantees (i.e. traveler information systems, public transportation systems, parking management services, transport sharing systems). Cross sector (solutions that do not fall into only one specific category) and utilities (i.e. smart water management systems, smart energy and gas grids, waste collection activities) gained respectively 15% and 9% share of the overall amount of Smart City projects.

[2] https://www.FIWARE.org/smart-cities/

Figure 16 FIWARE Subgrantees Addressing the Smart City Domain, %



n = 244; Smart City-related subgrantees

(*) = Transport includes both the B2B transportation and storage market and the B2C transport and logistics segment

Source: FI-IMPACT May 2016, based on data provided by accelerators

2.8. FIWARE Subgrantees: Comparative Analysis by FIWARE Generic Enablers

The FIWARE Generic Enablers aim to offer general functions to boost the development of apps in multiple industry sectors. These are: Data/Context Management, IoT Services Enablement, Advanced Web-based User Interface, and Security, Interface to Networks and Devices, Architecture of Applications/Services Ecosystem and Delivery Framework, Cloud Hosting.

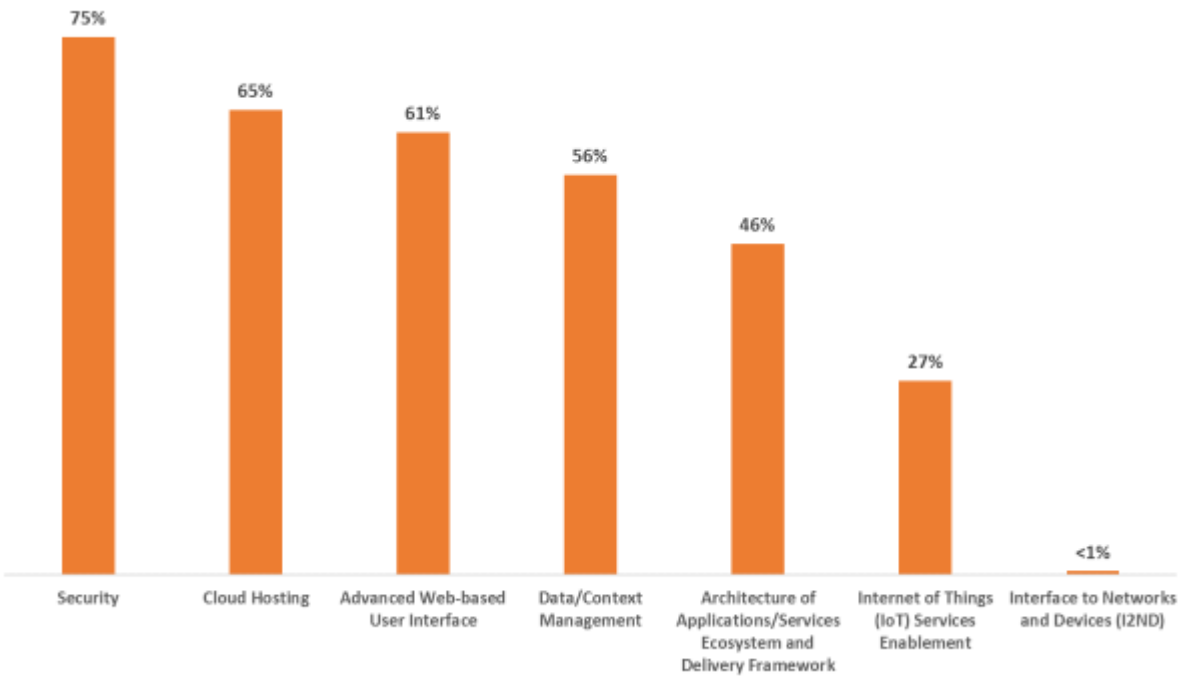
According to the answers collected from subgrantees through our survey, Security (75%), Cloud Hosting (65%) and Advanced Web-based User Interface (61%) are the most deployed FIWARE Chapters. Data/Context Management and Architecture of Applications /Service Ecosystem and Delivery Framework are also important, while Internet of Things (IoT) Service Enablers remains less used and only a couple of funded initiatives focus on Interface to Networks and Devices (I2ND).

Within every Chapter there are the following enablers:

- Security: Identity management (58%) is the most frequently used enabler. It covers a number of aspects involving users' access to networks, services, and applications. It is followed by PEP Proxy (20%) and Authorization PDP (16%);
- Cloud Hosting: Object Storage GE is by far the most used enabler (51%); Advanced Web-based User Interface: POI Data Provider (34%) is the enabler that is most frequently used. POI Data Provider provides spatial search services and data on Points of Interest via RESTful web service API. It is followed by 3D-UI-XML3D (16%), and GIS Data Provider (16%).
- Data Context/Management: Big Data Analysis (56%) is the mostly deployed enabler, followed by Publish/Subscribe Context Broker (32%);

Some FIWARE enablers have not yet been fully exploited as their adoption rate is lower. This is the case of Network Information and Control, an enabler that has not taken off, as only 3 initiatives are using it.

Figure 17 Use of FIWARE Chapters by Subgrantees, %



n = 605; subgrantees that provided this data in the survey

Source: FI-IMPACT May 2016

This outlines that building communication-efficient distributed apps, exploiting advanced network capabilities, or managing robotic devices are still in an embryonal phase.

2.9. FIWARE Subgrantees: Comparative Analysis by Innovative ICT Tools

IDC predicts that companies' strategic investments in IT will be built on introducing or strengthening 3rd platform technologies, which are built on what IDC calls "4 pillars" (Mobility, Cloud, Social Media, and Big Data) and on IoT.

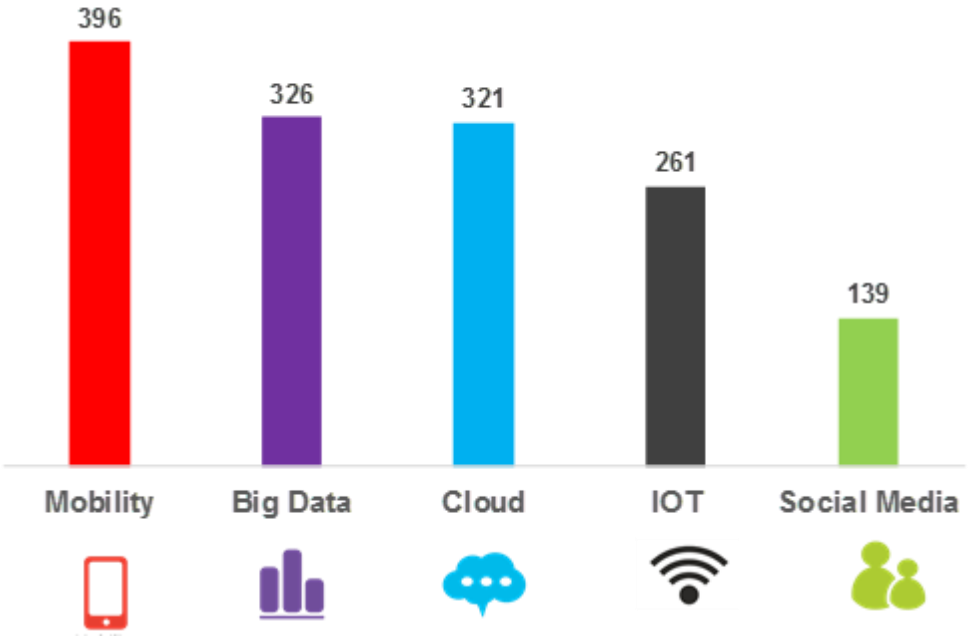
By "3rd platform" IDC indicates the convergence of disruptive trends in the IT industry built on mobile devices and apps, cloud services, mobile broadband networks, big data analytics, and social media platforms.

Our research analyzed funded initiatives with regards to the IDC's 4 pillars. We found that 396 initiatives (40%) focus on Mobility, 326 (33%) on Big Data, 321 (33%) on Cloud and 139 on Social Media (14%). Initiatives focusing on IoT are 261 (27%).

Overlaps might exist as, for example, a solution can be at the same time delivered via Cloud and deploy Social Media tools. Many businesses are looking at these solutions to create new channels to engage with customers, to streamline processes and operations, and to innovate their products. For these reasons, the development of these areas surely represents an opportunity to create innovation and increase technology orientation , and

it might also generate higher margins and revenues streams. Each Pillar is analyzed in more detail below.

Figure 18 Use of Innovative ICT Tools (IDC 3rd platform) by Subgrantees



n = 985; all available subgrantees

Source: FI-IMPACT May 2016, based on data provided by accelerators

Mobility

As mobility is a critical part of business digital innovation, a considerable number of SMEs are strategically investing in mobile solutions and apps to generate revenues and extend their reach. IDC expects mobile solutions to increase in the short-term as many companies will invest in mobile strategies to boost productivity and strengthen collaboration. Mobile investments will drive innovation and allow many companies to gain a competitive advantage. IDC forecasts that 54% of the companies are or will develop Native Mobile applications for external use (i.e. customer related services), while 57% are or will create extensions of corporate applications to mobile devices. This will happen more frequently in industries such as business services, telecom/media, and manufacturing.

- The focus on mobility is significant as 396 out of the 985 initiatives (40%) are paying attention towards mobile enablement.
- Some accelerators put a strong focus on mobile solutions. It is the case of Soul-FI (19% of the mobile-based initiatives come from this accelerator), CEED Tech (11%), and Impact (10%).

- The industry sectors that are more mobile-oriented compared with others are agriculture (12% of mobile solutions target this industry) and healthcare (11%).
- The countries with the highest adoption of mobility in their initiatives are Spain (26% of mobile-based projects), Italy (12%), and Germany (9%).

Big Data

Big Data is developing in Western European countries and is a rapidly growing market. A large number of proposals funded by the FI-PPP Phase III are focusing on this technology. According to IDC, in Western Europe, 28% of the companies are already using Big Data and 27% will introduce such solutions by the end of 2016. Companies using or planning to use Big Data are more oriented towards on-premises solutions rather than on solutions delivered as a service in the public cloud or as a dedicated managed service by an external provider, although those are gaining acceptance especially among SMEs.

- 326 out of the 985 initiatives (33%) are deploying Big Data solutions.
- The top three accelerators that supported Big Data-oriented initiatives are Soul-FI (17% of Big Data-oriented projects are funded by this accelerator), SpeedUp Europe (13%), and FINODEX (11%).
- The industry sectors whose focus on Big Data is stronger compared with other industries are agriculture (16% of the Big Data projects address this sector), healthcare (16%), and government (14%).
- The countries which supported Big Data-driven initiatives were Spain (22% of the initiatives deploying Big Data), Germany (13%), and Italy (10%).

Cloud

Cloud solutions are growing rapidly but there is plenty of space for improvements in adoption across Western European countries as Cloud IT spending is still limited. According to IDC, 72% of the Western European companies are using Cloud or they are planning to use it by the end of 2016.

- In this phase 321 out of the 985 funded initiatives (33%) are adopting Cloud technologies.
- The three accelerators that pushed cloud adoption are FICHe (16% of Cloud-based initiatives were accelerated by this accelerator), CEED Tech (15%) and FABulous (12%).
- Cloud solutions are more frequently used in industry sectors such as healthcare (20% of the Cloud initiatives target this industry), agriculture (13%), and manufacturing (13%).
- Countries where Cloud-based projects are more widespread are Spain (23% of the initiatives based on Cloud), Italy (11%), and Germany (9%).

IoT (Internet of Things)

The Internet of Things is one of the most important drivers for innovation for the growth and expansion of IT-based value in the 3rd platform era. The IoT explosion took place with the constant growth of connected devices to create a "smart" ecosystem (smart cars, homes, industry equipment, wearable, and so on).

- 261 out of the 985 subgrantees (27%) are IoT initiatives.
- The accelerators supporting more IoT projects are SOUL-FI (20% of the IoT proposals come from this accelerator), FICHe (13%), and FINODEX (12%).
- IoT projects are most likely to address industries such as healthcare (19% of the IoT funded initiatives), agriculture (18%), and government (15%).
- Countries were IoT based initiatives are most recurrent are Spain (25% of IoT initiatives), Italy (14%) and Germany (11%).

Social Media

Social Media usage is generally high, but its use still appears limited compared with other 3rd platform solutions. Engaging with potential and current customers is extremely important to increase customer retention and increase profitability. IDC estimates that 67% of Western European companies will adopt Social Media by the end of 2016. A large share of these organizations operate in the telecommunication and media industries, where Social Media is highly correlated to their core business.

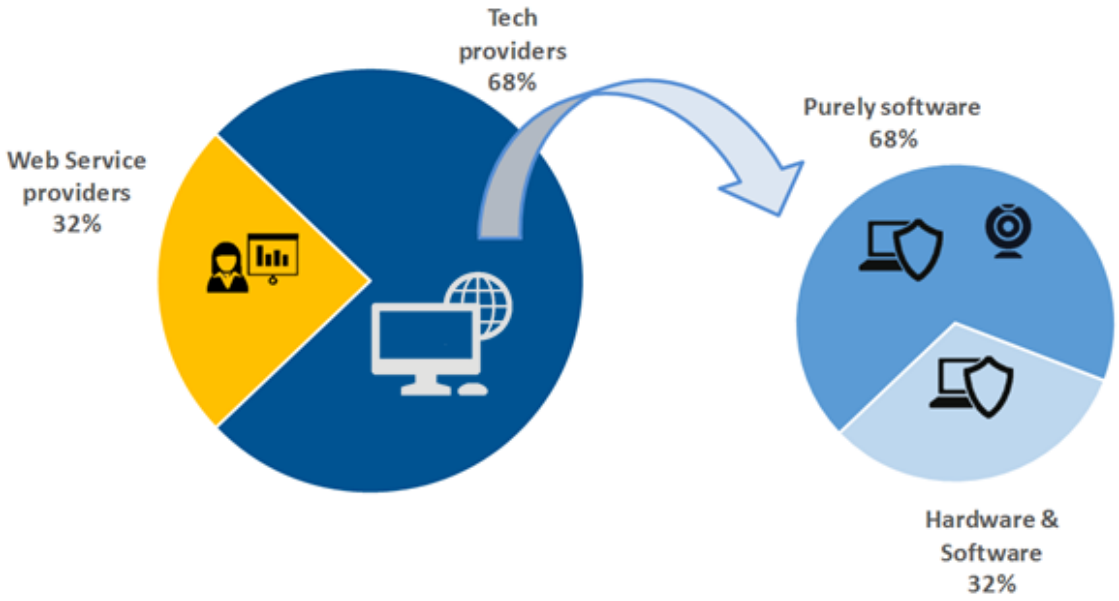
- In phase 3 of the FI-PPP, Social Media is the least widespread technology as 139 out of the 985 subgrantees (14%) are active on Social Media channels.
- The accelerators with a strong focus on Social Media are SpeedUp Europe (23% of Social Media initiatives), SOUL-FI (19%), and FABulous (11%).
- Projects that are not industry-specific and target more than one sector (what IDC calls "horizontal" or "cross sectors solutions") are the most Social Media oriented (16% of Social Media projects target this segment), followed by manufacturing (12%) and government (12%).
- Countries where Social Media proposals are more frequently generated are Germany (20%), Spain (20%), and Italy (11%).

2.10. FIWARE Subgrantees: Comparative Analysis by Type of Offering

FI-IMPACT found that 32% of the initiatives offer Web Services, while the majority of them offer tech solutions (68%). Among the latter group, the subgrantees address the market with purely software solutions (68%) or with a bundle of hardware and software solutions (32%).

This means that in addition to software, the initiatives also offer hardware components, such as RFID or sensors.

Figure 19 FIWARE Subgrantees by Type of Offering, %



n = 985; all available subgrantees

Source: FI-IMPACT May 2016, based on data provided by accelerators

The table below provides a comprehensive view of how the technology offering is positioned with regards to the type of market subgrantees are targeting. The data, confirming the analysis presented in §2.5, shows that the subgrantees have a stronger focus on the business market independently by the type of technological offering.

Table 2 FIWARE Subgrantees by Type of Offering and Type of Customer, %

Type of Market Focus / Type of Offering	B2B	B2B/B2C	B2C
Web-based Service Providers	41%	28%	30%
Tech Providers:			
HW & SW Solutions	69%	16%	15%
Software Solutions	68%	17%	15%

n = 985; all available subgrantees

Source: FI-IMPACT May 2016, based on data provided by accelerators

As far as purely software solutions are concerned, our analysis found that the most recurrent category is industry-specific. In fact, projects exclusively providing software are or will offer operation and manufacturing applications more frequently compared with other software, outlining that most of the project offerings target specific sectors.

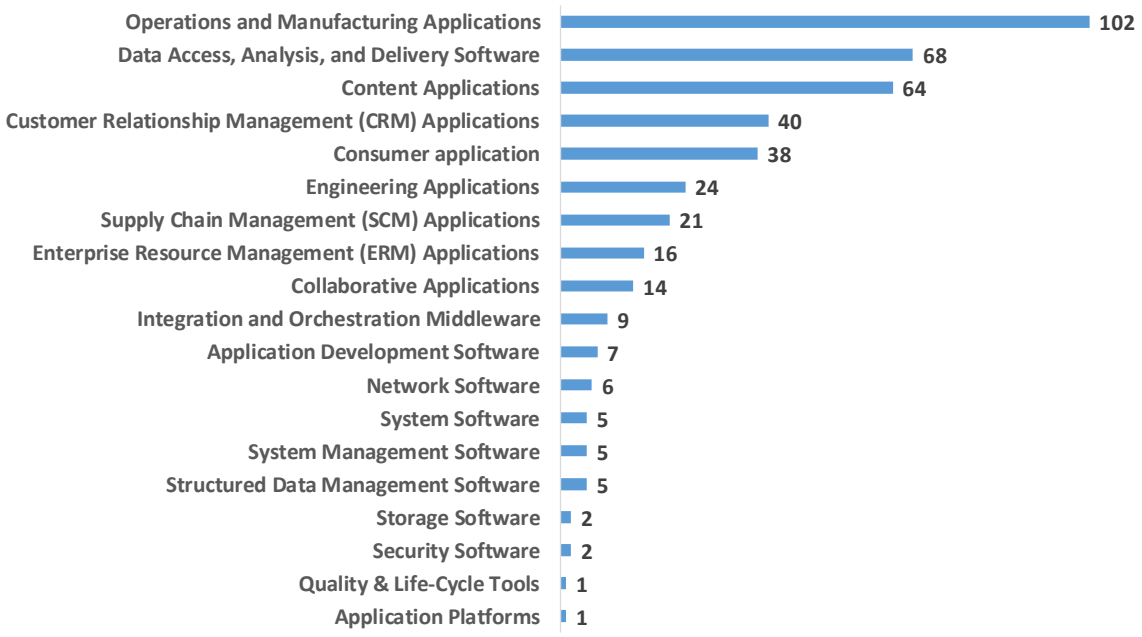
This is backed up by the fact that some accelerators focus on specific sectors, implying a strong focus on particular needs.

The second most recurrent category is Data Access, Analysis, and Delivery Software. This is highly correlated to the strong focus of some projects towards Big Data.

Content applications are also quite popular as the need to develop IT solutions to manage unstructured data is strong, as well as Customer Relationship Management (CRM) Applications.

A detailed segmentation of the subgrantees providing software solutions is provided in Chapter 5, in the context of the analysis of the software market.

Figure 20 FIWARE Subgrantees Offering Software Solutions, by Software Market Category



n = 430; all available tech initiatives providing purely software solutions

Source: FI-IMPACT May 2016, based on data provided by accelerators

Within the technology providers group (68% of the 985 subgrantees), 32% of funded initiatives are offering or still developing hardware and software solutions.

Looking at the vertical markets these solutions are targeting, we find they address primarily consumers (25%), followed by solutions addressing the healthcare sector (16%). The third most targeted sector is agriculture with 13% of subgrantees. Most of the hardware and software funded initiatives (78%) are IoT solutions. An in-depth analysis of the IoT market is provided in Chapter 5.

Besides the technology providers, the other subset of funded initiatives refers to web-based services (32%). Solutions classified as web services do not offer or sell a technology but use technology to provide a service via the web. Examples of existing web-based services include: online shopping marketplace, online accommodation and food services, crowdfunding platforms, sharing platforms, online education services, social networks.

Most of them provide services for business customers, we find 11% addressing agriculture and manufacturing organizations, followed by an 9% addressing the transportation industry sector.

In Chapter 5 we provide an analysis of the market potential of web-based service providers.

2.11. FIWARE Subgrantees: Tracking Start-ups Through Mattermark

Since February 2016, FI-IMPACT has adopted Mattermark as a tool to monitor the FIWARE start-ups and SMEs over time during Phase 3 Accelerator funding. The aim was to strengthen and complement the insights gained through our analysis and enrich the lessons learned from the FI-PPP initiative.

The sample of subgrantees monitored by Mattermark counts 736 URLs out of the 985 subgrantees (for the remaining 249 subgrantees a valid URL was not available).

Besides the details on the company profiles, Mattermark has provided additional insights on their growth (for example in terms of employee count, and additional funding), performance, and social media reach.

In the table below, we present some highlights of the latest data collected through Mattermark.

Table 3 Subgrantees on Mattermark: an Overview of the Available Data

Indicator	Base*	Average Data
Employee count	168	9.5
Monthly unique visitors	249	10,545
Mobile downloads	10	1,111
Twitter followers	437	971
Facebook likes	416	1,848
LinkedIn follows	155	87

*number of subgrantees for which the data is available, out of 736 URLs tracked

Source: Mattermark, June 17 2016

Compared to the overall sample of subgrantees monitored, currently the data from Mattermark is limited to small subsets, but representing the companies that already operate on the market and are visible to potential investors. Thus, these are the companies with significant potential to grow and be successful.

On average, the data available is quite low across the selected indicators, but this reflects that the subgrantees are mainly start-ups born with the FIWARE Acceleration Programme.

Taking into account the number of employees, for example, 53% of the tracked subgrantees has less than 6 employees, which reflects our analysis on the team size of the funded initiatives.

According to Mattermark, 43 companies currently have their mobile app available on Google Play or App Store.

On the social media, like Twitter and Facebook, the subgrantees have started reaching out to their potential customer base.

2.12. Key Findings

As of May 16th FI-IMPACT have analyzed 985 initiatives selected for funding by the Accelerators in the FI-PPP Phase III, from the almost 8,000 applications the 16 Accelerators received since the start of the Acceleration Programme in late 2014. The insights presented in the current report are a snapshot of the dynamic ecosystem of the FIWARE start-ups and SMEs.

As a conclusion of our mapping analysis of the FIWARE start-ups and SMEs ecosystem we found that:

- Soul-FI, FINODEX and SpeedUp Europe are the accelerators with the largest number of funded initiatives, counting a third of the projects funded (332 subgrantees);
- While FIWARE attracted business ideas from across Europe, there is a stark dominance of funded initiatives originated in Spain, Italy, and Germany, followed by projects generated in UK, The Netherlands, Greece, and Portugal;
- The companies that applied for funding to the programme are mainly born with the FIWARE Programme: 47% of them have less than one year of experience in running business (25% more, if we consider up to 4 years that is still within the time horizon of a start-up).
- Confirming the early stage of these companies, the data on the team size showing that 55% of them are, at this phase of their development, micro-companies with up to 5 members;
- The FIWARE start-ups are mainly targeting the Business markets (B2B): 60% of the funded initiatives are B2B and 20% are B2C. The remaining 20% target both consumers and businesses (B2B/B2C).
- FI-IMPACT analyzed target sectors in more detail and found that:
    - FIWARE is supporting the digital innovation of traditional sector. The funded initiatives have a strong focus on agriculture (18% of all projects), also promoted by two Accelerators active in this area (Smart AgriFood 2 and FRACTALS);
    - Healthcare is another widely targeted sector, as 16% of the projects are healthcare-related;
    - We also identified an additional category within the market segmentation, “cross-sector solutions”, to indicate those solutions without a specific vertical focus and that may address more than one sector (18%);
- These solutions make use of the latest innovative technologies (Mobility, Cloud, Big Data, Social Media, and IoT) offered by the FIWARE platform. More specifically,

396 projects are mobile-based, 326 are Big Data-oriented, 321 use Cloud, 261 involve IoT solutions, and 139 are active on Social Media.

- The FIWARE start-ups and SMEs are supporting the development of the Smart City ecosystem: 27% of them are offering solutions addressing this area, targeting mainly the government and transport sectors.
- Looking at their offerings, 68% of the subgrantees sell an IT product (either a software solution or a hardware and software solution), while 32% of them are web service providers as their core business is to provide a service (such as a marketplace to meet demand and offer of products or services).
- Finally, through Mattermark, our mapping analysis goes beyond the Phase 3 framework as we have been able to learn about what the subgrantees are doing on the market and to what extent they are successful in attracting external investments. Currently, 736 companies are tracked through this tool.

3. Assessment of the Phase 3 Initiatives' Performance

3.1. Introduction

This chapter presents the results of the second round of the subgrantees' KPIs measurement implemented in the second year of our project to assess the readiness of the Phase III initiatives and their potential performance.

The first measurement was presented in the deliverable D2.3, whose results were based on 472 subgrantees that participated in our survey up to November 3rd 2015. The second assessment is applied to 648 subgrantees (67% of the total subgrantees) that responded to our survey up to May 16th 2016.

Like the first assessment, the new analysis looks at four performance assessment areas and assigns a score from 0 to 5 to their performance:

- **Innovation Focus**: level of originality, maturity and innovation sustainability of the subgrantee's offering, assessed on the basis of questions on the type of innovation pursued by the initiative and its closeness to market.
- **Market Focus**: performance in the collection of knowledge about target customers and in developing a coherent strategy and plan to address the targeted market. This is based on questions investigating in detail the type of market and customer addressed.
- **Feasibility**: capability to insure the economic viability of the business idea through the collection of necessary funding, assessed on the basis of the level of development of the business and financial plan of the funded initiative.
- **Market Needs**: performance in the potential satisfaction of targeted customers' needs, measured as the level of alignment between the solutions' promised benefits and real market needs. This indicator is measured separately for business and consumer users, using benchmarks derived from IDC's data on real market needs.
- **Potential Social Impacts**: identification of the main type of social impacts potentially achieved by the funded projects.

The results presented in the report are aggregated for the overall sample of the respondents. For each KPI, we provide the average scores of the entire sample of respondents. The measurement is based on a 5-point scale aggregating results in 3 evaluation classes:

- 0 - 1.6: Low performance
- 1.7 -3.3: Medium performance
- 3.4 - 5.0: High performance

The following paragraphs are dedicated to the analysis of the KPIs measurement results.

3.2. Innovation KPI

3.2.1. Definition

The Innovation indicator expresses the level of originality, maturity and sustainability of innovation to a product or service in an organization's go to market strategy.

As part of our model we measured the level of innovation and positioning in the go-to-market process of the funded initiatives. An innovative product or service can make a significant impact in the market if you are ready to implement it, but can conceal substantial engineering, business planning, development, testing and marketing effort if the product or service is still in the planning phases. If the innovation is being developed and validated among colleagues and potential clients the innovation real market potential is increased. Innovation is quite healthy in organizations if it is part of a strategy but can be quite resource consuming where stand-alone.

3.2.2. Measurement Approach

We proposed five questions to measure this KPI. Each question provides a score contributing to the calculation of the overall KPI.

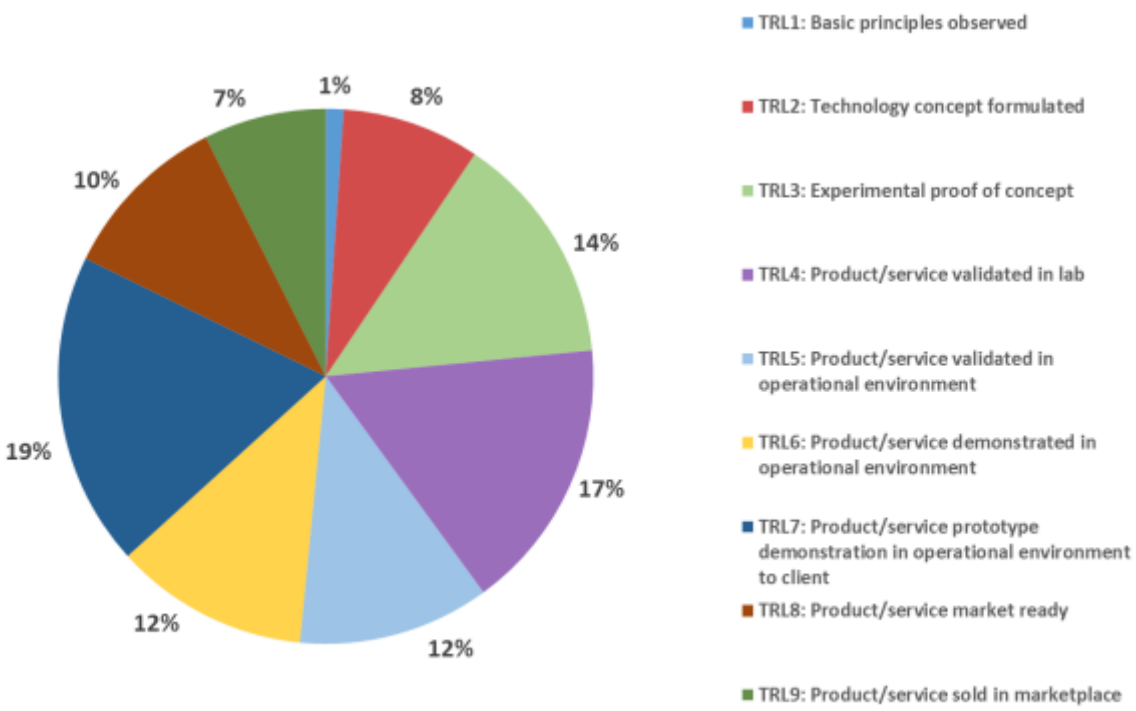
How near is your concept to being commercially exploitable?

The first question investigates about the market readiness of the subgrantee's solution, which greatly increases realistically achievable innovation. To measure it, we used the Technology Readiness Level (TRL) approach developed by NASA as it is widely known and provides comparable answers.

The analysis shows a quite equal distribution across the 9 levels of the scale. Only 17% of the projects we are assessing are positioned at the highest points of the TRL scale (TRL 8 and TRL 9). In the first assessment, we had 13% of the subgrantees in the top levels of the scale (8 and 9), so the data shows that these companies have advanced in developing their solutions.

Overall, the data confirms that generally these solutions are at in their first phase of development. There is a large group of start-ups with a single idea, who would naturally be at an earlier stage the other large group of better established entities that already had products and services on the market.

Figure 21 Innovation KPI: Market Readiness as described using TRLs



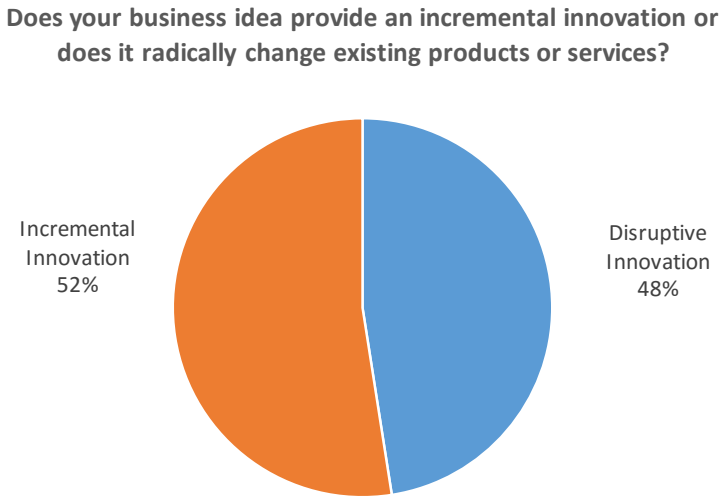
n = 648 respondents to the FI-IMPACT assessment tool, May 2016

Source: FI-IMPACT 2016

Does your concept or idea provide an Incremental Improvement or radically change existing products or services?

No foreseen improvement was not included as a possible answer, as no business idea would answer the question in this manner. The different approaches foreseen by our measurement resulted almost equally distributed among the subgrantees. The incremental effect was expected to be most common. 52% of respondents claimed they were incrementally expanding the state of the art in their domain, while respondents claiming their application or service would provide disruptive innovation was surprisingly high. Compared to the first assessment the data looks similar, as in November 2015, 56% of the subgrantees were approaching their markets with incremental innovation.

Figure 22 KPI Innovation: Percentage of Respondents Expecting Incremental or Disruptive Innovation



n = 648; respondents to the FI-IMPACT assessment tool, May 2016

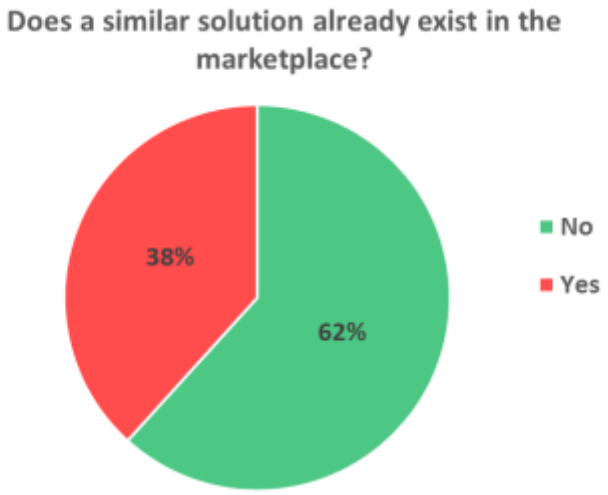
Source: FI-IMPACT 2016

Does a similar solution exist in the marketplace?

While the previous innovation question relates to a conceptual uniqueness and the technological parameters, this one approaches innovation from the economic and market perspective by investigating whether other players in the market have already developed a similar solution.

Again the results here are largely in line with the types of smaller "new idea generating" proposals that were received. As part of their strategic pitch styles addressing venture capitalist types of audiences, subgrantees are largely declaring they will provide something new and innovative (more than 60% of respondents, in line with the first round of measurement).

Figure 23 KPI Innovation: Competitors in the Marketplace



n = 648; respondents to the FI-IMPACT assessment tool

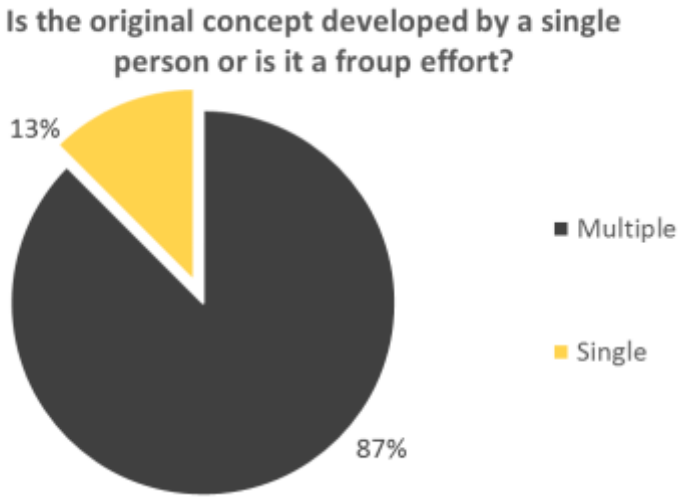
Source: FI-IMPACT 2016

Was the initial concept conceived by a single person? or by two or more people?

The following question is based on the idea that a group of collaborators involved in the conceptual phase is more likely to be objective and identify needs and requirements, compared to a "lone inventor".

The results are similar to the demographics shown in §2.3, where we see that the number of individual entrepreneurs is very similar (11%). Thus, the outcome and result of the question was largely predictable as roughly 13% said this was a lone effort while 87% claimed a team effort.

Figure 24 KPI Innovation: Group Effort or Lone Effort



n = 648; respondents to the FI-IMPACT assessment tool, May 2016

Source: FI-IMPACT 2016

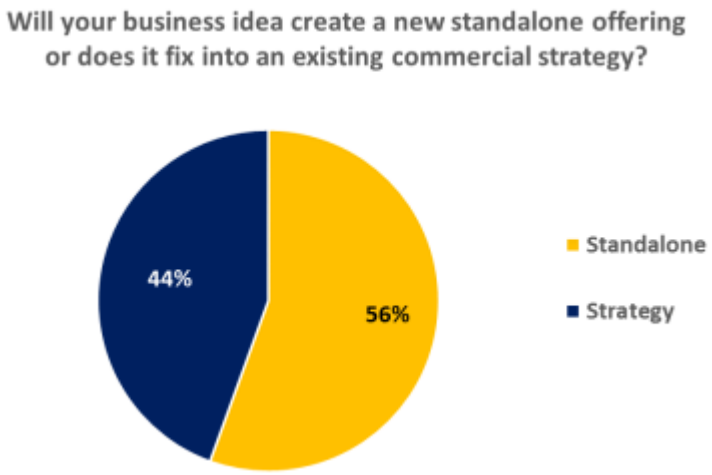
Will your business idea create a new standalone offering or does it fix into an existing commercial strategy?

This final question assesses whether these solutions are part of a larger organisational strategy involving existing product lines of similar offerings or whether this it is a new product line for the organisation. Thus this question examines the innovativeness of the organisational strategy.

As we see in the figure below, the majority of initiatives are new product lines in small companies. This confirms the general characteristics of the group of subgrantees, where the majority are made of small young companies (start-ups) settled as they were selected by the FIWARE Acceleration programme, and CURRENTLY are developing only one solution.

In many cases they are "betting" on the idea. This was in fact expected given the nature of the companies. However, there are a sizeable number of companies that are using FIWARE to improve their existing product and service offerings.

Figure 25 KPI Innovation: Standalone Ideas or Strategic Development



n = 648; respondents to the FI-IMPACT assessment tool

Source: FI-IMPACT 2016

3.2.3. Innovation KPI: Measurement Results

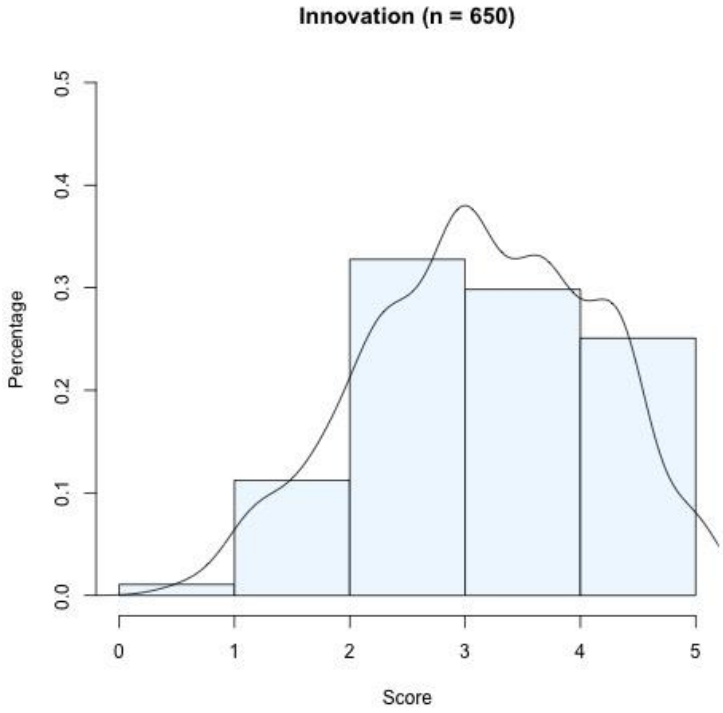
The chart below shows the distribution of Innovation Focus aggregated scores for the 650 subgrantees assessed with our measurement, at May 2016. The score is the weighted average of the answers to the innovation questions listed above, combining the two main investigated aspects: the closeness to market and the level of originality and disruption of the business idea.

The score corresponds to a scale of high, medium or low level of innovation focus as follows:

- Scores from 0 to 1.6 correspond to a low level of innovation;
- Scores from 1.7 to 3.3 correspond to a medium level of innovation;
- Scores from 3.4 to 5 correspond to a high level of innovation.

As the chart shows, most of the respondents (357 out of 650) are concentrated in the higher part of the scale. Overall, the average score of this group of initiatives is 3.1 which is quite positive and the best result among the 4 KPI indicators.

Figure 26 Innovation KPI: average results



n = 648 respondents to the FI-IMPACT assessment tool, May 2016

Source: FI-IMPACT 2016

This result indicates that the level of originality of these solutions is relatively high, and these projects are driving innovation in the markets where they compete thanks to FIWARE.

The results are completely in line with the first measurement.

3.3. Market Focus KPI

3.3.1. Definition

The Market Focus indicator assesses to what extent the sub grantees have gathered knowledge about their target customers, and whether their initiative has a coherent strategy and plan to reach the target market

This indicator measures the completeness level of "customer development"[3] activities: whether customers have already been approached to collect validated feedback on the

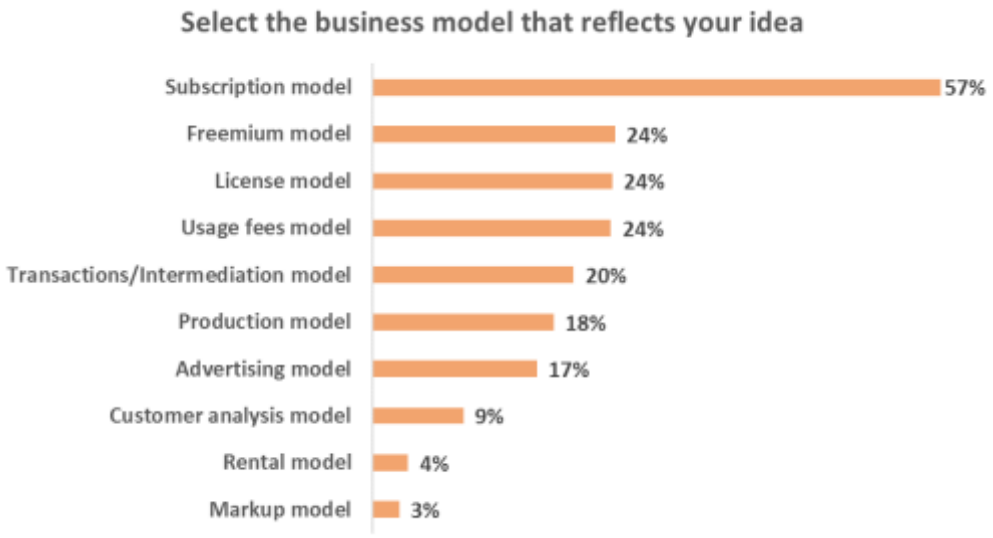
[3] Steve Blank, "The four steps to Epiphany", 2013.

product, and to what extent a strategy has been developed to acquire the target number of customers.

3.3.1. Measurement Approach

The first question in this area concerns the "business model" choice made by the proposers. The choice among alternative models does not directly impact on the KPI scoring for the subgrantees, but can provide significant insights on their progress along the key stages of a start-up lifecycle.

Figure 27 Market Focus KPI: Business Model



n = 648; respondents to the FI-IMPACT assessment tool, Multiple answers were allowed

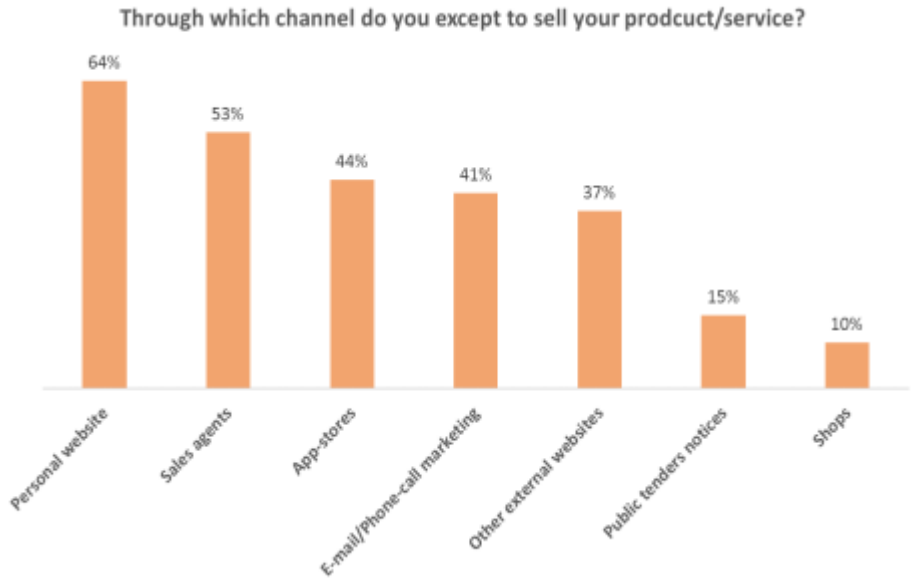
Source: FI-IMPACT 2016

The data confirms Year 1 assessment: the subscription model is by far the most preferred choice as source of revenues. Only 12.5% of subgrantees rely solely on this business model. The rest of the respondents combine two or more models, often quite different from each other. For example, 21% of respondents declare to pursue both the subscription *and* license model, which in theory are absolute opposites. This may apply to start-ups that offer a combined product plus service (e.g., a device plus subscription services associated to it) or, in other cases, to start-ups that are still quite behind in the validation of their business model on the market and are trying different directions at once.

The prevalence of subscription model is high among pure service providers (73%) and among software providers (78%), as can be expected. However, even a quite large majority of technology and hardware providers declare they rely on the subscription model (71%).

The general FI-IMPACT scoring confirms that subgrantees who are more advanced in their start-up launch process are consistently targeting one model over the others. For example, 71% of the above-mentioned subgrantees who are mixing up Subscription and License models are not among the best performers (scores lower than 3).

Figure 28 Market Focus KPI: Sales Channel

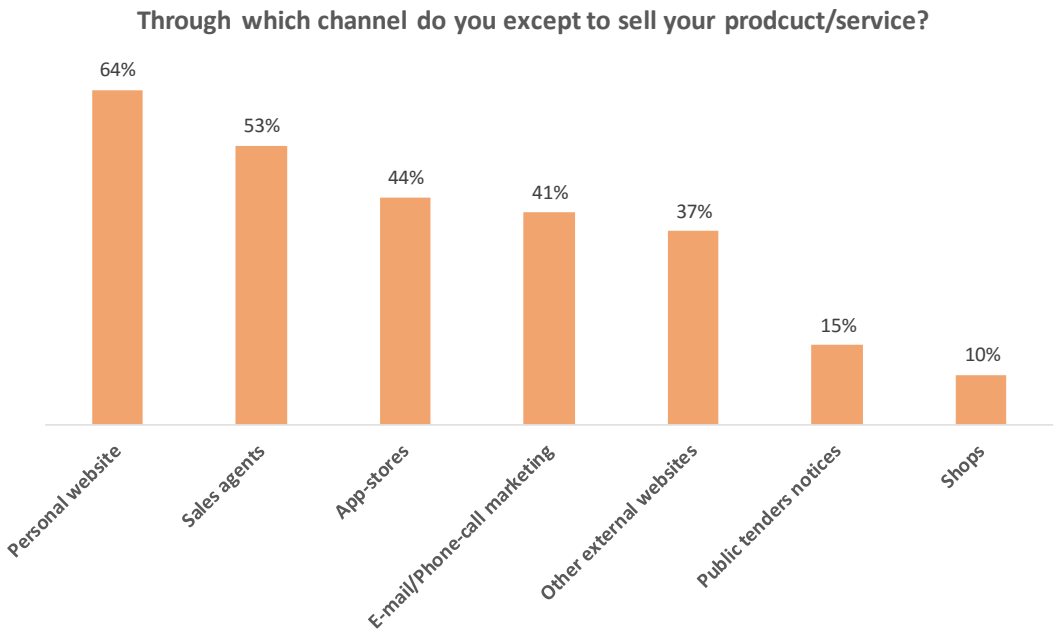


n = 648; respondents to the FI-IMPACT assessment tool, Multiple answers were allowed

Source: FI-IMPACT 2016

Another important business model characteristic is addressed by the question on *channels* selected to acquire customers in their target market by surveyed sub grantees. The data on selected channels do not impact directly on KPI scoring. However, they are one further important element to assess a company's market focus, i.e., the progress made by the sub grantee in understanding its target customers and the means to reach them.

Figure 29 Market Focus KPI: Sales Channel



n = 648; respondents to the FI-IMPACT assessment tool, Multiple answers were allowed

Source: FI-IMPACT 2016

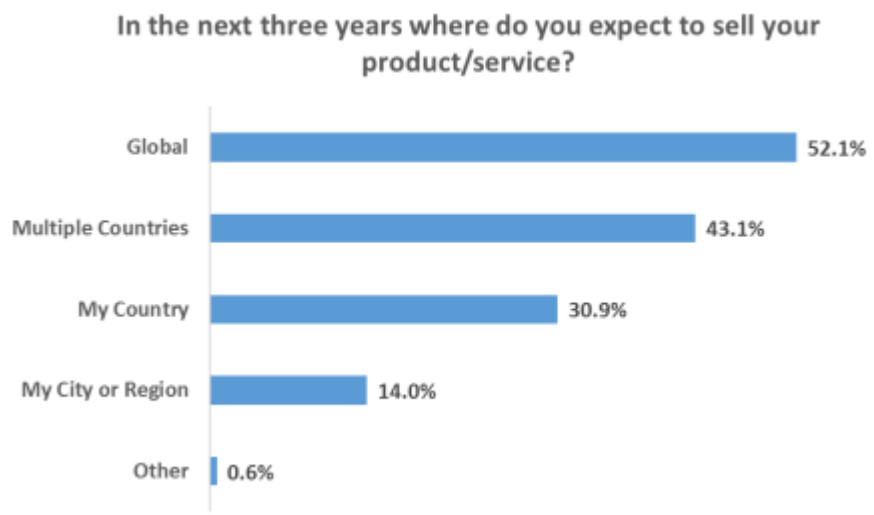
As common to most businesses, the majority of respondents aim at selling their product or service through multiple channels.

The data confirm the indications of Year 1 Impact Assessment, with slight changes in the percentage adoption of certain channels. In particular, less subgrantees appear to be focusing on third-party web sites (- 2%), while the number of subgrantees relying on an own sales-force has increased by the same amount, reaching 53%. This percentage does not change much for Subgrantees operating in different target markets, of different maturity. For example, only 41% of respondents selling B2B solutions indicate an own sales-force as a channel, while this is essential in most B2B sales, for example to attend expositions and to visit individual companies.

The Personal website is still the preferred channel by respondents, but it is hardly the only sales channel (only for 4% of respondents). As observed in Year 1, targeting a high variety of channels is typical of an early stage of customer development, and therefore of a start-up which is early in its lifecycle. Indeed, of those Subgrantees declaring sales agents as their *only* channel, 32% are among the best performers.

The question on geographical target (Figure 30) and the detail by country provided in Figure 31 are used directly for revenues estimation in the Market Model described above. Compared to Year 1 assessment, the percentage of respondents who aim at selling their product globally is slightly increased (+1.1%), while the percentage of those selling in multiple countries is slightly decreased (- 2%).

Figure 30 Market Focus KPI: Target Country



n = 648; respondents to the FI-IMPACT assessment tool, 278 respondents selected multiple countries. Multiple answers were allowed

Source: FI-IMPACT 2016

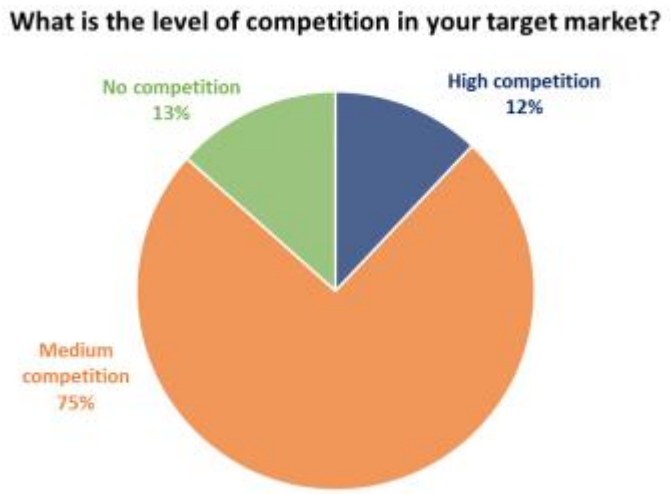
For the 43% of subgrantees developing a multi-country strategy, the main are Germany (66%), France (61%), UK (60%), Spain (58%), and Italy (50%).

The type of market is an important dimension, as different market types require different customer development approaches, and therefore different questions to assess the start-up progress. All of these aspects are considered in our Market Focus indicator, taking into account of different requirements placed by different *market types.*

The *type of market* where a start-up can find itself is determined by crossing the question on level of competition (Figure 31), with the question on "type of innovation" introduced in the Innovation section above. Based on Steve Blank's definition of start-up markets, there are three different situations a sub grantee may find itself in:

- Creating a *new market,* with an entirely new product not yet available to customers; this is identified in our model by no competition and a disruptive innovation;
- Competing with other start-ups in a *starting market,* where some players are already present and customer trends are starting to emerge; this is identified by low-medium competition and disruptive or incremental innovation;
- Competing with established players in a *consolidated market,* where the customers can immediately recognise and judge products and competition is strong; this is identified by incremental innovation and strong competition.

Figure 31 Market Focus KPI: Level of Competition



n = 648; respondents to the FI-IMPACT assessment tool,

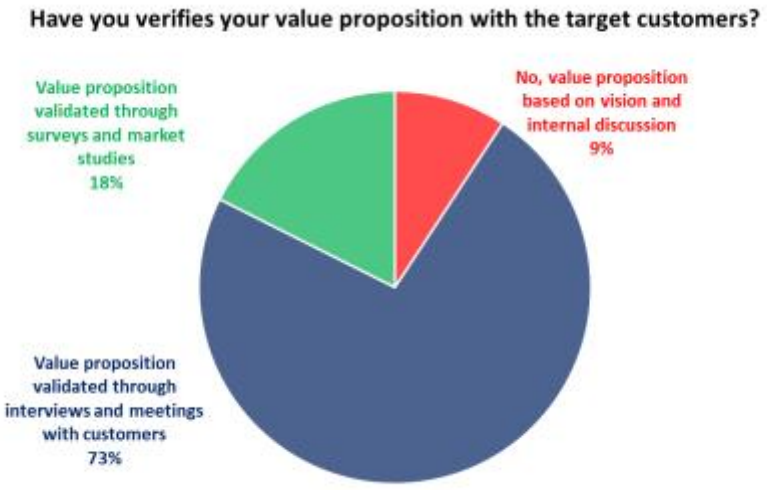
Source: FI-IMPACT 2016

The three types of market require rather different approaches, and this is taken into account in our Market Model. For example, "Unicorn" revenue estimates take into account that this type of start-up needs time to "educate" the market and so it will experience little to no growth in the first 3 years, with the potential to grow exponentially afterwards. The situation is different for sub grantees operating in a consolidated market, who will have to get up to speed sooner with marketing and sales activities.

Therefore, readiness in this area means to have validated knowledge on the true nature of the company's own product and market, as a basis for product and business development. The Year 2 assessment results show that most sub grantees have made good progress in identifying their type of market. For example, 62 % of respondents who have declared "No competition" in the target market have a disruptive innovation, while 60% of respondents who have declared "High" competition in the target market have an incremental innovation. Some inconsistent answers remain, confirming that some start-ups are still in the process of understanding their market's type. For example, 3% respondents declare to have an incremental innovation with "no competition" and another 3% declare a disruptive innovation with "high competition".

The question on value proposition refers to the activities done in the market to validate the sub grantee's value proposition. In terms of readiness, a sub grantee having gone through customer validation will be operating sooner on the market, while an untested value proposition will probably need to be revised as soon as the first dealings with customers take place, delaying marketing and sales plans.

Figure 32 Market Focus KPI: Value Proposition



n = 648; respondents to the FI-IMPACT assessment tool

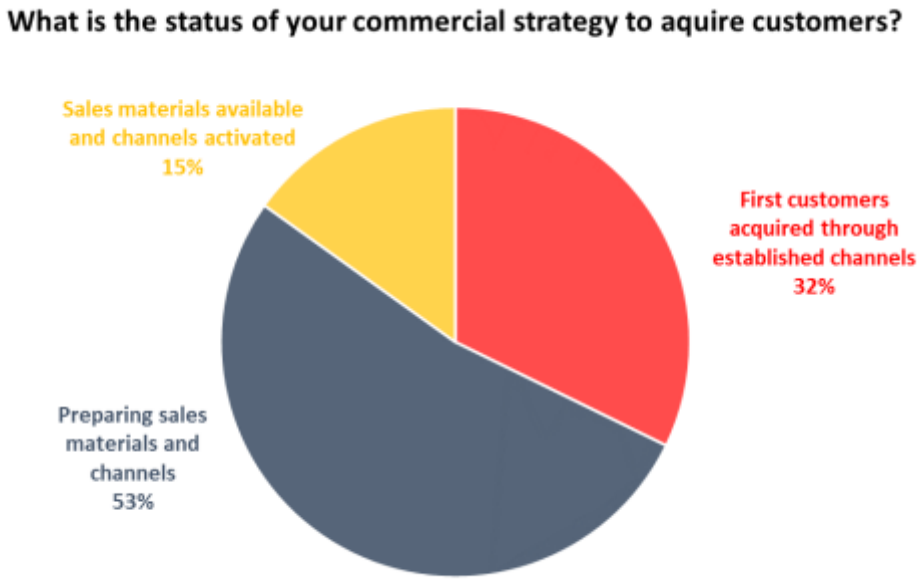
Source: FI-IMPACT 2016

The Year 2 assessment confirms the relation between the progress made by the subgrantees in customer validation and the technology readiness level declared in the Innovation section:

- 62% of respondents who have not verified the value proposition with the customer, have a TRL between 1 and 4 (Research environment) while only 13% have a TRL between 7 and 9 (Real environment).
- 57% of respondents who have verified the customer value proposition through surveys and market studies, have a TRL between 1 and 4 while the 19% have a TRL between 7 and 9.
- 33% of respondents who have verified the value proposition through interviews and meetings with customers, have a TRL between 1 and 4, while the 44% have a TRL between 7 and 9.

The question on commercial strategy refers to how advanced the company is in defining and executing its marketing and sales strategy. In terms of readiness, a sub grantee having made significant progress in this area is expected to be operating sooner on the market than others who are still mostly focused on product development.

Figure 33 Market Focus KPI: Commercial Strategy



n = 648; respondents to the FI-IMPACT assessment tool

Source: FI-IMPACT 2016

The Year 2 assessment shows the relation between the status of commercial strategy and the technology readiness level declared in the Innovation section:

- 21% of respondents who declare to have acquired the first customers have a TRL between 1 and 4 (Research environment), while 61% have a TRL between 7 and 9 (Real environment).
- 32% of respondents who declare to have prepared and activated the sales channels have a TRL between 1 and 4 (Research environment), while 39% have a TRL between 7 and 9 (Real environment).
- 54% of respondents who are still preparing their sales channels have a TRL between 1 and 4 (Research environment), while 21% have a TRL between 7 and 9 (Real environment).

3.3.2. Market Focus KPI: Measurement Results

The chart below shows the distribution of Market Focus aggregated scores for the 481 respondents of the first round of the Impact Assessment survey, updated at November 3rd 2015.

The score is the weighted average of the answers to the market questions listed above, combining the two main investigated aspects: customer development and market strategy (see Annex 7.1 for the calculation details).

The score corresponds to a scale of high, medium or low level of innovation focus as follows:

- Scores from 0 to 1.6 correspond to a low focus on customer development and market strategy;

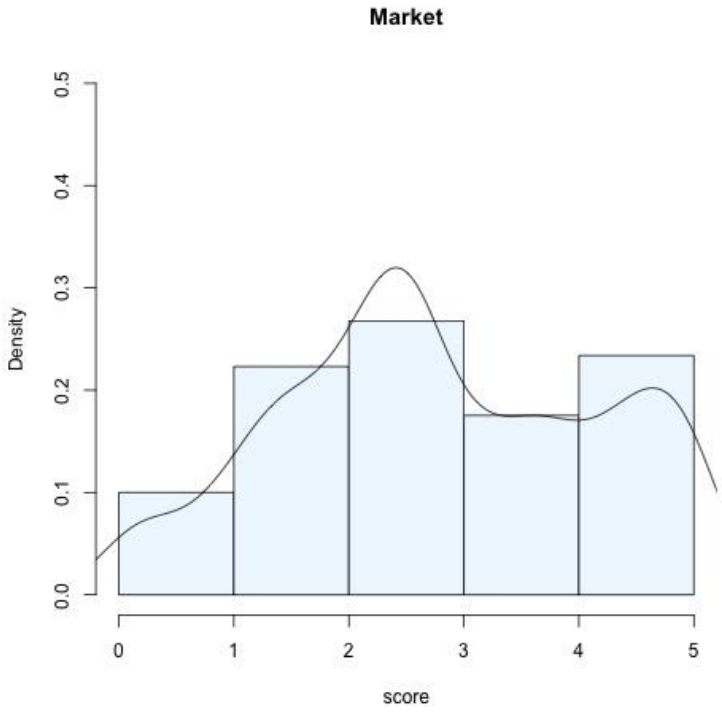
- Scores from 1.7 to 3.3 correspond to a medium focus on customer development and market strategy;
- Scores from 3.4 to 5 correspond to a high focus on customer development and market strategy.

The chart below shows the distribution of the subgrantees scores, which is quite dispersed along the scale, with a peak for the score between 2 and 2.5, corresponding to a medium-low level of market focus. This means that more than half of the respondents demonstrate (according to our survey) a modest knowledge about customers in their target market, and their plans to reach their markets need improvements.

On the other hand, there is also a substantial group of subgrantees showing a promising approach to their market: about 18% of respondents score between 3 and 4, and another 18% over 4 with a more than satisfactory market focus.

The combination of these results leads to an overall average score of 2.7, corresponding to a medium level of market focus.

Figure 34 Market Focus KPI: Average Score



n = 648 respondents to the FI-IMPACT assessment tool, May 2016

Source: FI-IMPACT 2016

3.4. Feasibility KPI

3.4.1. Definition

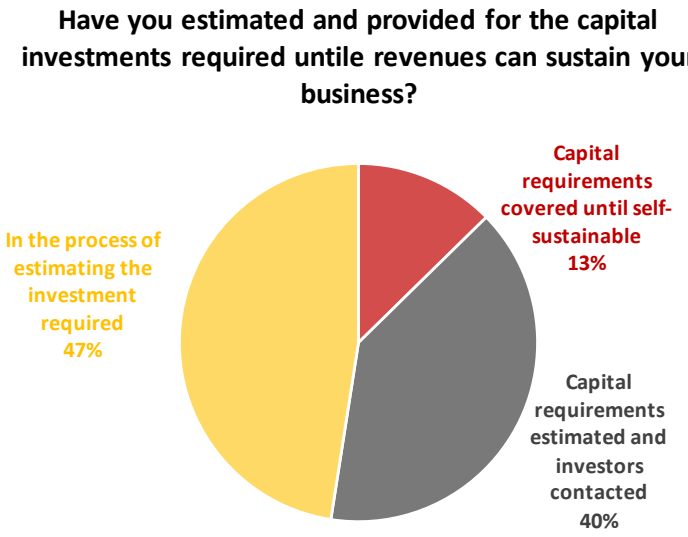
The Feasibility indicator measures to what extent the sub grantees have assessed the economic viability of their business, and if they have already provided for the necessary funds for the start-up phase.

This is relevant for business readiness: those companies who have made themselves aware of the funds required to start and grow the business, and have been securing sources for these funds, are most likely to perform well and avoid failure.

3.4.2. Measurement Approach

The first two questions on Feasibility concern the sub grantee's estimation of the required capital investments and the company's status in the process of securing these funds.

Figure 35 Feasibility KPI: Capital Investment Estimation

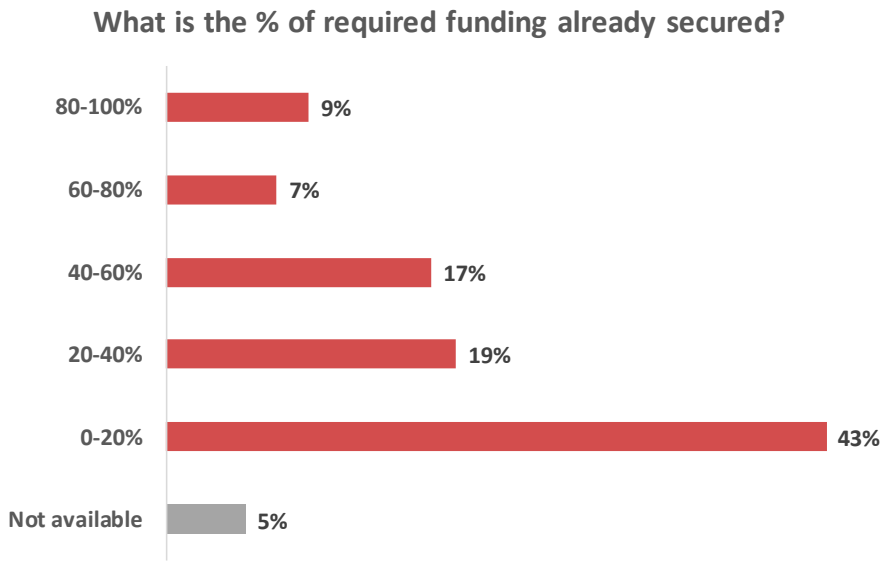


n = 648; respondents to the FI-IMPACT assessment tool

Source: FI-IMPACT 2016

About half of the sub grantees has estimated the capital required to develop their idea and a good share of them (72%) have already secured some funds (up to 50%).

Figure 36 Feasibility KPI: Funds Status



n = 648; respondents to the FI-IMPACT assessment tool

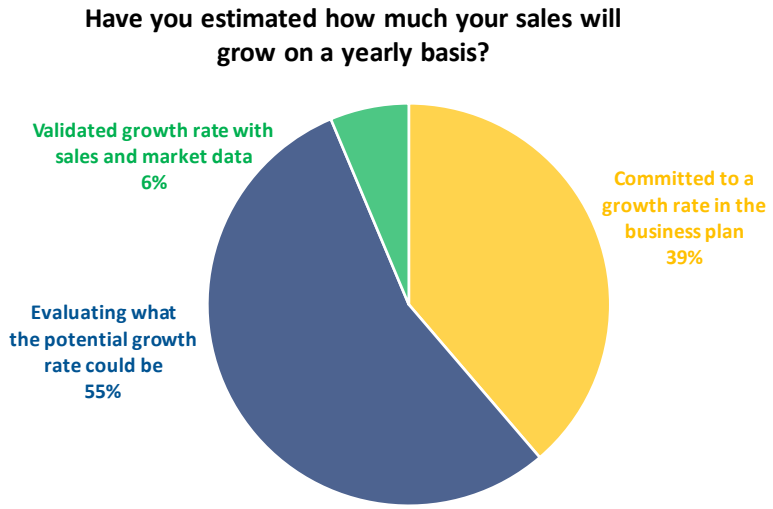
Source: FI-IMPACT 2016

According to the final Year 2 assessment, a larger share of subgrantees have collected sufficient funding to reach break-even, 32% with a +20% on Year 1 assessment. Of these, 32% rely for less than 50% on investors' capital to reach self-sufficiency.

Among the respondents who are still estimating the required capital, 61% have nevertheless secured some capital.

Sales growth estimations are directly affecting the Market Model, and to this purpose the questions in Figure 50 and Figure 51 have been introduced in the survey.

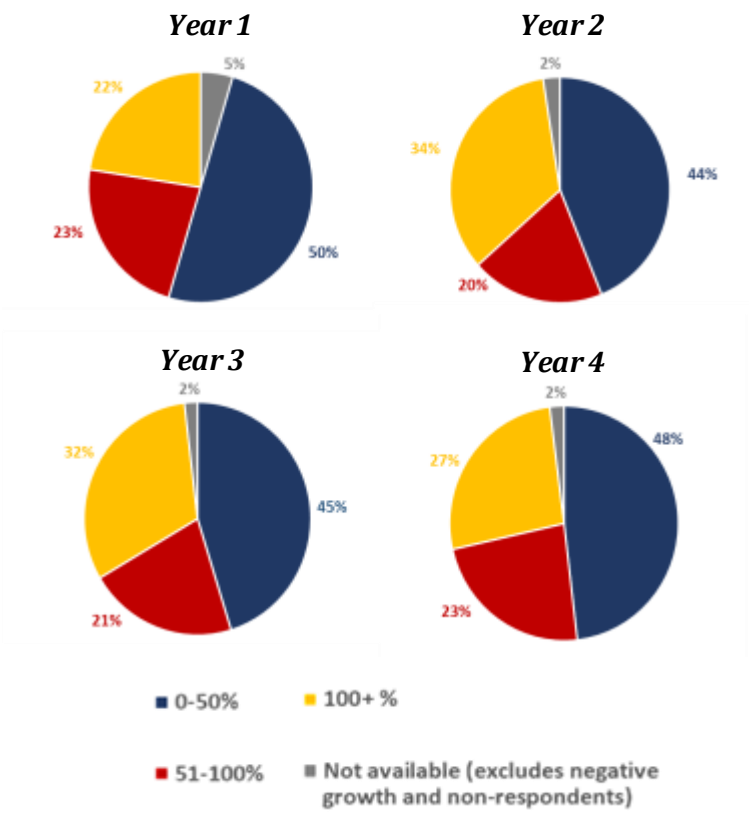
Figure 37 Feasibility KPI: sales growth estimation



n = 648; respondents to the FI-IMPACT assessment tool

Source: FI-IMPACT 2016

Figure 38 Feasibility KPI: sales growth estimation (year 1, year 2, year 3, year 4)



n = 648; respondents to the FI-IMPACT assessment tool

Source: FI-IMPACT 2016

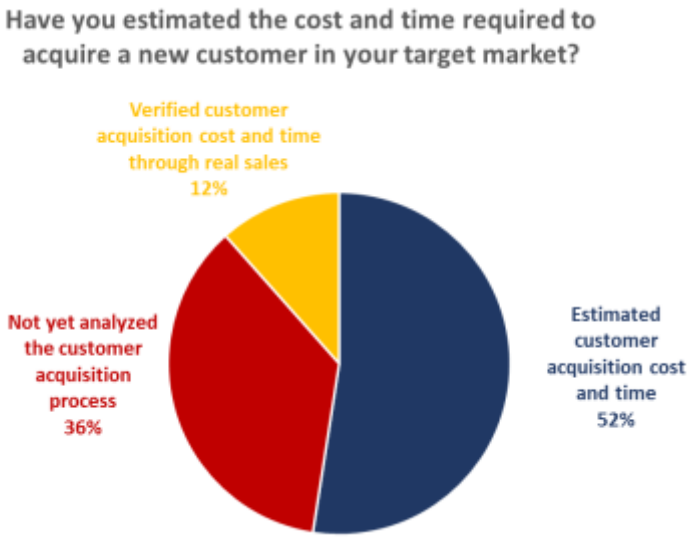
The Year 2 assessment confirms that the majority of sub grantees (55%) have not yet set on a definite annual sales growth rate. Anyway, 63% of these do not expect their sales to grow by more than 100% per year for the next four years.

This changes for respondents who have committed to a growth rate in the Business Plan (39% of the total). The majority of these companies (53%) expect to grow by more than 100% on a yearly basis.

A small part of respondents (6%) have validated their growth targets through actual sales data. For these, growth expectations have increased as 71% of them expect over 100% yearly growth in the next four years.

A further element required for a sound implementation of the business plan, and hence affecting feasibility, is knowledge of the actions and costs required to acquire customers from the target market.

Figure 39 Feasibility KPI: costs of customer acquisition



n = 648; respondents to the FI-IMPACT assessment tool

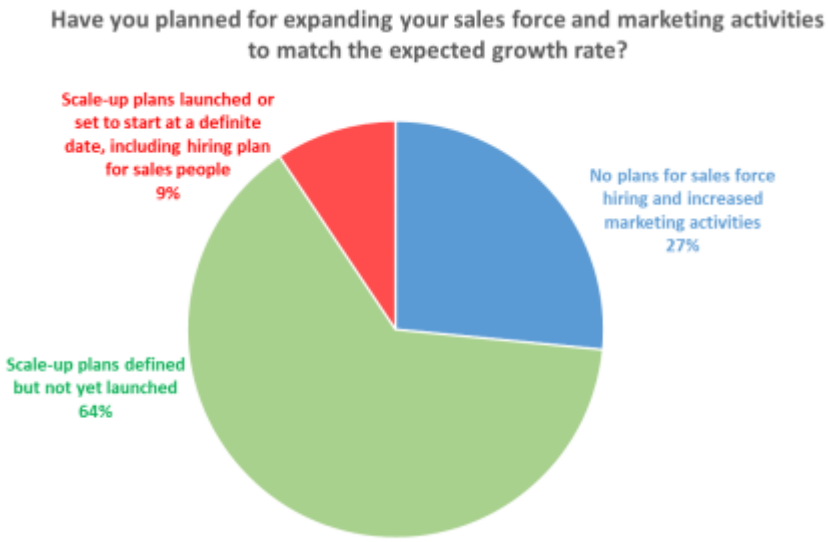
Source: FI-IMPACT 2016

Generally, the cost and time required to acquire a new customer in the target market are estimated in a bland way in the research stage, more in-depth in the prototyping stage and validated when the product is being made ready for market.

This is confirmed by the correlation between the progress made by the start-ups in this area and their declared TRL. Of the 36% respondents who have not yet analysed the customer acquisition process 47% are still in the research environment (TRL 1-4). Conversely, of the 12% respondents who have validated customer acquisition on the market a good majority (68%) are in the real environment (TRL 7-9).

Especially for companies operating in mature or starting markets, it is important to have a clear marketing and sales strategy set up since the first year of business. Therefore, we assess a start-up progress in preparing, funding and launching appropriate marketing and sales plans.

Figure 40 Feasibility KPI: sales force and marketing activities strategy



n = 648; respondents to the FI-IMPACT assessment tool

Source: FI-IMPACT 2016

The sales force size and the marketing investments required to achieve the expected growth rate are planned generally after making an accurate estimate of the sales growth. Therefore, Figure 39, on customer acquisition, and Figure 40, on sales and marketing plans, are quite aligned. In general, a sizeable majority of respondents (64%) have scale up plans for their marketing and sales, but not yet launched.

This is marginally affected by the start-up's confidence on its growth potential: of respondents who declare to have validated their growth rate, only 46% are actually enacting their sales plans. This percentage decreases to 27% for those start-ups that have only committed to a growth percentage in their business plan.

Progress in sales and marketing is correlated to technology readiness. 48% of respondents declaring no scale-up plans are in the research environment (TRL 1-4), while 69% of sub grantees who are already enacting their plans are in the real environment (TRL 7-9).

3.4.3. Feasibility KPI: Measurement Results

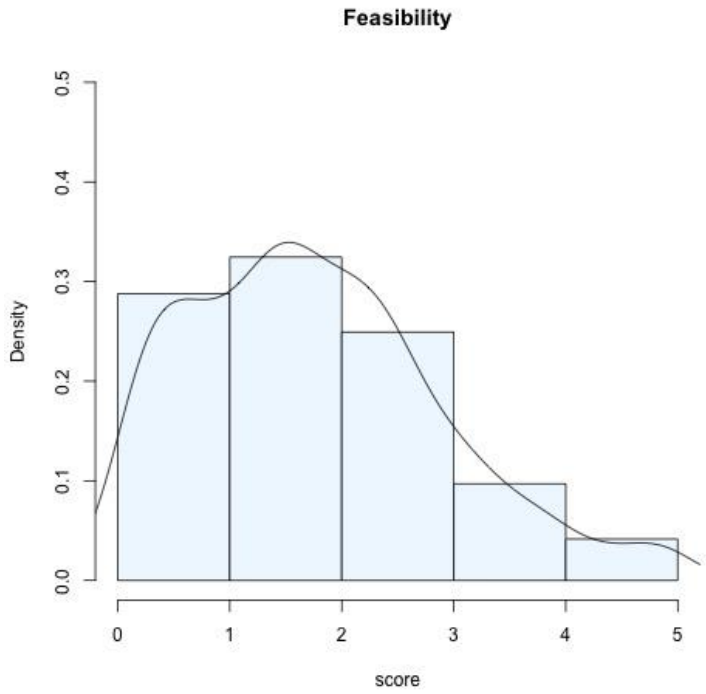
The chart below shows the distribution of Feasibility aggregated scores for the 481 respondents of the first round of the Impact Assessment survey, updated at November 3rd 2015. The score is a weighted average of the answers to the questions described above, focused on the capability to collect the necessary financial resources (see Annex 7.1 for the calculation details).

The score corresponds to a scale of high, medium or low level of Feasibility as follows:

- Scores from 0 to 1.6 correspond to a low level of feasibility;
- Scores from 1.7 to 3.3 correspond to a medium level of feasibility;
- Scores from 3.4 to 5 correspond to a high level of feasibility.

The average score of feasibility is 1.7, and is the lowest of the five KPIs we are measuring.

Figure 41 Feasibility KPI: average score



n = 648 respondents to the FI-IMPACT assessment tool, May 2016

Source: FI-IMPACT 2016

3.5. Business market needs KPI

3.5.1. Definition

The B2B Market Needs Indicator measures the extent to which the benefits provided by the respondent's product or service are close to the potential needs of the market segment targeted, for the business market. This indicator provides a "reality check" by comparing the respondent's answers with IDC data sourced from ICT users' surveys, used as a benchmark of users' priorities.

We do so by asking the respondent to select and rank by relevance his product/service main benefits out of a pre-defined list developed by IDC. Then we compare the ranking indicated by the respondent with the ranking sourced from IDC data for the specific industry sector or consumer segment targeted by the start-up. The respondent's score is high if his/her answers are aligned with the ranking provided by IDC, low if the answers are different from those provided by IDC. Therefore, the indicator measures the coherence between the respondent's answers and the IDC data. This indicator is different from the Market focus one because it focuses on comparing start-ups expectations with real market data.

3.5.2. Measurement Approach

This section analyses the type of potential benefits, as indicated by the subgrantees in the survey, and to what extent they coincide with B2B or B2G real market needs, based on a benchmark elaborated by IDC.

To simplify the analysis, the questionnaire suggested a pre-defined list of business and public sector potential benefits among which funded initiatives were asked to choose:

- Reducing operational costs
- Improving operational efficiency
- Enhancing customer (citizen for public sector, patient for healthcare) care
- Innovating the product/service companies sell/provide
- Improving sales performance
- Improving marketing effectiveness
- Increasing use and distribution of open data and transparency
- Strengthening multi-channel delivery strategy
- Improving scalability of existing tools
- Simplifying regulatory tasks and complying with regulations
- Improving data protection

The figure below shows the ranking of the business benefits priorities by industry, elaborated on the basis of the IDC Vertical Markets Survey, which was used as the benchmark of comparison with the subgrantees' answers. The ranking from 1 to 11 in each row of the table reflects the different values given by the companies in a specific industry sector to each of the business needs.

Figure 42 Market Needs KPI: Ranking of business needs by industry (based on IDC data)

Vertical Markets \ Market needs											
Accommodation and food services	2	6	1	9	3	4	11	5	10	8	7
Agriculture	2	4	5	6	3	10	11	8	9	1	7
Arts and Entertainment	3	8	1	6	2	7	10	9	11	4	5
Business Services	4	5	2	8	6	9	11	10	7	3	1
Construction	2	6	3	7	3	9	11	8	10	3	1
Education	2	8	7	5	5	10	4	11	9	1	3
Government	5	6	10	9	4	8	1	7	11	2	3
Healthcare	7	6	2	8	5	10	4	11	9	3	1
Cross-sector Solutions	5	4	6	7	3	8	10	11	9	2	1
Manufacturing	3	2	6	5	7	10	11	9	8	4	1
Wholesale and Retail	3	5	4	8	1	2	11	9	10	7	6
Telecom and Media	8	7	2	5	2	9	10	11	6	4	1
Transport	3	5	4	6	7	9	11	10	8	1	2
Utilities	7	8	6	5	4	2	11	3	10	9	1

Note: in each row numbers from 1 to 11 represent the ranking of the market needs by Vertical Market as per the IDC Vertical Market Survey. 1 = most important need 11= less important need

Source: IDC European Vertical Markets, 2015

The analysis is based on 647 answers to the following question: "*Which are the main expected benefits your solution will provide for Private and/or Public sector (B2B/B2G)?*" The KPI score is calculated on the basis of the main business market sector selected by the respondents (identified in the question 3.3 of the Market Focus section of the questionnaire).

In order to rank the main benefits, they expect to achieve, the respondents were asked to distribute 6 points (stars) across a list of 11 suggested business benefits. Funded initiatives chose how to distribute the given points, according to how their solutions addresses market needs. They could have put 1 or more points up to 6 to one benefit, or all points in just one answer, assuming that the sum had to be 6 'stars'. They could not score all of the listed benefits. This method obliges the respondents to declare just the main benefits they expect to bring to the market.

Final values are assigned considering the points given to each benefit and the number of successful respondents for each industry sector. In this way, the final score represents the average points each subgrantee targeting that particular industry gave to each business benefit.

Here we compare the answers of the funded initiatives split by industry sector with market needs resulting from the IDC survey. For the funded initiatives, results are presented on the basis of the number of respondents targeting each industry sector. For each industry sector, a table will show which are the top five expected business benefits identified by the funded initiatives and the correspondent top five market needs identified through the IDC survey.

Among the funded initiatives which successfully answered the questionnaire, the most targeted industry sectors are Agriculture, Cross-Sector Solutions, Manufacturing, Healthcare, Business Services, and Government. In these industry sectors, the number of respondents is comprised between 40 and 90. The second group of industry sectors includes Wholesale and Retail, Transport, Arts and Entertainment, Education, Utilities, and Telecom and Media. This group is sought by a number of funded initiatives comprised between 10 and 30. Finally, we find Accommodation and Food Services, with a number of targeting funded initiatives lower than 10.

Agriculture, Forestry and Fishing

Among the 648 respondents, 104 are targeting the agricultural industry.

The top expected business benefits of the funded initiatives addressing the agriculture sector with their solutions deal mostly with the reduction of operational costs and the improvement of data protection.

Even if it is undergoing an in-depth tech transformation, Agriculture is still one of the less advanced sectors in terms of IT spending and technology innovation, and for this reason companies need to adopt new solutions by lowering costs at the same time.

On the other hand, the market needs identified by the IDC survey in this industry give priority to regulatory concerns, to the reduction of operational costs and to the improvement of sales performance.

Table 4 Agriculture, Forestry and Fishing: Top five Expected Business Benefits of the funded initiatives compared to Top five Market Needs from IDC survey

Top five Expected Business Benefits of the funded initiatives	Top five Market Needs from IDC survey
1. Reducing operational costs	1. Simplifying regulatory tasks and complying with regulations
2. Improving data protection	2. Reducing operational costs
3. Improving operational efficiency	3. Improving sales performance
4. Increase use and distribution of data transparency	4. Improving operational efficiency
5. Enhancing customer (citizen for public sector, patient for healthcare) care	5. Enhancing customer (citizen for public sector, patient for healthcare) care

N= 104 respondents selecting this market at May 31st 2016

Source FI-IMPACT 2016

Cross-Sector Solutions

96 start-ups are developing cross-sector solutions.

Our definition of a Cross-Sector Solution refers to a solution suitable for every industry sector, from marketing applications, to big data/analytics solutions, to content management and back-office applications. In this group, the expected business benefits identified by the funded initiatives are improving data protection and reduction of operational costs. There is a good correspondence with the market need identified through the IDC survey.

Table 5 Cross-sector: Top five Expected Business Benefits of the funded initiatives compared to Top five Market Needs from IDC survey

Top five Expected Business Benefits of the funded initiatives	Top five Market Needs from IDC survey
1. Improving data protection	1. Improving data protection
2. Reducing operational costs	2. Simplifying regulatory tasks and complying with regulations
3. Improving sales performance	3. Improving sales performance
4. Enhancing customer (citizen for public sector, patient for healthcare) care	4. Reducing operational efficiency
5. Improving operational efficiency + Improving scalability of existing tools	5. Reducing operational costs

N= 96 respondents selecting this market at May 31st 2016

Source FI-IMPACT 2016

Manufacturing

The 73 initiatives targeting this sector are related to a variety of manufacturing sub-sectors, from automotive to white goods, and from textile to plastic. Innovative projects include IoT for supply chain and logistic, 3D printing factories, intelligent transport items, and innovative internet based feature in equipment and machines. In this sector, the expected business benefits are reduction of operational costs and improving data protection. Improving sales performance and operational efficiency are two other key issues that projects targeting this sector want to address.

Table 6 Manufacturing: Top five Expected Business Benefits of the funded initiatives compared to Top five Market Needs from IDC survey

Top five Expected Business Benefits of the funded initiatives	Top five Market Needs from IDC survey
1. Reducing operational costs	1. Improving data protection
2. Improving data protection	2. Improving operational efficiency
3. Improving sales performance	3. Reducing operational costs
4. Improving operational efficiency	4. Simplifying regulatory tasks and complying with regulations
5. Enhancing customer (citizen for public sector, patient for healthcare) care	5. Innovating the product or service companies sell/provide

N= 73 respondents selecting this market at May 31st 2016
Source FI-IMPACT 2016

Healthcare

59 initiatives are addressing the healthcare sector with their solutions.

Innovating the product or service the organizations provide is the business benefit to which is assigned the highest value. The second benefit the funded initiatives are expected to deliver is reducing operational costs.

The healthcare sector is requested to reduce costs, especially in the public sector, and funded projects are identifying it as a key issue.

Healthcare is one of those sectors for which correspondence between business benefits and market needs is above the average and so there is a very good match.

Table 7 Healthcare: Top five Expected Business Benefits of the funded initiatives compared to Top five Market Needs from IDC survey

Top five Expected Business Benefits of the funded initiatives	Top five Market Needs from IDC survey
1. Innovating the product or service companies sell/provide	1. Improving data protection

2. Reducing operational costs	2. Enhancing patient care
3. Improving data protection	3. Simplifying regulatory tasks and complying with regulations
4. Improving sales performance	4. Improving sales performance
5. Improving scalability of existing tools	5. Increasing use and distribution of open data and transparency

N= 69 respondents selecting this market at May 31st 2016

Source FI-IMPACT 2016

Business Services

The analyzed 48 funded initiatives targeting Business Services give the highest value to improving sales performance. Among the other business benefits, they similarly expect to enhance customer care, reduce operational costs, improve data protection and improve operational efficiency. Business services industry needs are well addressed by the funded initiatives, as the index is the highest, together with manufacturing.

Table 8 Business services: Top five Expected Business Benefits of the funded initiatives compared to Top five Market Needs from IDC survey

Top five Expected Business Benefits of the funded initiatives	Top five Market Needs from IDC survey
1. Improving sales performance	1. Improving data protection
2. Enhancing customer (citizen for public sector, patient for healthcare) care	2. Enhancing customer (citizen for public sector, patient for healthcare) care
3. Improving data protection	3. Simplifying regulatory tasks and complying with regulations
4. Reducing operational costs	4. Reducing operational costs
5. Improving operational efficiency	5. Improving operational efficiency

N= 48 respondents selecting this market at May 31st 2016

Source FI-IMPACT 2016

Government

This market is addressed by 60 initiatives.

Funded initiatives valued the improving of sales performance and the enhancement of customer care as the first and second business benefits to deliver. Among other choices they also valued as important the improvement of data protection, the reduction of operational costs and the improvement of operational efficiency, following the aim of a better management of public sector resources. Government business needs are not well aligned to IDC ones, and the resulting index of correspondence is below the average.

Table 9 Government: Top five Expected Business Benefits of the funded initiatives compared to Top five Market Needs from IDC survey

Top five Expected Business Benefits of the funded initiatives	Top five Market Needs from IDC survey
1. Innovating the product or service companies sell/provide	1. Increasing use and distribution of open data and transparency
2. Improving data protection	2. Simplifying regulatory tasks and complying with regulations
3. Reducing operational costs	3. Improving data protection
4. Improving scalability of existing tools	4. Improving performance
5. Enhancing customer (citizen for public sector, patient for healthcare) care	5. Reducing operational costs

N= 60 respondents selecting this market at May 31st 2016

Source FI-IMPACT 2016

Wholesale and Retail

44 initiatives are targeting the wholesale and retail industry where "improved operational efficiency" is the number one benefit they expect to deliver. Also reducing operational costs and enhancing customer care are considered of similar importance, highlighting the concentration of answers on the top three points. According to the IDC Data, the funded initiatives targeting the wholesale and retail industry sector should make a sanity check to understand if they are aligned with market needs.

Table 10 Wholesale and Retail: Top five Expected Business Benefits of the funded initiatives compared to Top five Market Needs from IDC survey

Top five Expected Business Benefits of the funded initiatives	Top five Market Needs from IDC survey
1. Improving operational efficiency	1. Improving sales performance
2. Reducing operational costs	2. Improving marketing effectiveness
3. Enhancing customer (citizen for public sector, patient for healthcare) care	3. Reducing operational costs
4. Improving marketing effectiveness	4. Improving operational efficiency
5. Improving data protection	5. Enhancing customer (citizen for public sector, patient for healthcare) care

N= 44 respondents selecting this market at May 31st 2016

Source FI-IMPACT 2016

Transport

45 funded initiatives targeting Transport considered reducing operational costs the most important business benefit they can deliver with their projects. Similar values are given to improve data protection, sales performances and innovate the product or service. The IDC data indicates a satisfactory level of alignment.

Table 11 Transport: Top five Expected Business Benefits of the funded initiatives compared to Top five Market Needs from IDC survey

Top five Expected Business Benefits of the funded initiatives	Top five Market Needs from IDC survey
1. Reducing operational costs	1. Simplifying regulatory tasks and complying with regulations
2. Improving data protection	2. Improving data protection
3. Improving sales performance	3. Reducing operational costs
4. Innovating the product or service companies sell/provide	4. Enhancing customer care
5. Improving operational efficiency	5. Improving operational efficiency

N= 45 respondents selecting this market at May 31st 2016

Source FI-IMPACT 2016

Arts and Entertainment

The 17 funded initiatives focused on this industry sector assigned similar values to four business benefit they expect to address. The first in order of importance is enhancing customer care, as the business of companies in this industry sector is directly influenced by customer satisfaction. Other business benefits are improving sales performance and operational efficiency, and reducing operational costs.

Table 12 Arts and Entertainment: Top five Expected Business Benefits of the funded initiatives compared to Top five Market Needs from IDC survey

Top five Expected Business Benefits of the funded initiatives	Top five Market Needs from IDC survey
1. Enhancing customer (citizen for public sector, patient for healthcare) care	1. Enhancing customer care
2. Improving sales performance	2. Improving sales performance
3. Improving operational efficiency	3. Reducing operational costs
4. Reducing operational costs	4. Simplifying regulatory tasks and complying with regulations
5. Improving data protection	5. Improving data protection

N= 17 respondents selecting this market at May 31st 2016

Source FI-IMPACT 2016

Education

For Education, multiple business benefits are considered important. This result shows that 28 funded initiatives targeting this market consider that different market needs have to be addressed. Innovating the product or service and improving sales performance are considered of primary importance, followed by reducing operational costs and improving

data protection. Education, together with agriculture, is the industry in which expected business benefits are not very consistent with IDC ones.

Table 13 Education: Top five Expected Business Benefits of the funded initiatives compared to Top five Market Needs from IDC survey

Top five Expected Business Benefits of the funded initiatives	Top five Market Needs from IDC survey
1. Innovating the product or service companies sell/provide	1. Simplifying regulatory tasks and complying with regulations
2. Improving sales performance	2. Reducing operational costs
3. Reducing operational costs	3. Improving data protection
4 Improving data protection	4. Increasing use and distribution of open data and transparency
5. Improving operational efficiency + Improving scalability of existing tools	5. Innovating the product or service companies sell/provide + 5. Improving sales performance

N= 28 respondents selecting this market at May 31st 2016

Source FI-IMPACT 2016

Utilities

A little part of the funded initiatives is targeting the utilities market (22).

In this industry sector, reducing operational costs is considered of primary importance, then we find improving sales performance and improving data protection. Improving operational efficiency follows. All the others are valued quite below the top list of benefits.

Table 14 Utilities: Top five Expected Business Benefits of the funded initiatives compared to Top five Market Needs from IDC survey

Top five Expected Business Benefits of the funded initiatives	Top five Market Needs from IDC survey
1. Reducing operational costs	1. Improving data protection
2. Improving sales performance	2. Improving marketing effectiveness
3. Improving data protection	3. Strengthening multi-channel delivery strategy
4. Improving operational efficiency	4. Improving sales performance
5. Simplifying regulatory tasks and complying with regulations	5. Innovating the product or service companies sell/provide

N= 22 respondents selecting this market at May 31st 2016

Source FI-IMPACT 2016

Telecom and Media

All the benefits identified for Telecom and Media are related with efficiency, as the highest values are assigned to improving sales performance, improving marketing effectiveness and reducing operational costs. Enhancing customer care follows. Funded initiatives targeting this industry sector, and successfully answering the questionnaire, are only 18.

Table 15 Telecom and Media: Top five Expected Business Benefits of the funded initiatives compared to Top five Market Needs from IDC survey

Top five Expected Business Benefits of the funded initiatives	Top five Market Needs from IDC survey
1. Reducing operational costs	1. Improving data protection
2. Improving sales performance	2. Enhancing customer (citizen for public sector, patient for healthcare) care
3. Improving marketing effectiveness	3. Improving sales performance
4. Enhancing customer (citizen for public sector, patient for healthcare) care	4. Simplifying regulatory tasks and complying with regulations
5. Improving data protection	5. Innovating the product or service companies sell/provide

N= 18 respondents selecting this market at May 31st 2016

Source FI-IMPACT 2016

Accommodation and Food Services

The number of analyzed funded initiatives targeting Accommodation is only 12. These respondents identified enhancing customer care and improving operational efficiency as the main business benefits to deliver with their project. Other benefits deal with the management of costs and security, as they are identified in reducing operational costs and improving data protection. Also sales performances can be considered an important market need for the funded initiatives.

Accommodation and food services index of correspondence is positioned in the middle of the classification.

Table 16 Accommodation and Food Services: Top five Expected Business Benefits of the funded initiatives compared to Top five Market Needs from IDC survey

Top five Expected Business Benefits of the funded initiatives	Top five Market Needs from IDC survey
1. Enhancing customer (citizen for public sector, patient for healthcare) care	1. Improving operational efficiency + 1. Enhancing customer (citizen for public sector, patient for healthcare) care
2. Improving operational efficiency	2. Reducing operational costs
3. Reducing operational costs	3. Improving sales performance
4 Improving data protection	4. Improving marketing effectiveness
5. Improving sales performance	5. Strengthening multi-channel delivery strategy

N= 12 respondents selecting this market at May 31st 2016

Source FI-IMPACT 2016

3.5.3. Business market needs KPI: Measurement results

This indicator is measured on 467 funded initiatives responding to the IA survey that are targeting at least one of the business markets identified by IDC.

To give better insights we have calculated the aggregated scores separately by sector and for the entire group of initiatives.

Results by industry sector

The table below shows the ranking of aggregated Market Needs KPI scores by industry on a scale of high, medium or low level of alignment with B2B market needs as follows:

- Scores between 6.7 - 10: high level of alignment between the subgrantees answers and the IDC benchmark of real market needs;
- 3.3 – 6.6: medium level of alignment;
- 0-3.2: low level of alignment.

This score is calculated from 0 to 10 in order to highlight better the differences between the performance levels by industry sector.

The analysis suggests that initiatives targeting Business Services and Manufacturing show the highest correspondence with the IDC benchmark data, and therefore their potential benefits are well aligned with real market needs.

Interestingly, the results for all the other sectors fall in the medium level of the scale, even if there are clear differences. The expected benefits of Healthcare solutions appear rather coherent with market needs, close to the high performance level of the scale, while respondents targeting the Agriculture and Education sectors appear to be less aligned with real market needs. A positive consideration is that for no sector the score falls in the low level of alignment area of the scale.

Table 17 KPI Market Needs: index of correspondence between business benefits and market needs

Initiative addressing B2B Market	Index Value	Index Classes	Correspondence with benchmark
Business Services	7.3	6.7-10	High
Manufacturing	6.9		
Cross Sectors Solutions	6.6	3.3-6.6	Medium
Construction	6.3		
Accomodation and Food Services	6.0		
Healthcare	5.8		
Utilities	5.8		
Transport	5.4		
Telecom and Media	5.1		
Wholesale and Retail	4.8		
Government	4.8		
Education	4.8		
Arts and Entertainment	4.7		
Agriculture	4.3		
		0-3.2	Low

N = 648 respondents to the FI-IMPACT Assessment Tool

Source: FI-IMPACT elaboration on IDC European Vertical Markets, 2016

Aggregated results

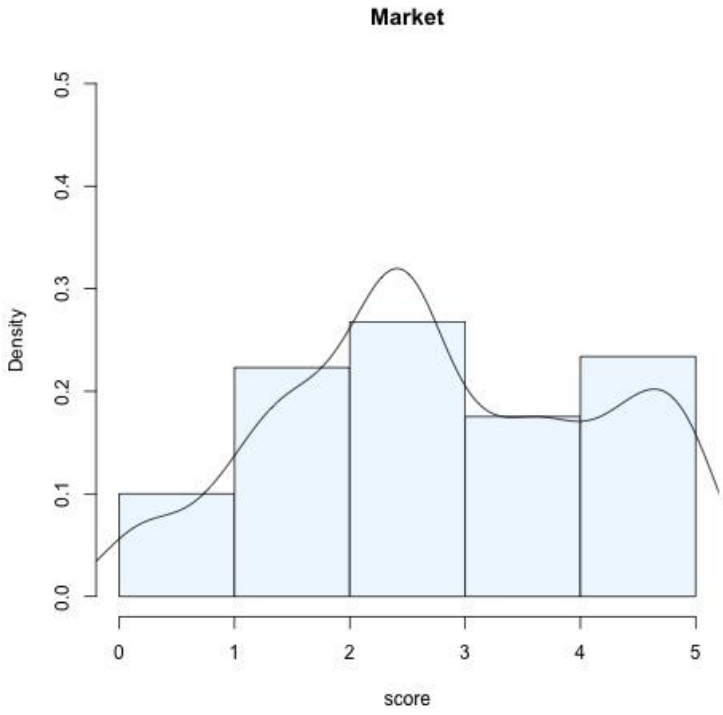
The measurement of the Market Needs KPI for the whole group of funded initiatives is graded on a 0 to 5 scale to allow comparability with the other KPIs (but the underlying data is the same). The score corresponds to a scale of high, medium or low level of alignment of respondents' answers with B2B market needs as follows:

- Scores from 0 to 1.6 correspond to a low alignment;
- Scores from 1.7 to 3.3 correspond to a medium level of alignment;
- Scores from 3.4 to 5 correspond to a high level of alignment.

The table below shows the distribution of initiatives along the scale. The average score is 2.9 on the 5-points scale and is the second highest among KPIs after the Innovation's one: it corresponds to a medium level of performance in the delivery of benefits aligned with Business Market Needs.

Overall, these initiatives demonstrate to have a good knowledge of the real needs of their target markets as they are mostly positioned in the highest half of the measurement scale. In addition, 52% of the respondents score above the average.

Figure 43 B2B Market Needs: average score



N= 648 respondents to the FI-IMPACT Assessment Tool, May 2016

Source: FI-IMPACT 2016

3.6. Consumer market needs KPI

3.6.1. Definition

The B2C Market Needs Indicator measures to what extent the benefits provided by the respondent's product or service are close to the potential needs of the consumer market segment targeted. This indicator provides a "reality check" by comparing the respondent's answers with IDC data sourced from ICT users' surveys, used as a benchmark of users' priorities.

We do so by asking the respondent to select and rank by relevance his product/service main benefits out of a pre-defined list developed by IDC. Then we compare the ranking indicated by the respondent with the ranking sourced from IDC data for the specific industry sector or consumer segment targeted by the start-up. The respondent's score is high if his/her answers are aligned with the ranking provided by IDC, low if the answers are different from those provided by IDC. Therefore, the indicator measures the coherence between the respondent's answers and the IDC data. This indicator is different from the Market focus one because it focuses on comparing start-ups expectations with real market data.

3.6.2. Measurement Approach

The resulting score measures the coherence between the respondent answers and the benchmark, therefore providing an assessment of the respondents' capability to

understand the priority needs of their market. The benchmark of this KPI is based on external sources and IDC's expert assessment, identified and applied to calculate the indicator in the same way as the business needs.

Results are based on the answers to the following question: "*Which are the main expected benefits your solution will provide for Consumers (B2C)?*" As in the case of B2B/B2G, the respondents had the possibility to distribute 6 given point (stars) across a list of 7 suggested benefits. There were 257 respondents to this question, 3 of which gave incomplete answers that were not elaborated. The elaborations are based on 254 answers.

The list of potential benefits was the following:

- Answering communication/collaboration needs
- Providing better entertainment
- Improving quality of life
- Simplifying daily tasks
- Reducing/Saving time
- Having easier and faster access to information/services
- Saving money

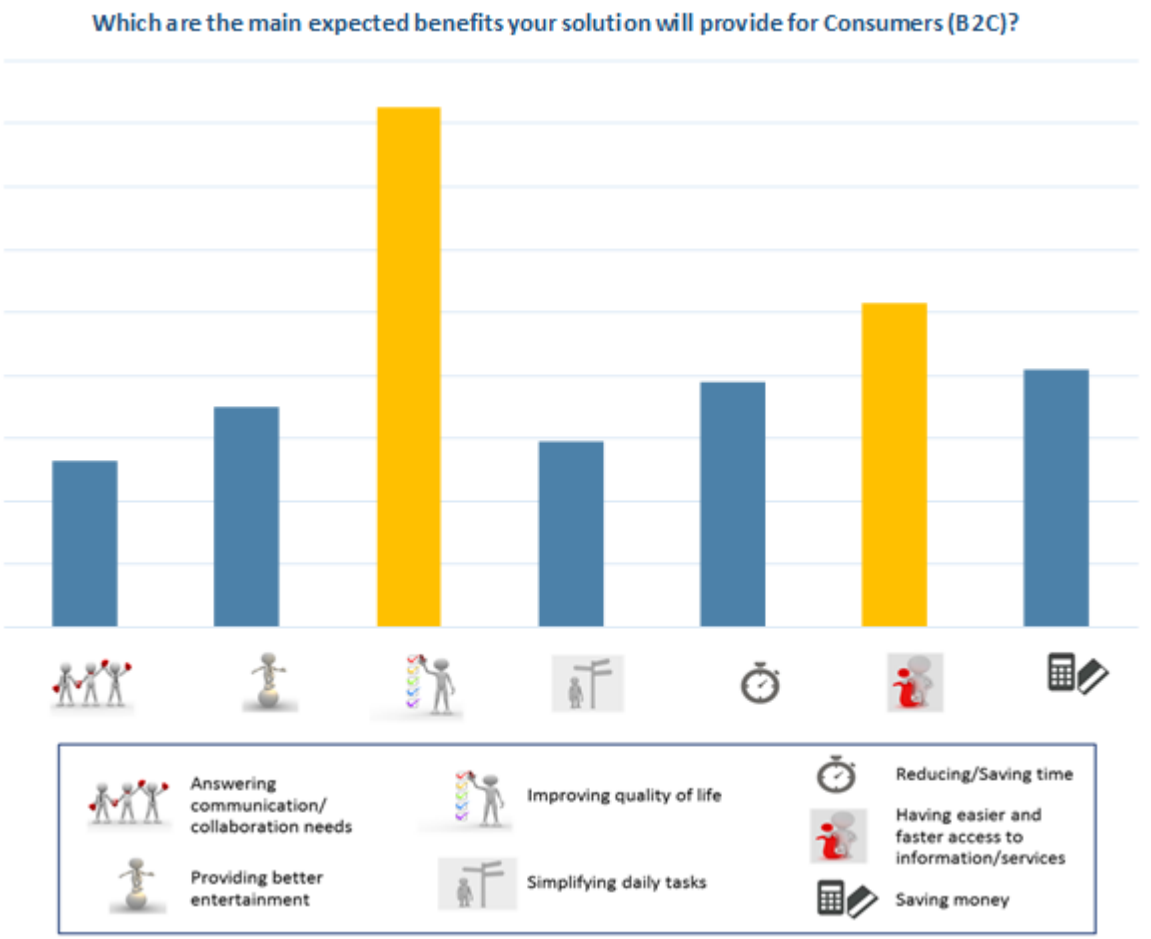
Based on our classification of initiatives, we have grouped the respondents in the following segments:

- **Leisure and gaming (44 initiatives)**: this category includes consumer gaming applications as well all those solutions related to entertainment.
- **Health and wellness (49 initiatives)**: this category is related to those solutions that have the purpose of improving health and wellbeing. They range from solutions for assisting blind and visually impaired people to those to support diets and sport activities.
- **DIY/Design (34 initiatives)**: this category relates to supporting Do It Yourself activities and most initiatives in this segment refer to 3Dprinting (e.g. re-manufacturing of existing objects through 3D scanning and printing, capturing of reality in 3D through smartphones, etc.)
- **Transport and logistics (52 initiatives)**: these initiatives are related to the mobility of people and objects and can therefore be related to applications for parking facilities, for real time traffic information, or for taxi requests among others.
- **Education and culture (21 initiatives)**: education and culture initiatives are related to many areas such as for example applications to learn new languages, solutions for remote coaching over the Internet on different topics including unconventional musical instruments, to mobile apps to guide visitors in 3D around heritage centers.
- **Consumer shopping (24 initiatives)**: This category includes consumer solutions created to improve the shopping experience.
- **Environment and nature (9 initiatives)**: these initiatives can be related to gathering information and data on pollution, or to collect and receive information for wildfire prevention among others.

- **Citizens' engagement (8 initiatives)**: citizens' engagement initiatives refer in most cases to systems for government-citizen interaction.
- **Energy and home automation (12 initiatives)**: these are initiatives such as a virtual social network that enable people to run their home appliances when there is green energy production close to their homes or to automatically lock or unlock all the doors in a building.
- **Other** (5 initiatives): solutions that do not fall into any of the just mentioned categories

As the results show, the majority of funded initiatives expect to deliver improvements in terms of quality of life and faster access to information and services to their customers. Simplifying daily tasks is the benefit least mentioned by respondents.

The figure below shows the overall ranking of B2C benefits based on the votes given by respondents, with the first and second most voted benefits highlighted in yellow.



Base: n = 254 respondents

Source: FI-IMPACT Impact Assessment Questionnaire 2016

The expected benefits may have a different priority in each of the market segments identified above. The following tables present the ranking of the most voted market needs by market segment compared with the ranking provided by our benchmarks.

Leisure and gaming

We find 44 initiatives in this segment.

Their top expected benefits to consumers concern the entertainment and consequently the improvement of the quality of life, followed by an easier access to information and services.

As the table shows, the rankings are almost identical.

Table 18 Leisure and gaming: Top five Expected Consumer Benefits of the funded initiatives

Top five Expected Consumer Benefits of the funded initiatives	Top five Expected Consumer Benefits of the benchmark
1. Providing better entertainment	1. Providing better entertainment
2. Improving quality of life	2. Improving quality of life
3. Having easier and faster access to information/services	3. Having easier and faster access to information/services
4. Answering communication/collaboration needs	4. Answering communication/ collaboration needs
5. Reducing/Saving time	5. Saving money

N= 44 respondents selecting this market at May 31st 2016

Source FI-IMPACT 2016

Health and wellness

The initiatives (49) in this category expect to improve their customers' quality of life and help accessing information and service in an easier way. They are also focused on supporting the collaboration and communication.

Overall, there is a good match between their answers and our benchmark for this market.

Table 19 Health and wellness: Top five Expected Consumer Benefits of the funded

Top five Expected Consumer Benefits of the funded initiatives	Top five Expected Consumer Benefits of the benchmark
1. Improving quality of life	1. Improving quality of life
2. Having easier and faster access to information/services	2. Providing better entertainment
3. Answering communication/collaboration needs	3. Having easier and faster access to information/services
4. Simplifying daily tasks	4. Simplifying daily tasks
5. Reducing/Saving time	5. Answering communication/ collaboration needs

N= 49 respondents selecting this market at May 31st 2016

Source FI-IMPACT 2016

Transport and logistics

In this market 52 responses show a high correspondence with the benchmark.

The improvement of the quality of is life is most important need to be addressed by these initiatives.

Table 20 Transport and logistics: Top five Expected Consumer Benefits of the funded

Top five Expected Consumer Benefits of the funded initiatives	Top five Expected Consumer Benefits of the benchmark
1. Improving quality of life	1. Simplifying daily tasks
2. Simplifying daily tasks	2. Having easier and faster access to information/services
3. Reducing/Saving time	3. Improving quality of life
4. Answering communication/collaboration needs	4. Saving money
5. Having easier and faster access to information/services	5. Reducing/Saving time

N= 52 respondents selecting this market at May 31st 2016

Source FI-IMPACT 2016

DIY and design

We found 34 initiatives in this market: they have a clear idea of what are the needs to be addressed through their solutions. Their main concern is about the improvement of their customers' quality of life, followed by their entertainment. The priorities identified by the respondents are consistent with our benchmark.

Table 21 DYI and design: Top five Expected Consumer Benefits of the funded initiatives

Top five Expected Consumer Benefits of the funded initiatives	Top five Expected Consumer Benefits of the benchmark
1. Improving quality of life	1. Providing better entertainment
2. Providing better entertainment	2. Simplifying daily tasks
3. Reducing/Saving time	3. Improving quality of life
4. Having easier and faster access to information/services	4. Saving money
5. Answering communication/collaboration needs	5. Reducing/Saving time

N= 34 respondents selecting this market at May 31st 2016
Source FI-IMPACT 2016

Education and culture

The results show that 21 initiatives in this market consider improving quality of life as the most important benefits for their customer, besides providing better entertainment.

Table 22 Education and culture: Top five Expected Consumer Benefits of the funded initiatives

Top five Expected Consumer Benefits of the funded initiatives	Top five Expected Consumer Benefits of the benchmark
1. Improving quality of life	1. Having easier and faster access to information/services
2. Providing better entertainment	2. Improving quality of life
3. Answering communication/collaboration needs	3. Saving money
4. Simplifying daily tasks	4. Providing better entertainment
5. Having easier and faster access to information/services	5. Reducing/Saving time

N= 21 respondents selecting this market at May 31st 2016

Source FI-IMPACT 2016

Shopping

Through their solutions, the 24 initiatives in this market consider time savings and simplifying daily tasks as the most important benefits for their customers. Also time and money savings have high priorities in their ranking. Overall, there is a good match with the identified benchmark.

Table 23 Shopping: Top five Expected Consumer Benefits of the funded initiatives

Top five Expected Consumer Benefits of the funded initiatives	Top five Expected Consumer Benefits of the benchmark
1. Reducing/Saving time	1. Reducing/Saving time
2. Simplifying daily tasks	2. Saving money
3. Having easier and faster access to information/services	3. Having easier and faster access to information/services
4. Improving quality of life	4. Simplifying daily tasks
5. Answering communication/collaboration needs	5. Improving quality of life

N= 24 respondents selecting this market at May 31st 2016

Source FI-IMPACT 2016

Environment and nature

The 9 initiatives analysed in this market give the highest values to improving the quality of life and improving access to information and services. Overall they are consistent with the priorities identified by our benchmark.

Table 24 Environment and nature: Top five Expected Consumer Benefits of the funded initiatives

Top five Expected Consumer Benefits of the funded initiatives	Top five Expected Consumer Benefits of the benchmark
1. Improving quality of life	1. Improving quality of life
2. Having easier and faster access to information/services	2. Having easier and faster access to information/services
3. Reducing/Saving time	3. Answering communication/ collaboration needs
4. Simplifying daily tasks	4. Providing better entertainment
5. Answering communication/collaboration needs	5. Simplifying daily tasks

N= 9 respondents selecting this market at May 31st 2016

Source FI-IMPACT 2016

Citizen engagement

We found only 8 initiatives in this market. These initiatives consider improving the quality of life as the top benefit to deliver to their customers. Enhancing communication and collaboration is also important. As the table shows, there is a good match of priorities in the different rankings.

Table 25 Citizen engagement: Top five Expected Consumer Benefits of the funded

Top five Expected Consumer Benefits of the funded initiatives	Top five Expected Consumer Benefits of the benchmark
1. Improving quality of life	1. Answering communication/ collaboration needs
2. Answering communication/ collaboration needs	2. Having easier and faster access to information/services
3. Reducing/Saving time	3. Improving quality of life
4. Having easier and faster access to information/services	4. Simplifying daily tasks
5. Simplifying daily tasks	5. Reducing/Saving time

N= 8 respondents selecting this market at May 31st 2016

Source FI-IMPACT 2016

3.6.1. Consumer market needs KPI: Measurement results

This indicator is measured on 254 funded initiatives responding to the IA survey who were classified by IDC as addressing the consumer market. To give better insights we have calculated the aggregated scores separately by consumer market segment and for the entire group of initiatives.

Results by Consumer Market segment

The table below shows the ranking of aggregated Consumer Market Needs KPI scores by segment. The scores are classified on a scale of high, medium or low level of alignment with Consumer market needs as follows:

- 6.7 - 10: high level of alignment between the subgrantees answers and the IDC benchmark of real market needs;
- 3.3 – 6.6: medium level of alignment;
- 0-3.2: low level of alignment.

This score is calculated from 0 to 10 in order to highlight better the differences between the performance levels by market segment.

The findings from our measurement highlight that:

- All consumer markets are positioned in the high or medium part of the scale, meaning that their potential benefits are coherent with their markets' priority needs, even if there are differences between the various market segments;
- Subgrantees targeting the consumer health/wellness, citizen engagement and leisure and gaming demonstrate a higher alignment with their customers' needs compared to the others;
- Subgrantees targeting the environment and nature, shopping, transport and logistics, energy and home automation, education and DIY show a medium level of performance, even though they are still well above the threshold of low alignment with market needs.

Table 26 KPI Market Needs: index of correspondence between consumer benefits and B2C market needs

Initiative addressing B2C Market	Index Value	Index Classes	Correspondence with benchmark
Consumer health/wellness	7.1	6.7-10	High
Consumer citizen engagement	7.1		
Consumer leisure/gaming	6.7		
Consumer environment & nature	6.6	3.3-6.6	Medium
Consumer shopping	6.5		
Consumer transport & logistics	6.3		
Consumer energy & home automation	6.3		
Consumer education/culture	6.2		
Consumer DIY/design	5.0		
Consumer other	3.9		
		0-3.2	Low

N = 648 respondents to the FI-IMPACT Assessment Tool

Source: FI-IMPACT elaboration on IDC European Vertical Markets, 2015

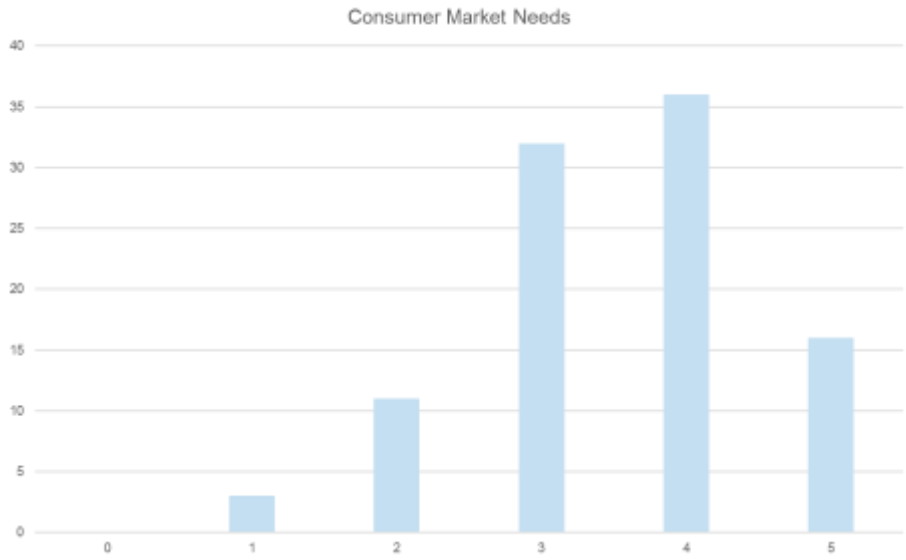
Aggregated results

This score is calculated on a 5-point scale, to allow comparability with the other KPIs. The KPI measures the extent to which perceived user benefits associated with a consumer solution are aligned with our benchmark of consumer needs as follows:

- Scores from 0 to 1.6 correspond to a low alignment;
- Scores from 1.7 to 3.3 correspond to a medium level of alignment;
- Scores from 3.4 to 5 correspond to a high level of alignment.

The overall average score is 3.5, corresponding to a high level of alignment, between the consumer benefits provided by the initiatives and the benefits prioritized by users. This score is higher than the average score for business market needs of 2.9.

Figure 44 B2C Market Needs: average score



N= 648 respondents to the FI-IMPACT Assessment Tool, May 2016

Source: FI-IMPACT 2016

3.7. Potential social Impacts

3.7.1. Methodological Approach

FI-IMPACT's social impact measurements aims at the definition and approach towards identifying and measuring potential social impacts which arise through the implementation of the FI-PPP Phase III accelerator programme.

The social impact indicators reflect the extent to which subgrantees have social impact in eleven key areas. They focus on identifying specific social benefits that subgrantees will support and the contribution to quality of life for specific social groups. It also contextualises the impact of subgrantees against the average social impact of all surveyed projects in these areas.

A potential social impact is hereby defined as (based upon the most common viewpoints on social impact found in an extensive literature review): "The effect of an activity on the social fabric of the public and well-being of the individuals and community groups.[4]"

The indicators for the social impact are derived from the main focus areas within the FI-PPP programme, the societal challenges of the Horizon 2020 programme, and the FI-PPP Phase II. For FI-PPP Phase II we analysed the described use cases, which were used to test the developed technologies in real world scenarios[5].

4 Compare with IAIA's (International Association for Impact Assessment) KEY CITATIONS list for social impact assessment (http://www.iaia.org)

5 See project list for FI-PPP Phase 2 on https://www.fi-ppp.eu/

This chapter presents the latest findings of the second assessment of the subgrantees carried out through the FI-IMPACT Impact Assessment Survey, up to May 2016.

As we did in the first round of measurement (whose results were presented in D2.3), the measurement of readiness of projects of FI-PPP Phase III was conducted with two key questions regarding potential social impacts. After careful consideration the list of questions regarding social impacts was limited to the two following questions to keep the questionnaires short enough. Including more questions might have resulted in decreased return rates of subgrantees answering the questionnaires, mainly as it might have been considered as too overwhelming.

The measurement of readiness addresses the following key social benefits of the FI-PPP Phase III:

- Perceived security of communities, neighbourhoods and housing
- Protection of privacy and security of personal digital data
- Citizens involvement and participation in open government
- E-inclusion
- Fitness and well-being
- Health
- Quality of life in urban areas
- Quality of life as a result of better access to information and data
- Social inclusion
- Access and use of e-learning and innovative learning methodologies
- Demand and use of sustainable transport solutions

Additionally, the readiness measurement asks specifically for the contributions for the following social groups:

- Unemployed
- Socially excluded groups (e.g. homeless, immigrants, etc.)
- Low income (e.g. unemployed single parents)
- Ethnic or cultural minorities
- Elderly (over 65 years old)
- Disabled

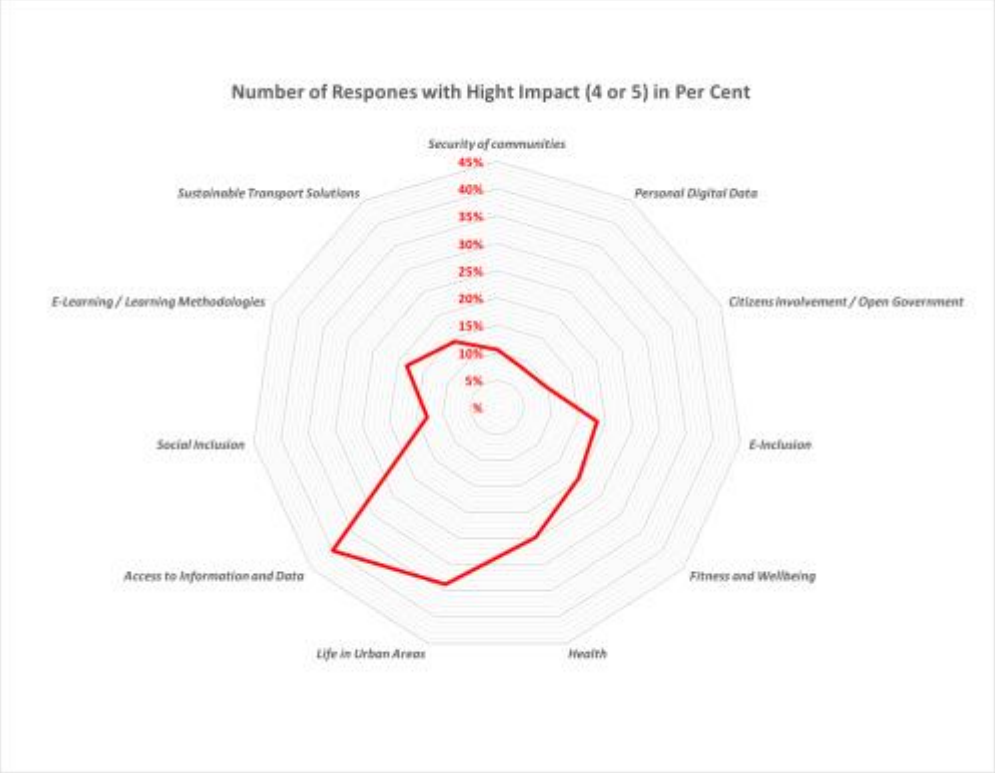
The questions were answered in a range from 1 to 5, whereas 1 is the lowest value, i.e. no impact, and 5 is the highest, i.e. highest impact.

3.7.2. Potential social impacts: main results

The most relevant social benefits for the FI-PPP Phase 3 subgrantees are shown in Figure 42, showing the percentage of all subgrantees that have rated their particular social benefit with a high impact (answer 4 or 5 in the questionnaire).

What comes out from the data collected is that user centricity and quality of life are the first priorities of the subgrantees. They address challenges such as the transparency of information and access to data, and e-inclusion is also seen as relevant.

Figure 45 Overview Results for Social Benefits with High Impact (4 or 5)

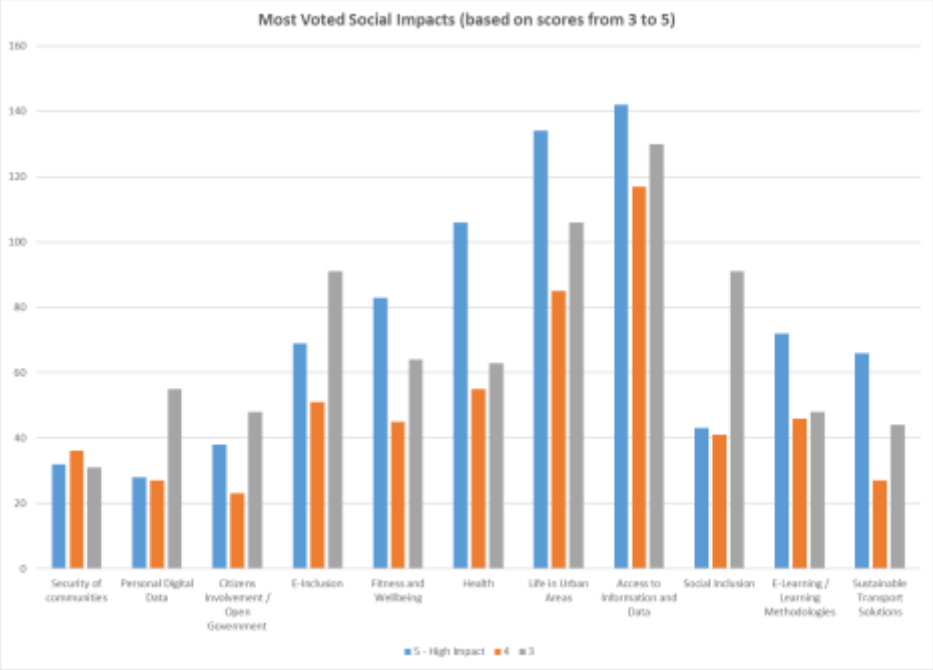


N = 648 respondents to the Impact Assessment Questionnaire

Source: FI-IMPACT 2016

Health is also another key focus from the social perspective.

Figure 46 Most voted Social Benefits (ranking 3 to 5)



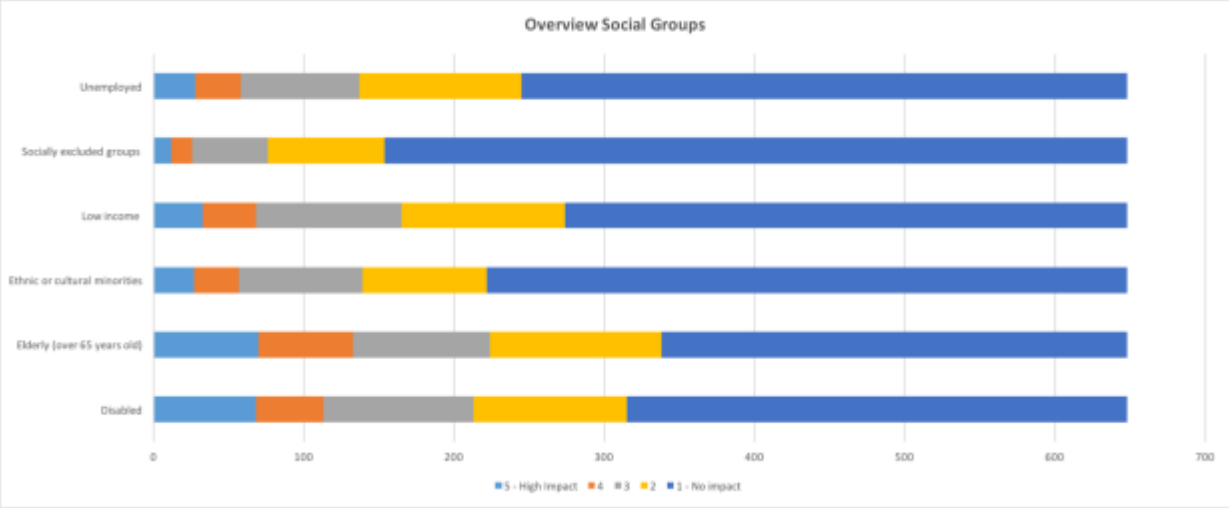
N = 648 respondents to the Impact Assessment Questionnaire

Source: FI-IMPACT 2016

Subgrantees are also concerned about particular categories of citizens that are at risk of social exclusions: in particular, disabled people and elderly. In our analysis we found that the subgrantees are developing solutions to empower these groups of users, especially in the healthcare sector.

Figure 45 shows which social impacts were voted as the one with the highest impacts. Figure 47 shows the detailed results for social groups. It shows how the subgrantees awarded impact levels for all social groups.

Figure 47 Averages and Overview of Social Groups, N=648



N = 648 respondents to the Impact Assessment Questionnaire

Source: FI-IMPACT 2016

3.7.3. Social Impact Assessment: key findings

For key social benefits with above average (i.e. high impact) ratings, highest scoring answers are ease of data and information access, quality of life in urban areas and health. It is also noteworthy that the social inclusion and e-inclusion categories have significant high ratings, but average rather than high impact. This shows that the latter two categories are impacted by the FI-PPP Phase 3, however, they are not the main field of activity of subgrantees and can thus can be considered as side-effect of the FI-WARE acceleration programme. These results are also consistent with the results presented in D2.3 Ex-Ante Impact Assessment and Forecast, where FI-IMPACT analysed the responses from approximately 400 subgrantees. For the current results, 648 subgrantees provided their answers regarding social impact.

Through these indicators we deduce that the subgrantees of the FI-Accelerator programmes are taking their roles in including EU citizens and end-user seriously, especially in the particular thematic accelerators which target Smart Cities and social inclusion. Another key social benefit clearly highlighted by the subgrantees responses is health, fitness and well-being, which is a rather surprising result, especially consider that most of the FI accelerators do not directly feature this topic. Underrepresented social benefits are any benefits dealing with security (ranging from security of communities and neighbourhoods to personal data and privacy matters).

The highest scoring groups are elderly and disabled people. The lowest scoring are socially excluded citizens. The strong focus on elderly and disabled people can be seen as a direct result from the focus on health topics, as portrayed in the key social benefits above. The lack of subgrantees targeting solutions for socially excluded citizens seems to be directly linked to a missing market potential for this groups. This is, however, by no means as obvious as it may seem, as subgrantees working on solutions for the Smart City realm or health topics, might have taken up on working on interesting innovations for socially excluded. This is also a stark contrast to the social group of ethnic or cultural minorities, which scores average. One would expect these two groups to be strongly correlated and achieve similar results. These findings are also consistent with the findings presented in D2.3.

Finally, we think it is noteworthy to mention that the category of social of group of people with low income scores above average in the high impact section, and over proportionally well in average impact areas. This implies, firstly, that business models based upon advertisement / freemium models are common in European start-up scene and, secondly, that solutions that are developed for and in cooperation with the public sector (e.g. Smart Cities) have a good chance to affect low income people and families.

3.8. Key Findings

Overall, the KPIs fall in the medium performance area of our evaluation scale, but they present relevant differences.

The **Consumer Market Needs KPI** shows an average score of 3.5, corresponding to a high average performance. This is excellent, since B2C initiatives have a potentially high demand and chances of success. However, the indicator is based on a small number of respondents (102), which may have been a factor. Also, the coherence between projected benefits and real consumer needs is particularly high for the citizen engagement, DIY and design, environment and nature segments.

With an average score of 3.1, **the Innovation KPI** is the next highest measured: these initiatives are developing solutions with high potential of innovation, and they generally are also well positioned in terms of closeness to the market.

The Business Market Needs KPI is a little lower with an average score of 2.9. The initiatives with a focus on B2B and B2G markets aim at delivering benefits broadly aligned with their customers' needs. The results by sector underline some differences: initiatives targeting the Manufacturing, Business Services and Cross-sectors Solutions show a good alignment with market needs, while those targeting Agriculture and Education appear further from customer priorities.

The Market Focus KPI has an average score of 2.7, corresponding to a medium level of performance. This indicator presents a polarization of respondents between a group of with low scores (under 2) and a substantial group (about 30%) with high scores (over 3.3). In other words, there is a group of initiatives who need to spend more time in developing their market plans in order to succeed in the market.

The **Feasibility indicator** has the lowest score of all KPIs, 1.7, at the threshold marking the low level of performance. These initiatives appear to be on average at a very initial phase of development of their solution and of their process of securing funds.

Finally, we assessed whether the subgrantees' solutions **impact on social-related topics**. We found that through their solutions subgrantees are supporting social challenges, especially concerning the improvement of the users' access to information and data (40% of subgrantees rated it as highly important) and the quality of life in urban areas (highly important for 35% of subgrantees).

4. Overview of Potential Demand of Funded Initiatives

4.1. Introduction

This chapter presents an articulated analysis based on IDC data of the potential demand in the market segments addressed by the funded initiatives. The main objectives are:

- To provide information about the market context and main trends for each of the market segments addressed by the funded initiatives;
- To provide insights on the potential chances of success of the start-ups and SMEs funded by Phase 3, by verifying the dynamics and growth trends of the market segments where they aim to compete;
- To leverage the results of this analysis, developing the main assumptions feeding into the market model estimating the potential revenues of the subgrantees.

This analysis is based on the segmentation of the subgrantees by type of offering in the 3 main groups identified: companies offering pure software solutions, mixed hardware and software solutions, or web based services. This segmentation is particularly relevant because the business models, demand dynamics and potential market of the 3 groups are quite different. This segmentation is carried over in the market model presented in the following chapter.

4.2. Market Context: Sizing the Opportunity of Potential Demand

IDC analyzed funded initiatives dividing them in homogeneous groups. In order to do this, we interlocked the type of proposal and the target industry sector.

In order to create groups of homogeneous proposals the first step has been to split the proposals into the following three groups (see also Chapter 2.10):

1. **Pure software solutions.** The first group of proposals is characterized by the fact that initiatives are purely software ones. These initiatives have been further split in the following software categories:
    - Operations and Manufacturing Applications,
    - Data Access, Analysis, and Delivery Software,
    - Content Applications,
    - Consumer Applications,
    - CRM Applications,
    - Engineering Applications,
    - SCM Applications,
    - ERM Applications,
    - Collaborative Applications
    - Others

For each of these categories, the definition is available in the Annex. Each of those 9 groups has been further analyzed by industry sector.

2. **Hardware and software solutions**. The second subset of funded initiatives refers to solutions that include hardware and software. They have also been split by top industry sectors.

3. **Web services.** The third subset of funded initiatives is the one referred to web platforms that provide services, such as hotel/restaurant booking and reservation or city life citizen participation or shared transport opportunities, without offering/selling to the final user an IT solution.

4.2.1. Pure software solutions

IDC analyzed in more detail each software market in which there are at least 10 funded initiatives. This means that IDC sized the market opportunity for the 9 software markets listed above, developing an approach which breaks each of them by industry sector.

They are summarized in the following table and analyzed in more detail in the following pages.

Table 27 IDC Size and growth by software market and related number of funded initiatives providing purely software solutions, €B

Software Categories	EU28 Size (2014) €B	EU28 Size (2015) €B	EU28 Size (2020) €B	CAGR 2014-2020	N. of Funded Initiatives
Operations and Manufacturing Applications	8.2	8.5	10.5	4.3%	102
Data access, analysis, and delivery software	3.7	4.0	5.5	6.8%	68
Content applications	6.1	6.3	7.5	3.5%	64
CRM applications	5.1	5.5	7.7	7.0%	40
Consumer applications	1.7	1.7	1.5	-1.3%	38
Engineering applications	4.6	4.8	5.9	4.3%	24
SCM Applications	1.8	1.9	2.3	3.5%	21
ERM applications	11.1	11.6	14.8	5.0%	16
Collaborative Applications	2.5	3.0	4.9	12.0%	14
Others	34.2	35.6	44.0	4.3%	*43*

Source: IDC elaboration of FI-IMPACT data 2016

Operations and Manufacturing Applications

The operations and manufacturing applications market in the EU will reach 10.5 €B in 2020, growing at a 4.3% CAGR from 2014 to 2020. The Operations and Manufacturing Applications market is, according to IDC, the second largest in size, among the 9 analyzed (excluding Others).

IDC segments it into 3 sub-technologies: manufacturing, other back-office and services operations management. The last one counts for more than 80% of the operations and manufacturing applications, is growing slightly faster than the other two sub-technologies and it includes a broad range of industry-specific applications. From the analysis of subgrantees, 102 offer operations and manufacturing applications, of which all but 1 address the services operations management market: they have understood that customers are increasingly demanding industry-specific enterprise applications.

The following factors will drive the operations and manufacturing applications market growth:

- Customers are increasingly demanding industry-specific enterprise applications that are purpose built;
- Even SMEs must deal with globalization and therefore their demand is evolving towards more sophisticated tools developed for their specific sector.

IDC expects vendors willing to tackle this space will need to concentrate efforts on:

- Focusing on solutions delivered via the public cloud is a good idea especially if targeting SMEs, which do not have money for relevant capital investments;

Providing also support services is a good strategy to help companies who are not sophisticated IT users to evolve towards more advanced software applications. According to IDC, the industries that will most increase their spending by 2020 in services operations management are: utilities, manufacturing, business services, finance, and telecom and media, where growth rates are higher than in the average market. However, the majority of subgrantees address the agriculture, healthcare, or consumer health and wellness segments, which are not the largest potential markets but still have good potential demand for targeted applications.

The table below presents some examples of the software solutions developed by the most promising subgrantees (what FI-IMPACT calls the High Potential Initiatives)

Table 28 Examples of subgrantees providing software solutions

Company Name	Solution Name	Vertical Market	Software Category	Short Description
UMANICK Technologies, S.L.	UMANICK Identity 4 Health	B2B Healthcare	Identity and Access Management	A complete suite of multi-biometric and multi-modal software using the most advanced biometric technologies: fingerprint, iris, face, and voice recognition. It is integrated with the hospital or medical centre processes and information systems (HIS, EMR, other) through health standard HL7 and web services API. It uses standard fingerprint and

				iris sensors from multiple vendors
Purveyance Limited	Purveyance	B2B Agriculture	Production Planning	Purveyance is a specialised suite of smart phone and web based modules designed to pro-actively manage quality in fresh produce supply chains. Purveyance makes use of smart technology to improve the quality of reporting waste and poor quality in the fresh produce supply chains so that better information can be passed to producers and they can minimize waste and get better returns back to farm.
8fit Desarrollos S.L.	8fit	B2C Health Wellness	Consumer App	8fit is a mobile fitness application offering personalized exercise programs, diet coaching and meal plans. The app offers simple and easy exercise routines that you can do at home. It also offers personalized meal plans and diet based on your own health requirements.

Source: FI-IMPACT 2016

Data access, analysis, and delivery software

The data access, analysis, and delivery software market in the EU will reach 5.5 €B in 2020, growing at a healthy 6.8% CAGR from 2014 to 2020. The Data Access, Analysis, and Delivery Software is a relatively smaller market (sixth in size among the 9 presented in the table).

IDC segments it into 3 sub-technologies: advanced and predictive analytics software, end-user query, reporting, and analysis and spatial information management. The advanced and predictive analytics software is the segment growing at a faster rate (CAGR 2014-2020 is forecast to be 8.2%); end-user query, reporting, and analysis will grow by 6.7% while spatial information management will grow by 5.5%.

The data access, analysis, and delivery software market growth will be driven by the following trends:

- The awareness of the potential benefits of business intelligence (BI) technologies has been growing for many years, but now IDC observes increased uptake by a wider range of enterprises, including SMEs, driven by lower costs of BI solutions and clearer competitive advantages;

- However, IDC expects that revenue will increase more slowly than the number of users of this technology, as price per user continue to fall. This is due to the fact that access to formerly big-ticket business analytics technologies will become democratized due to consumerization and the cloud.

IDC expects vendors willing to tackle this space will need to concentrate efforts on:

- Recognize the range of use cases and invest in fit-for-purpose technology, while reflecting the need for common platforms that are open to a wide range of data types;
- Deliver the required level of self-service data access and analysis;
- Enable rapid experimentation across big data and analytics processes, promoting agile development and project management techniques.

Also, in this competitive area, IDC believes there is a potential market for start-ups who can rapidly develop applications to replace processes historically done manually, on spreadsheets, or through the use of custom applications. This is clearly good news for FIWARE start-ups. There are 68 subgrantees addressing this market segment, taking advantage of increasing demand especially by SMEs and of the advent of BI cloud-based solutions.

The industries that, according to IDC show the highest growth potential to 2020 in data access, analysis, and delivery software are: utilities, business services, finance, wholesale and retail, and agriculture, where growth rates are higher than in the average market. This is good news because about a third of the subgrantees address the agriculture market. The others address the healthcare sector, or are cross-vertical solutions, or address the consumer market (15 of them).

By size, manufacturing and finance are the sectors with the largest spending for this type of solutions by far.

Content applications

The content applications market in the EU will reach 7.5 €B by 2020, growing at a 3.5% CAGR from 2014 to 2020. While the Content Applications market is quite big, it is also quite mature.

IDC segments it into 4 sub-technologies: Authoring and Publishing Software, Content Analytics, Discovery, and Cognitive Software, Content Management and Enterprise Portals:

- The Content Analytics, Discovery, and Cognitive Software segment will grow at a 7.5% CAGR in the reference period.
- The content management segment will grow at a 5.4% CAGR as it will continue to consolidate over the forecast period. This will increase pressure on many of the small content management vendors that serve narrow niches (whether based on geography, industry, or customer company size). Growth in the market will be driven also by the continued shift to digital business.

IDC expects vendors working in this space will need to concentrate efforts on:

- Ease of use, ease of implementation, and ease of deployment to appeal to business users that will become increasingly important in purchase decisions;
- Cloud, as cloud adoption in the content management market will begin to inflect during the forecast period;
- As the market consolidates, the winners will be the vendors that establish big partner ecosystems; for large vendors, that includes global systems integrators and/or large software and services players, while for smaller vendors, it means vertically oriented integrators or VARs or more specialized services vendors in general.

We find that 64 initiatives address this market segment. IDC believesthere will be consolidation in this marketspace but continue to be space for smaller niche players able to provide specialized offerings.

According to IDC, the industries that will increase their spending on content applications the most to 2020 are: utilities, business services, finance, manufacturing, telecom and media and healthcare, where growth rates are higher than in the average market.

In terms of size, the biggest markets are: manufacturing, wholesale and retail and finance. On the other hand, the majority of subgrantees are focused on the healthcare, consumer and telecom and media sectors. There is also a group of 13 funded initiatives whose solutions are in principle cross-sector, and may find clients anywhere.

Consumer applications

The EU28 consumer applications market, according to IDC, in 2014 was worth 1.7 €B and is not expected to grow in value to 2020, if we consider the actual revenues based on the sales of these applications. This results from the decrease of prices and the evolution of the offering towards different business models, where apps are increasingly free and developers' revenue flows come from other sources, such as subscriptions or mixed freemium models. In this context, it would be misleading to consider this market, which is addressed by 38 subgrantees, as not attractive; there is of course a need for start-ups and competitors to position carefully their offering and pay attention to their business model.

More specifically, this market according to IDC's taxonomy includes software products for recreation, education, and/or personal productivity enhancement.

The consumer software market includes home education/entertainment products sold to homes for specific educational purposes (for either adults or children) or reference (e.g., dictionaries and encyclopedias); games and entertainment (sports, adventure/role playing, arcade/action, strategy, and family entertainment applications); and home productivity that covers the software categories of home creativity, including all help, how-to, and lifestyle applications (e.g., cookbooks); personal productivity products, including resume writers, standalone calendars, expense records, will makers, and family-tree makers; and personal finance and tax preparation programs.

Customer relationship management (CRM) applications

The customer relationship management (CRM) applications market in the EU will reach 7.7 €B in 2020, growing at a 7.0% CAGR from 2014 to 2020. The CRM Applications market is the fourth largest and it shows slightly above average growth rates.

Marketing and customer service applications in particular are expected to show solid growth over the next 5 years, while sales applications revenues will grow at a slower pace, and contact center applications will be the slowest ones.

The CRM applications growth will be driven by the following trends:

- Multiple innovation trends, including the uptake of cloud-based CRM applications (because it implies new adoption from new types of customers); the diffusion of customer experience management (because the CRM application is the cornerstone of the customer experience foundation); the shift to digital marketing (because it creates an enormous need for packaged software to manage the complexities and potential); the focus on collaborative working, driving collaborative CRM applications, the use of social networks in a CRM context, the uptake of mobile CRM applications; finally, increased demand from midsize organizations.
- According to IDC, CRM applications remain among the top IT investment priorities, particularly by midmarket and large organizations. IDC believes that the current customer experience and digital marketing investments are taking the resources and attention away from sales applications and toward marketing and customer service applications.
- Software-as-a-service-based (SaaS-based) CRM is mainstream and makes up 27% of total market value. Also IDC forecasts a CAGR for SaaS-based CRM close to 20%, which will almost double its total market share to approximately 50% by 2020. On-premises-deployed CRM applications will decline in low single digits annually during the forecast period.

There are 40 subgrantees focused on this market space, mainly focused on the consumer, wholesale and retail, business services and manufacturing. Also in this case there is a group of initiatives with cross-sector solutions, not specific by vertical market. This can be a strong point, as some CRM modules or functionalities do not necessarily need to be customized since they are by their very nature horizontal tools. In terms of demand dynamics, the industries that will increase the most their spending to 2020 in CRM applications, according to IDC forecasts are: utilities, business services, finance, manufacturing, and wholesale and retail, where growth rates are higher than in the average market.

Engineering applications

IDC expects the engineering applications market to grow between 2014 and 2020 at a CAGR of 4.3% in the EU, reaching a size of 5.9 €B. The Engineering Applications market is the fifth largest market and it shows average growth rates. This market is composed by the following sub-technologies: Collaborative Product Data Management, Mechanical Computer-Aided Design (MCAD), Mechanical Computer-Aided Engineering (MCAE),

Mechanical Computer-Aided Manufacturing (MCAM) and MCAE is forecast to be the fastest growing segment.

The engineering applications market, together with operations and manufacturing, and supply chain management markets continue to be primarily on-premises/other software based, and IDC forecasts that less than 3% of this market is today delivered via the cloud.

The engineering applications market growth will be driven by the following factors:

- The strength of the EU manufacturing industry that, by itself, buys 60% of the engineering applications in the EU;
- The increasing demand by small and medium architecture and engineering companies, within the business services sector: it is a very fragmented industry with a high number of potential users just starting to take up advanced applications.

There are 24 subgrantees addressing this market space. It is interesting to notice that 20 of them leverage 3D printing and/or robotics solutions, which are very dynamic emerging markets with the potential for first mover advantage.

The industries that will most increase in the engineering applications market their spending to 2020 are: utilities, business services, manufacturing, and telecom and media, where growth rates are higher than in the average market.

According to IDC, the biggest markets are: manufacturing, business services and wholesale and retail. The funded initiatives active in this segment are mainly focused on the manufacturing and consumer DIY/ design solutions, while a few have focused on business services.

Supply Chain Management (SCM) Applications

IDC anticipates the SCM applications market to grow over the period 2014 to 2020 at a CAGR of 3.5% in the EU, reaching a size of 2.3 €B. The SCM Applications market is small and growing below average of the software segments considered here

This market is composed by the following sub-technologies: Inventory Management, Logistics, and Production Planning. Production planning is the biggest of the three (45% of the total SCM market) while production planning is growing faster than the other two sub-technologies.
The supply chain management market continues to be primarily on premise as the cloud delivery mode has not yet become widespread.

The SCM applications market growth will be driven by the following factors:

- The overall wealth of the EU manufacturing and retail/wholesale industries that buy the 68% of SCM applications in the EU;
- Successful SCM applications systems will be those that easily and efficiently integrate with other systems in order to improve management, planning and execution.

There are 21 subgrantees addressing this market space, where they will find high competition and also barriers to entrance. Opportunities might materialize especially for niche specialized offerings.

The industries that will most increase their spending to 2020 in SCM applications are: utilities, business services, finance, telecom and media, and manufacturing where growth rates are higher than in the average market.

According to IDC, the biggest markets are: manufacturing, wholesale and retail, and government. The FIWARE funded initiatives offering SCM applications are mainly focused on the manufacturing and agriculture sectors.

Enterprise resource management (ERM) applications

The EU28 enterprise resource management (ERM) applications market is expected to grow by a 5.0% CAGR in the 2014-2020 period, reaching the size of 14.8 €B. The ERM Applications market is the biggest market segment in our analysis, with average growth rates.

Market growth is primarily driven by the uptake of cloud-based ERM applications and modules, as well as the increased impact of 3rd Platform technologies (big data, mobile, social technologies, cloud, IoT).

New drivers for investments in ERM applications include:

- the increased presence of software as a service (SaaS) delivery mode; the continued transition to a more consumer-like ERM applications market (more emphasis on intuitive end-user experience, mobile, and cloud-oriented solutions); as well as the increased emergence of social and collaborative elements in ERM applications.
- The spread of smart mobile devices, the integration of mobile and social/collaborative elements in ERM applications, and the embedding of analytics is making first-time investments in ERM applications more attractive for many midsize businesses and organizations that wish to replace manual, Excel-based, or custom-built applications.
- The markets in the ERM domain are highly mature. The level of maturity of each functional market has a significant bearing on future forecast growth rates. For example, order management and financial applications have slower growth rates compared with other mature functional market segments.
- The human capital management (HCM) applications market is forecast to see the strongest growth to 2020 with a 9.2% CAGR over the next 5 years. Other fast-growth markets include procurement (5.6%) as well as financial planning and strategic management (FPSM) applications (5.5%).
- The SaaS ERM segment represented around 17% of the total market in 2014, with a 28% annual growth rate. In addition, IDC forecasts a CAGR to 2020 of around 23% for this segment of the market.

There are 16 subgrantees active in this market space. The industries that will most increase their spending in ERM applications to 2020 are: utilities, business services,

finance, telecom and media, manufacturing, and healthcare, where growth rates are higher than in the average market.

According to IDC, the biggest markets are: manufacturing, wholesale and retail and finance. The largest group of funded initiatives offering ERM provide cross-sector solutions. This can be competitive, as typically ERM software require less sector-specific capabilities if compared to other solution areas. Therefore, IDC believes that it is a good choice to develop ERM solutions or modules with no industry specificities.

Collaborative Applications

Many European enterprises are looking for new opportunities to introduce modernized collaboration solutions in their organization as part of their digital business strategies. IDC observes collaboration and productivity becoming a top business priority for many organizations.

Data shows that:

- The EU collaborative applications market is expected to increase to 4.9 €B by 2020, representing a 12.0% compound annual growth rate (CAGR) in revenue for 2014–2020.
- The growth prospects of the different functional market segments vary substantially: from file synchronization and sharing software (29.2% CAGR), enterprise social networks (15.3% CAGR), to team collaborative applications (12.3% CAGR), and both email and conferencing applications relatively low growth (6.7% and 7.5% CAGR, respectively).

IDC expects that public cloud will outgrow all other cloud and on-premises deployment models due to the ease of implementation, adoption, and integration across applications. Over the next five years, public cloud will accelerate the demand for collaborative applications because it allows organizations to move to a new generation of applications with little efforts, while improving the access across devices and platforms via a web-based experience.

There are 14 subgrantees active in this very promising market space. The industries that will most increase their spending on collaborative applications to 2020 are: utilities, business services, finance, manufacturing and telecom and media, where growth rates are higher than in the average market. According to IDC, the biggest industry sectors by spending on these applications are: manufacturing, finance and wholesale and retail. The subgrantees active in this technology space mainly develop cross-sector solution, or address the public sector and the consumer market.

Others

The remaining 44 subgrantees providing purely software solutions are categorized among the following other software categories:

- Integration and Orchestration Middleware (9)
- Application Development Software (7)
- Network Software (6)
- System Software (5)

- System Management Software (5)
- Structured Data Management Software (5)
- Security Software (2)
- Storage Software (2)
- Quality & Life-Cycle Tools (1)
- Application Platforms (1)

The aggregation of these 10 software categories is expected grow at a 4.3% CAGR, rising from 34.2 €B in 2014 to 44 €B in 2020. System Software and Structured Data Management Software represent the two largest markets among these software categories (7.9 €B and 9.1 €B in 2015, respectively). Nevertheless, Network Software and System Management Software will be the fastest growing categories (8.5% and 6.6% 2014-2020 CAGR, respectively), with the second one representing the fourth largest market among the ten categories here considered.

The largest group of funded initiatives active in these segments are mainly focusing on cross-sector solutions and, to a lesser extent, manufacturing and business services markets.

4.2.1. Hardware and software solutions

The second analyzed subset of funded initiatives refers to solutions that include hardware and software.

32% of funded initiatives are hardware and software solutions.

They address primarily consumers (25%), followed by solutions addressing the healthcare sector (16%). The third most targeted sector is agriculture with 13% of selected initiatives. Most of the hardware and software funded initiatives (78%) are IoT solutions, therefore it is worth understanding the total IoT spending estimate in EU 28 in order to understand the dimension of addressable market for these funded initiatives.

IDC defines the Internet of Things as an aggregation of endpoints — or "things" — that are uniquely identifiable and that communicate over a network without human interaction using some form of automated connectivity, be it local or global. Objects become interconnected, make themselves recognizable, and acquire intelligence in the sense that they can communicate information about themselves and access information that has been provided by other sources.

IDC estimates that the EU 28 IoT market is worth 120 €B in 2015 and will grow to 305 €B by 2020, at a 21% compound annual growth rate (CAGR). Top 5 countries in Western Europe (France, Germany, Italy, Spain, UK) count for 70% of the total EU IoT market. Restricting our analysis to the Top 5 European countries, we can see how Germany and UK take the largest shares of the European market, while France emerges for the second highest (among TOP 5) expected 2015-2020 CAGR.

Table 29 European TOP 5 WE Countries IoT Market Revenue Forecast, 2015-2020 (€ B)

Country	2015	2016	2017	2018	2019	2020	2015-2020 CAGR
France	17.1	22.2	27.5	33.1	38.9	45.2	21.5%
Germany	23.4	30.0	37.0	44.6	52.2	60.3	20.8%
Italy	15.4	18.8	22.8	27.1	32.1	37.4	19.5%
Spain	10.2	12.8	15.6	18.6	21.7	25.0	19.6%
United Kingdom	18.9	24.9	31.2	37.6	44.4	51.4	22.1%
TOP 5 WE	**85.0**	**108.7**	**134.2**	**160.9**	**189.4**	**219.4**	**20.9%**

Source: IDC Worldwide Semiannual Internet of Things Spending Guide, May 2016

Among IT vendors, IoT does not just represent a significant opportunity for their business, but it is also leading to a new concept of the usual operating way and market approach. The ecosystem that makes up the IoT market is both vast and complex, including modules/devices, connectivity, IoT purpose-built platforms, storage, servers, security, analytics software, IT services from consulting to on-going management of the solutions, and of course security. For this reason, it is vital for any company to be part of an ecosystem of partners that can provide a comprehensive solution. No vendor can do it all: partnerships and collaborations are essential for overcoming the spread of skills required by the IoT scenario and the road to be followed from players that claim a dominant or leadership position within this market.

From the buyers' side, IoT is completely reshaping working daily life dynamics in addition to represent a game changer for the usual service offered to clients. Main benefits coming from the adoption of IoT solutions are: reduced downtime and cost efficiency, increased productivity, better service and new customer experience, complete automation, more reliable and faster decision making, and market differentiation leading to new business models.

While many IoT applications are very much siloed by industry sector, calling for advanced industry-specific skills from vendors, on the other side there might be cross-industry initiatives. For example, concepts like the Smart Cities or Smart Agrifood ones, are scenarios that group and interface different industrial sectors (e.g. government, utilities, transportation for Smart Cities and food manufacturing, agriculture, and food-related retail for Smart Agrifood).

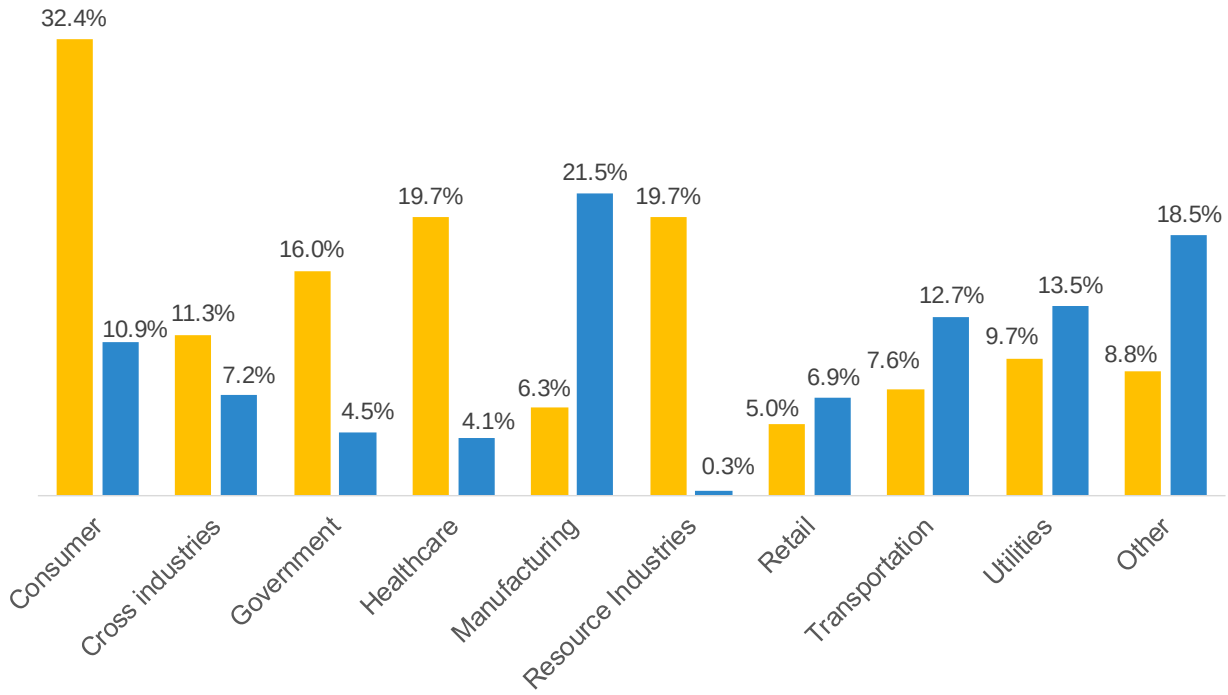
Some examples of the IoT solutions developed by the FIWARE subgrantees are provided in the table below.

Table 30 Examples of IoT solutions developed by the FIWARE Subgrantees

Company Name	Solution Name	Vertical Market	Short Description
NETICTECH S.A.	medVC	B2B Healthcare	A suite of software applications designed to rehabilitate the impairments resulting from degenerative conditions, to stimulate cognitive functions, and to promote active aging among senior citizens. Using motion-tracking sensors, touchscreens and gamification techniques it creates more than 60 exercises that allow clinicians to monitor the physical and cognitive therapy of their patients.
Breeze	Breeze	B2B Cross Sector	Leveraging smart sensor networks and intelligent environmental data analytics, Breeze provides actionable insights. Those are strategies to create cleaner air, to make the cities, buildings and communities more livable and to produce a healthier environment. Breeze is an integrated microcontroller platform measuring local air quality based on the Air Quality Index, and the Breeze Cloud platform collecting the data, enriching it with other available data sources and making it accessible both locally and on a global scale.
Connecterra	Happy Cow	B2B Agriculture	Happy Cow will develop hardware and software for a cloud based Estrus detection system for Dairy farms with special focus on organic dairy farms. Estrus detection is one of the fundamental optimization points in operations and can save farmers significant amounts of money, up to €250/year per cow.

Source: FI-IMPACT 2016

Figure 48 IDC IoT spending estimate in EU 28 compared with HW-SW funded initiatives, 2015



Legend: Blue Bar = IoT Spending, % - Yellow Bar = N. of subgrantees providing IoT solutions, %. The percentages do not sum to 100% due to multiple choices

Source: FI-IMPACT 2016

Manufacturing and utilities represent the two dominating vertical markets in terms of 2015 IoT market share.

Utilities can be considered the real IoT forerunner industry. IoT is not a completely new concept for the sector, with companies that are used to monitor their gridlines through sensors since many years, although a new IoT wave for the sector is represented by the deployment of smart meters in the downstream market that is taking place in many European countries.

The smart factory concept, fueled by the German Industries 4.0 revolution, is leading European Manufacturing companies to a completely new scenario characterized by a complete automation of the plant floor, self-healing processes, and predictive maintenance operations that will allow faster, better, and cheaper factory operations.

Next years' spotlight will also be on the Consumer market. The true driving force for the consumer sector will be represented by the Smart Home paradigm, a wide concept that includes solutions for environmental (e.g. temperature, humidity) monitoring, consumption tracking (energy, water), security, and home system remote enablement (lighting, heater, conditioner, window shutters, door locks). While for IoT home security solutions we mainly see a general trend that leads security traditional players to modernize their offering with new technologies capabilities, the home automation and monitoring market is characterized by a strong excitement. On one side there is a strong competition among big players from all industry sectors: IT (e.g. Google, Amazon), Utilities (playing as resellers of energy tracking solutions), Telecom (e.g. O2, Telefonica),

and Manufacturing (e.g. Philips, Bosch, GE). On the other side a continuous proliferation of new players (e.g. Tado in Germany, Hive and Heat Genius in the UK, Netatmo in France) and startups make the smart home scenario quite competitive, being a further evidence of the high opportunities that will characterize the Consumer sector in the next months.

Government and healthcare have smaller and very similar market shares in 2015 (4.5% and 4.1%, respectively). Nevertheless, government growth rate will be hampered by the fact that at least in this early stage medium-large municipalities will be just focused on sporadic IoT pilots, while a global IoT concept and revolution that will reshape city life is likely to happen only in very large European metropolis. Contrarily, healthcare growth rate will be significant, driven by the remote health monitoring and telemedicine deployment that will characterize the coming years for the sector.

Retail is an outstanding industrial sector in terms of expected growth in the next years, new IoT industry-specific applications are radically re-shaping the inventory operation and in-store customer experience.

Transportation, together with utilities, are other very advanced industries in IoT adoption, with IoT fleet tracking solutions that exist since many years.

Resource Industries, although it does not represent one of the main sector in terms of spending, represents one the most impacted sector by the IoT revolution. Cropping/Field monitoring and animal tagging solutions represent IoT applications with a very high potential and could be able to reshape the whole sectors in the next 5 years.

"Other" refers to all other industrial sectors, including telecom/media, financial services, education, and professional services.

The plethora of young companies leading the way in the IoT consumer market together with some recent acquisitions of IoT start-ups by big players (e.g. Microsoft recently acquired the young Italian IoT company Solair) highlights how the IoT market is highly dynamic and strongly promising for new and young players, such as phase 3 subgrantees.

4.2.1. Web Services

The third analyzed subset of funded initiatives refers to web services. Subgrantees categorized as web services leverage FIWARE and other ICTs to provide services: in other words, their core business is providing a service rather than a tool or a specific technology.

Most of them are marketplaces or peer-to-peer online platforms where companies or consumers can find information, purchase goods, look for specific services, and so on. 320 subgrantees have been classified as web service providers. There is a slight majority of initiatives addressing the consumer market (half pure B2C, half B2B2C), but there is also a substantial group of initiatives with a pure B2B market approach, most of them focused on helping business organizations to interact with each other online. The table below presents the subgrantees classification based on their primary targeted market: it should be considered as indicative because many of them address new demand which cannot be confined to a single sector or consumer segment, and in fact many of them potentially address multiple sectors or consumer segments.

Table 31 Subgrantees providing web services by target market

Primary Vertical Market	B2B	B2B/B2C	B2C
Accommodation and Food service activities	2	5	
Agriculture	29	6	
Arts entertainment	3	6	
Financial Services		1	
Business services	6	11	
Education	2		
Utilities	7		
Cross-sector services and platforms	35		
Healthcare	8		
Manufacturing	11	1	
Public administration	10		
Telecom and media	3		
Transport	8		
Retail	4		
Consumer leisure/gaming		5	20
Consumer other		1	8
Consumer transport & logistics		18	24
Consumer citizen engagement		2	5
Consumer education/culture		6	10
Consumer energy & home automation			2
Consumer environment & nature		2	2
Consumer health/wellness		10	6
Consumer shopping		9	11
Not Classified	4	2	3
TOTAL	132	91	97

Source: FI-IMPACT 2016

The identification of a target market is not sufficient to estimate the potential demand for these companies' services. Their markets and their business models are new and still evolving; their business ideas are innovative, sometimes disruptive; there is little historical data on the evolution of demand as we have for the more mature software and hardware markets. To better investigate their potential markets, we have used the following indicative categorization of web services, based on desk research, with some examples of the subgrantees falling into those categories.

- **Online Shopping Marketplaces:** online auction places that put in contact buyers and sellers for goods exchange such as E-bay, Groupon, Subito.it, Etsy, Pricefalls.com.

Duomoney is a UK-based start-up which provides a euro-based electronic wallet to be used on the Open Bazaar Bitcoin based marketplace

The Fashion Cloud app provides smart tools for the retail community of a city that have been exclusive to online shops so far, like search and product recommendation. The ultimate goal is to prevent city centres from dying out and to bring more customers into the smart shops of the smart city. Our mobile app enables shoppers to discover and search products from the shops around them, so they can immediately look at it or try it on in the store.

- **Online Accommodation and Food Services:** online platforms where people can review and book hotels or restaurants in order to plan their travels and spare time. Some famous examples are: Booking.com, Tripadvisor, Expedia, Lastminute.com, Trivago (Expedia owned), JustEat, DeliveryHero.

Foodpairing a Dutch start-up is developing a website-based community where to personalize and exchange recipes, based on clients' flavour profile and a Chrome plugin to visualize and personalise recipes. Over the last 8 years Foodpairing has developed one of the world's largest flavour database containing chemical aroma analysis, taste analysis and texture profiles. This is used to help users find their ideal flavours.

- **Sharing platforms:** it includes all online platforms at the base of the sharing economy, where people can share their goods or find available vehicles/seats/rooms/etc. The most successful examples can be found in the transport sphere such as BlaBlaCar, Uber, Lyft, BlackLane, Drivy, and Koolicar, but also in the accommodation sphere we find the famous Airbnb example.

Donkey Republic is a Dutch start-up that provides a platform for global bike-sharing. By mounting Donkey's smart-lock on a bicycle any private user or professional business has the opportunity to convert the bikes into shared bicycles that user can book, pay and unlock via their mobile phone – unlocking also works offline. The system uses geo-fencing to ensure bikes are returned when a rental ends. Donkey Republic provides global support to ensure a high - quality experience for anyone, anywhere, anytime.

- **Online Education platforms:** online platforms where people can learn languages or attend professional education courses, sometimes with a peer to peer learning model. Openclassrooms is an example of these platforms.

3D printing has widely been acknowledged to support innovative and stimulating ways of teaching certain subjects. 3ducation start up links 3D printing technology and education by developing an online education portal using the principles of 3D printing in classroom curriculum.

While for the other two categories of funded initiatives analyzed above (pure software solutions and hardware and software solutions) revenues mainly come from sales, for web services many different business models contribute to revenue generation: advertising (revenues generated by advertisements appearing on the online platform), usage fees (you pay for the amount of service you use), transactions/intermediation (revenues generated from being the intermediate in a transaction between two parties), rental model, and external financing.

Most of these companies are or are trying to enter markets where competition is high and, therefore, we expect that they need to exploit several factors to gain the largest market share (first mover advantage, product differentiation, pricing strategy, etc.).

These are very diverse market segments and it is difficult to provide specific estimates of the addressable market. However, the fastest growing market addressed by many of the subgrantees is the collaborative economy based on P2P sharing platforms.

This is a really new market: according to a study by NESTA, 64 % of collaborative enterprises have been founded since 2010[6]. Another study by PwC[7] concluded that the potential value of the five main sharing economy sectors (automotive, retail, hospitality, entertainment and media, finance) by 2025 could reach a value of $335 billion (297 €B at the current exchange rate). The same source in a study for the EC estimated that collaborative platforms operating in five key sectors of the economy generated revenues of 3.6 €B in 2015, facilitating 28 €B of transactions in the EU (Table 26), with a tremendous growth rate in the last 3 years (Table 27).

The two most developed segments appear to be P2P accommodation (Airbnb type of platforms) and transportation (car sharing): the second is largest in terms of platform revenues, while accommodation intermediates the largest value. Service providers collect over 85% of the gross revenues generated. The platforms revenues models vary, most of them collect fixed or variable commissions ranging from 1-2% for peer-to-peer lending to up to 20% for ridesharing services. While first-mover advantages are very strong for peer-to-peer platforms as for all platforms, this is still an emerging market and the business opportunity for new actors such as FIWARE subgrantees is clear. The EU dense population and different national communities and cultures offer opportunities for platforms with personalized and niche services satisfying a variety of customer segments.

Table 32 Net revenues and commerce generated from collaborative platforms (2015, €M)

Sector	Net Revenue	Total Commerce	Percentage of net revenue	Percentage of commerce
P2P accommodation	1,150	15,100	31.9%	53.7%
P2P transportation	1,650	5,100	27.3%	12.4%
On-demand household services	450	1,950	10.2%	5.4%
On-demand professional services	100	750	2.5%	2.2%
Collaborative finance	250	5,200	6.5%	15.6%
Total	3,600	28,100		

Source: PwC Consulting, EC Staff working document on the European agenda for the collaborative economy, June 2016

6 http://www.nesta.org.uk/publications/making-sense-uk-collaborative-economy

7 http://www.pwc.co.uk/issues/megatrends/collisions/sharingeconomy/the-sharing-economy-sizing-the-revenue-opportunity.html

Table 33 Net revenues and commerce generated via collaborative platforms (2013-2015, €B)

Year	Net Revenue	YoY Growth (%)	Total commerce	YoY Growth (%)
2013	1		9.9	
2014	1.8	55%	15.3	80%
2015	3.6	76%	26.9	97%

Source: PwC Consulting, EC Staff working document on the European agenda for the collaborative economy, June 2016

In terms of the potential number of users, an online Flash Eurobarometer[8] survey carried out in March 2016 in the 28EU Member States with over 14,000 answers found that a majority of respondents (52%) were aware of the existence of sharing platforms and 17% had used them at least once (most of them are young, highly educated, employed Europeans living in cities). However, take-up varies strongly by country and is highly correlated with the intensity and frequency of Internet usage and the level of digital skills. A 2015 similar online survey by ING Direct based on over 14,000 interviews in 15 countries found similar, slightly lower rates of awareness and usage, consistent with the growth of the market in the period between the 2 surveys. According to the ING survey, the vast majority of sharers earned € 1000 or less in the year before the survey, so still a marginal impact (assuming that people answered truthfully, which, considering fiscal issues, could be in doubt)[9]. These estimates confirm that the potential user population for sharing platforms is huge.

4.1. Main results

In summary, the potential market opportunities for Phase 3 initiatives appear relevant.

Pure Software Solutions. Technologies under the spotlight are industry-specific IT solutions and big data/analytics software tools. In these two areas we find the biggest groups of funded initiatives. The Operations and Manufacturing Applications market (where IDC categorizes industry-specific applications) is, according to IDC, the second largest in size, among the 9 analyzed. Its growth rate is slightly below the average of the considered markets but it represents a good opportunity especially in some industry sectors. It is addressed by the biggest group of FI funded initiatives (102) as they have understood that customers are increasingly demanding industry-specific enterprise applications that are purpose built. The Data Access, Analysis, and Delivery Software (where IDC categorizes analytic applications) is a relatively smaller market (it is the sixth among the 9) and it is addressed by the second biggest group of proposals (68). This is a healthily growing market as, especially with the advent of BI cloud solutions, a wider range of companies is now approaching this type of solutions, which were previously territory of big organizations only.

8 Flash Eurobarometer 438 (March 2016) on 'The use of collaborative platforms'.

9 https://www.ezonomics.com/ing_international_surveys/sharing_economy_2015/

Hardware and Software Solutions. Nearly 80% of hardware and software funded initiatives operate within the IoT Market. The consumer sector attracts the majority of funded initiatives and this is an IoT scenario expected to explode in the next years. Driven by the Smart Home revolution, this sector is particularly attractive for FIWARE subgrantees as it will not be a market just for big players, but also smaller and younger players will find good opportunities, as the recent successful examples in the European IoT consumer market shows. The other two emerging sectors in terms of number of funded initiatives will be Agriculture (part of Resource Industries) and Healthcare. According to IDC, the agriculture industry has a low IT intensity and also its IT spending is expected to show below average growth rates. However, IDC recognizes the importance that the IoT wave will have for this sector in order to enhance cultivation of products, crop management, animal tagging, and other activities related to this sector. Healthcare projects in the IoT sector are multiple: provide tools to shrink the distance between patients and doctors, facilitate real-time communication and information exchange between doctors, and also reduce costs and save time. Guaranteeing a quality care is a strong need in the sector, this is why some accelerators are targeting this market.

Web services. Providers in this market are a large and varied group addressing new emerging demand and responding to new needs. It is more difficult to estimate their potential revenues because of the variety of their business models (not based simply on sales but also on advertising, subscriptions, licensing exc.). They face an innovative market with strong competition but also relevant opportunities, also because they can more easily scale up beyond local and national borders. This group of subgrantees is normally focused on the European or world market. Recent estimates about the size of the sharing economy market underline the high economic potential of the P2P services and platforms providers. The number of potential users is also very high, with 52% of Europeans aware of this market and 17% already users.

Based on this analysis of potential demand, we understand that subgrantees are addressing markets with huge potentialities and opportunities, although the competition will be ruthless. Therefore, the path will not be easy for subgrantees and we expect many of them to fail in their first years. However, those who succeed have a chance to grow fast because of the nature of their targeted market.

5. Revenue Forecast Model of Funded Initiatives

5.1. Introduction

This chapter presents the 2nd release of the model developed by IDC to assess the market impacts of Phase 3, substantially updated and revised after the feedback received to the 1st release presented in Deliverable 2.3. In the first release of the model the database included 725 subgrantees; in this release the database includes 985 subgrantees which is the totality of initiatives funded by Phase 3 at May 13, 2016 when we froze the database to carry out the analysis. A few more (19 proposals) have been selected and will be funded in the last months of Phase 3 but their number is extremely limited and does not weaken the representativeness of these findings.

The main objectives of this chapter are:

- To assess the potential market impacts of the FIWARE subgrantees activity, measured in terms of the number of companies surviving by 2020, their potential revenues and their potential users;
- To present the main assumptions driving the forecast estimates under 3 main scenarios: a baseline scenario, an optimistic one and a pessimistic one taking into account the different possible trajectory of the economy and different success rates by the funded initiatives;
- To discuss the validity and coherence of the model results through a sensitivity analysis and a counterfactual scenario, considering the potential consequences without the acceleration program and its 80€M investments.
- To provide an input to the macro-economic impact model presented in the following chapter.

More specifically this chapter is divided in two parts presenting the main results as follows:

- **Estimate of funded initiatives' revenues to 2020**. This presents the results of the bottom-up model that calculates the estimated revenues of the subgrantees, divided in the 3 main clusters of enterprises offering pure software solutions, hardware/software solutions or web-based services. This model projects the revenues to 2020 under three alternative scenarios (optimistic/baseline/pessimistic) and a counterfactual scenario.
- **Estimate of the number of potential business and consumer users attracted by the subgrantees**. Building on the results of the revenues forecast, this model estimates how many business and/or consumers will be attracted by the FIWARE subgrantees active on the market by 2020.

The model covers the period from 2014 (when the first subgrantees entered the market) to 2020.

5.2. Methodology

In this section we explain the updated assumptions behind our Market Revenue Forecast Model and the methodological approach IDC followed to estimate the total revenues that will be generated by Phase 3 funded initiatives up to 2020.

The present release of the market model leverages additional data sources:

- A more extensive database of the 985 funded initiatives, with better data thanks to 2 rounds of feedback from Accelerators through the delivery of Accelerator reports in January and April 2016;
- Growth indicators about 736 subgrantees from the Mattermark online tool which tracks and monitor their progress and activities[10];
- Data about additional funding collected from venture capital and various investors by 64 initiatives, leveraging Mattermark and FIWARE community inputs (sourced from the Global database in the FIWARE community webspace, now hosted by Mobilize)[11];
- Data and information about individual subgrantees economic results, users and revenues published by them.

Estimating the total revenue generated by Phase 3 funded initiatives is complex as many variables must be considered both in terms of their characteristics and rate of development (e.g. market entry year, number of team members, type of proposed solution, etc.) and in terms of their possible success once on the market.

The methodology of development of the model is articulated in two main steps:

- Baseline assumptions: understanding the nature of funded initiatives (step 1);
- Forecast assumptions: Estimating their future trends and likeliness of success (step 2).

5.2.1. Step 1: Baseline Assumptions

As a starting point for our Market Revenue Forecast we have to understand who these funded initiatives are and what they do. To do this we leveraged our mapping analysis (see Chapter 2) and the results of the Impact Assessment Survey (650 compiled questionnaires). In particular, our methodological approach builds on the following indicators:

- Number of funded initiatives at the end of Phase 3 (reference population);
- Market Entry year for each initiative;
- Distribution of funded initiatives by type of offering, target industry sector, number of team members, and geographical scope;
- Average revenue generated by a single initiative during its first year on the market.

10 More details about the Mattermark indicators in Deliverable 3.3

11 This indicator is also presented in the Accelerators Benchmarking report annexed to this report

Reference Population

In the 1st release the reference population of initiatives was 1,000, as a proxy of the total number funded by the end of Phase 3. By May 2016, the global database includes 985 cases which is very close to the number of total funded initiatives by Phase 3 (there will be approximately 20 more). However, we decided to subtract 5% to this number to take into the incidence of duplication (the same initiative funded by different accelerators). Therefore, the reference population which is the model's starting point includes exactly 936 funded initiatives.

Market Entry Year

In the 1st model release we estimated a share of 40% subgrantees entering the market in 2015, rising to 51% by 2016. Based on the more complete dataset now available and the Impact Assessment Questionnaire results we find that more than half of the subgrantees were already on the market at the end of 2015, while an additional 38% of selected proposals are planning to enter the market in 2016. Although possible business delays or unforeseen difficulties could lead the subgrantees to slightly revise their entry market timeline, only 5% of funded initiatives are now expected to enter the market in 2017-2020. The change of this assumption had a strong impact on the model results, leading to higher estimated revenues to 2020 compared to the 1st release.

The high share of funded initiatives already on the market does not contradict the spirit of the FIWARE funding process; the population of subgrantees is not only composed of start-ups born with the programme, but also of young SMEs relying on the FIWARE technology and funding opportunity to accelerate product development and boost their business. The short time to market fits also with the development cycle driven by accelerators and professional incubators, which aims at bringing start-ups and new business ideas to market as soon as possible. The table below shows the distribution of funded initiatives by Market entry year which is the input of the new revised model.

Table 34 Phase 3 Funded Initiatives by Market Entry Year

Before 2015	2015	2016	2017	2018	2019	2020
35.2%	21.1%	38.4%	4.8%	0.2%	0.1%	0.2%

Source: Impact Assessment Questionnaire results, May 2016.

Profile of funded initiatives

Other key inputs for the model concern the technology offering of funded initiatives, the team size and which market they will address both in terms of target industry sector and geographical scope.

Technology offering

As illustrated in the mapping analysis (§ 2.10), we segmented the subgrantees in three main clusters depending on the type of technology offering: purely software solutions, hardware and software solutions, and web-based services. This segmentation is extremely important tp appropriately estimate revenue generation over the next few years. In terms of business models and revenues growth we have adopted the following assumptions:

- Initiatives offering purely software solutions do not require high capital investments and their likely revenues are close to the average of the reference sample, with a gradual growth dynamic.
- Initiatives offering hardware and software solutions usually do not produce directly the hardware components (sensors, devices, screens, etc.) but buy them from sub-suppliers. This requires a higher initial investment compared to purely software players. When we consider revenues (not profits), this has an impact as they will also resell the hardware with a mark-up. Therefore, funded initiatives offering hardware and software solutions are expected to have higher revenues than the average sample at least in the first years.
- Web services companies have different characteristics with respect to the other two clusters. Their revenue flows may come from a mix of sales, and/or subscription, and/or advertising, or other sources (e.g. freemium models). Based on empirical research, this type of companies tends to have low average revenues in their first years (when they are focused on increasing the volume of users, rather than revenues) but they may take off very quickly once they reach a critical mass of users.

Number of Team members

The indicator on the number of team members has changed compared to the 1st release. According to the new dataset from the IA survey, the average size of teams is larger than previously estimated. Although the distribution of initiatives with only one member has increased compared to the previous model release, the percentage of initiatives with members from two to five has considerably decreased, to the advantage of teams composed by more than six members. The number of team members is closely correlated with revenues and this indicator's change is one of the reasons why revenue s to 2020 are higher in the 2nd release of the model. The following assumptions have been used:

- Smaller teams with 1-2 members will generate lower average revenues in their first years, although higher growth rates, if successful (this as new employment will have a stronger impact in terms of team revenues growth on 1-2 members team with respect to larger team of more than 10 members).
- The team dimension is also correlated with potential death rates. Greenfield initiatives starting from scratch, with 1-person team, are likely to suffer higher death rates than young enterprises with a small partnership but who have already survived a couple of years.

Market targets

The primary industry sector targeted by the funded initiatives (sourced from the Global database) was used in the model as an additional factor influencing the revenues dynamics (leveraging IDC's vertical markets knowledge and demand forecasts). Compared to the 1st release, agriculture and healthcare were confirmed as the industries targeted by the largest number of subgrantees. There was an increase in the number of subgrantees addressing more than one sector and addressing the education sector.

The main assumptions were:

- Subgrantees addressing the private market grow faster than those addressing the public sector (where public procurement requires a long lead time and all kinds of references and guarantees of financial solidity);
- Subgrantees with a B2B or B2B2C business model experience higher barriers to entrance and a more gradual growth path than pure B2C initiatives, because they need to gain their business customers' trust and interact with complex supply chains; however, once past the early phase, they enjoy less fluctuations in revenues and greater solidity;
- Subgrantees with a B2C business model may take off quickly (with rapidly growing revenues) if they achieve visibility but may suffer from boom and bust cycles, depending on customer loyalty and their capability to reach a critical mass of users triggering positive network effects.
- We have also considered the different propensity of industry sectors to adopt the type of innovative technologies used by the subgrantees (sourced from our global database), such as IoT, 3D printing, software application category.

Geographical scope

Lastly (but not least), the geographical scope has to be considered, since this indicates the propensity to develop an aggressive market strategy and therefore to aim for higher growth. This indicator was sourced from the Impact assessment survey with the following assumptions:

- Subgrantees declaring to focus on the local or national market will generate less revenues than average and grow more slowly;
- Subgrantees addressing the EU or global market will grow faster and generate higher revenues than average.

Average 1st year revenue

The baseline starting point for the model is the estimate of 1st year average revenue segmented by the main 3 initiatives clusters and 2 categories of geographical scope (national/international). This is used as an input for the model.

Estimating the average first year (on-the-market) revenues is not that easy, in particular as many funded initiatives in their first year could also have no revenues and just survive thanks to fund raising. IDC analyzed results emerging from the Impact Assessment Questionnaire and from desk research on startups revenues during their first year of life. We estimated that on average funded initiatives would generate approximately €8,000 per each team member in their first year of life. This is based on the assumption that for many funded initiatives the main source of money in the 1st year will be external funds obtained from investors.

This value partially changes with respect to the offering cluster we consider and the geographical scope, as highlighted above. Moreover, a multiplier has to be applied to take into account the dimension of the team (the larger the team, the higher the revenues generated during its first year on the market). The industry sector targets are not assumed to have an impact on the average 1st year revenue but more on the growth rates during the next few years (see next section).

The table below shows the 1st year average revenue estimates applied to each subgrantee category.

Based on the additional data collected, the 1st year average revenues were slightly decreased compared to the 1st release of the model, while the growth rates to 2020 were slightly increased. Initial inputs from some subgrantees have confirmed the validity of these estimates (see par 5.2).

Table 35 Subgrantees average revenues in the 1st year

		Number of Team Members			
Type of Offering	**Geographical Scope**	**0-1**	**From 2 to 5**	**From 6 to 10**	**More than 10**
Pure software	National	6,460 €	22,610 €	51,680 €	96,900 €
	Multiple Countries	9,775 €	34,213 €	78,200 €	146,625 €
Web services	National	5,285 €	18,499 €	42,284 €	79,282 €
	Multiple Countries	7,998 €	27,992 €	63,982 €	119,966 €
Hardware & software	National	7,635 €	26,721 €	61,076 €	114,518 €
	Multiple Countries	11,552 €	40,433 €	92,418 €	173,284 €

Source: FI-IMPACT elaboration on IDC data, 2016

5.2.2. Step 2: Forecast Assumptions

When forecasting the revenues generated by Phase 3 funded initiatives we have to take into account the fact that not all of them will have the same success and growth dynamics in the examined period. We need also to consider the range of external factors which may influence the performance of subgrantees up to 2020, and especially the general socio-economic climate which may affect the take-up of their innovative solutions.

To reflect the wide variety of these start-ups and SMEs, the model is articulated as follows:

- The death rates applied to the population of subgrantees from 2015 to 2020 are sourced from Eurostat and were modulated by type of company, category and by scenario;
- Subgrantees are distributed in 7 categories with different revenue growth paths;
- The model presents 3 scenarios (baseline, optimistic, and pessimistic) to reflect the potential alternative development paths of FIWARE innovation take-up and provide a realistic range of the possible variation of the revenues forecasts.

Death rates

Death rates are a critical input to the model and difficult to estimate. The death rate is extremely high among start-ups, in particular in a dynamic and competitive sector such as the digital one. A large share of new IT start-ups fails and disappears within five years from their market entry, impaired by high competition, market trends, and inadequate business plans. Survival rates tend to increase as companies get older. About 45% of Phase 3 subgrantees have less than 1 year of experience, or no experience, so they are start-ups in a very early phase of their life (see Figure 7). Another 25% have between 2 and 4 years of experience. In addition, death rates are influenced by economic conditions, increasing in recessions and decreasing with economic growth and positive demand dynamics, so they must vary by scenario.

To take these factors into account we have used the following approach:

- The starting point was the average death rate for new enterprises after 5 years, sourced from Eurostat[12], of 56%;
- This was applied to the companies in the reference population with 2 or more years of experience;
- A higher death rate of 80% after 5 years was applied to the younger companies of the reference population (with 1 year or less of experience) based on the opinion of the same start-up experts interviewed for the validation of the self-assessment survey;
- This resulted in an average death rate (after 5 years on the market) for the baseline scenario of 64%;
- The average death rate was increased by 8% for the pessimistic scenario and decreased by -8% for the optimistic scenario.

The average 5 years death rates for each scenario are presented in the table below.

Table 36 Average 5 years death rates by scenario

	Model 1st Release	Model 2nd Release
Optimistic Scenario	27%	59%
Baseline Scenario	46%	64%
Pessimistic Scenario	60%	69%

Source: IDC 2016

Segmentation of Subgrantees by 7 growth trajectories

To provide a realistic view of the potential future of our varied population of innovative SMEs we have designed 7 different growth trajectories based on their characteristics and perspectives.

Categories 1 to 3 include the subgrantees who will eventually fail: we called them "dudes, lemons and dogs".

Categories 4 to 7 include those who will remain standing after 5 years, by 2020. The survivors are enterprises that will have a positive impact on the market and whose revenues will grow across the years. The majority of them will show a regular trend across the years both in terms of yearly revenues increase and new hired employees and tend towards stability, even if they differ in terms of when their peak of growth will be (categories 4 to 6, "Runners, Sprinters and Slow Learners").

Finally, we expect that a minor percentage of subgrantees (potentially very high achievers, the "stars" of our population) will start very slow during the first 2-3 years and will then take-off, with rapidly increasing revenues which may continue climbing fast

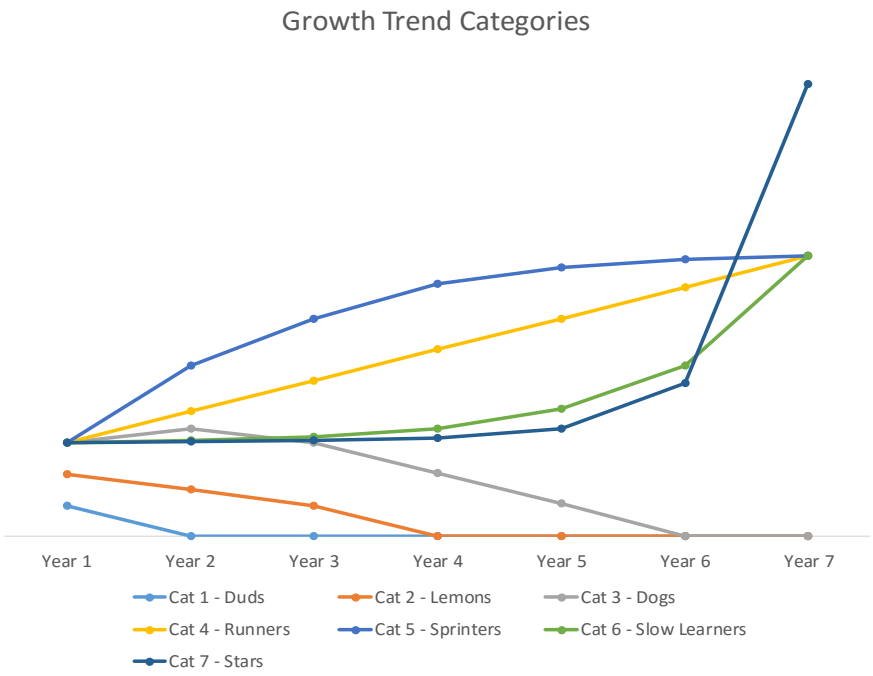
[12] http://ec.europa.eu/eurostat/statistics-explained/index.php/Business_demography_statistics

beyond 2020, after the period covered by the model. These high achievers can be found more often in the web services cluster of funded initiatives, because of their focus on new, emerging services markets. Many web services during their early life focus on incrementing their users' database with no direct effect on revenues, postponing profits generation and revenues explosion at a later stage. A recent famous example is represented by the car-sharing service BlaBlaCar. During its first years, while people were becoming familiar with the service and word of mouth was attracting more and more users, the only income was represented by funding from private investors. Just in a second moment, once that the number of users was considerable, the business model moved to a transaction fees approach (the service takes a percentage of the transactions done on the service platform) creating a new revenues stream.

More specifically, these are the 7 categories included in the model:

- **Category 1: Duds –** Failing in Y1: funded initiatives that will die after 1 year;
- **Category 2: Lemons –** Failing in Y3: funded initiatives (not in Category 1) that will not survive after 3 years;
- **Category 3: Dogs** - Failing in Y5: funded initiatives (not in Categories 1 and 2) that will not survive after 5 years;
- **Category 4: Runners -** Stably growing: funded initiatives whose revenues progressively expand over time;
- **Category 5: Sprinters -** Growing and then stabilizing: funded initiatives whose revenues will peak in the first years and then stabilize;
- **Category 6: Slow Learners -** Peaking after a while**:** funded initiatives whose revenues' growth will not be immediate but will peak at later stages;
- **Category 7 - Stars**: high achievers whose revenues are flat during the first 2-3 years with a considerable revenue explosion in the longer term.

Figure 49 Revenue trends and the 7 grow path categories



Source: FI-IMPACT elaboration on IDC data, 2016

Development of three scenarios

Scenarios are not predictions but potential development paths: their value added lies especially in the identification of the critical uncertainties which may affect certain market trajectories and in thinking through their potential consequences. For this market model we have developed a baseline scenario, based on the extrapolation of present trends, and two alternative optimistic and pessimistic scenarios for the period 2014-2020.

As argued in our Impact Assessment Guidebook (D.2.1) the development of alternative scenarios is good practice in forecasting models of innovation markets, as it allows taking into account the main economic, social and technological factors which affect the evolution of supply and demand beyond the specific business dynamics of each enterprise.

The main objective of the scenarios used in this market model is to define the potential range of variation of the forecast revenues to 2020 under positive or negative economic and framework conditions, thereby providing a more realistic view of the estimated market impacts and economic impacts.

The FI-IMPACT market model deals with a small group of business initiatives (if compared to the size of the European economy) building their products and services on the FIWARE technology platform: taking a broader perspective we can say that their footprint falls within the FIWARE market, which in turn is part of the overall ICT market.

IDC's consolidated scenario methodology (presented in detail in the Methodology annex, see par.8.3) is based on a model which considers the evolution of ICT markets as influenced by the interaction of four main group of factors as follows:

- Macroeconomic factors, measured in terms of GDP growth dynamics (sourced from main public sources) and total ICT spending growth dynamics (sourced from IDC);
- Policy/regulatory conditions, with a specific focus on EC policies on the Digital Single Market and other ICT policies by national governments;
- Global megatrends of digital innovation, based on IDC forecasts about emerging technology trends including specifically IoT, Big Data future demand perspectives.
- FIWARE/ICT market dynamics: this means the main supply-demand dynamics which may lead to faster or lower take-up of innovative technologies in the EU.

For the sake of this study we have developed the baseline scenario assumptions first, and then the alternative scenario assumptions. They are the following.

Baseline scenario

The baseline scenario is based on the extrapolation of the current trends of positive, moderate growth of the European economy, even if the UK vote to leave the EU will increase uncertainty in the short-medium term. Global macro trends will continue driving the diffusion of digital innovation (IoT, Big Data, Cloud computing) and digital transformation within medium-large companies. The nearly universal penetration of mobile and social technologies by 2020 will bring Europe closer to a "hyper-connected society" where consumers and businesses will rely more and more on multiple real-time, ICT based services for everyday life and work, opening good opportunities for the FI-PPP subgrantees. The availability of digital skills will be uneven but will not represent a major constraint to growth.

Policy initiatives will partially succeed in supporting R&D investments in digital technologies and the digitization of the EU industry, but the implementation of the Digital Single Market will meet with mixed success as regulatory initiatives aimed at removing barriers to cross-border digital business (such as unjustified geo-blocking and against the free-flow of data) are negotiated and slowly deployed within the observed period. Of course, the Leave vote of the UK will also have implications for the Digital Single Market strategy and the strength of EC policies. The Global Data Protection Regulation will enter into force from 2018 and by the end of the period should create greater harmonization across the EU, reducing the administrative burden on businesses.

Concerning the market of FIWARE technologies, this baseline scenario foresees a healthy growth of the supply industry and a corresponding gradual development of demand, especially by the most advanced, competitive and innovative enterprises, large and small. In this scenario, the funded initiatives focused on incremental innovation and improving efficiency, productivity and customer relationship management will fare best, while those aiming for disruptive innovation and mass market take-up may have a more difficult time. Markets where digital technologies adoption requires relevant systemic innovation, such as smart cities, healthcare and education in this scenario will evolve slowly, hindered by organizational inertia. On the contrary, the demand of ICT innovation by the food-

agriculture sector appears to be reaching momentum driven by overall demand for high quality food and food-based services. In this scenario the supply-demand interaction of digital innovation is still strongly dominated by the supply push.

The EU and national governments will continue the current trends of investments in accelerators, incubators and supporting digital innovation spaces, which is good news for the start-ups and innovative SMEs funded by Phase 3. Venture capital and Business angels funding in Europe have bounced back from the low level of the past crisis years, but in this scenario we expect the availability of risk capital to see only moderate growth. The survival and success rates of start-ups will remain close to historical trends.

Optimistic scenario

The chances of an optimistic scenario depend on more favorable framework and economic conditions in the period to 2020, accompanied by higher ICT investments and digital innovation moving to a faster adoption curve compared to the baseline scenario. The adoption of digital technologies is mutually reinforcing, so this would be helped by faster worldwide take-up of innovation accelerators such as IoT, cognitive systems, robotics, virtual reality, than in the baseline scenario.

In this scenario we assume a leap ahead of awareness of potential benefits and willingness to adopt digital innovation by mainstream IT users and especially SMEs, helped by the removal of policy and regulatory barriers to digital transformation. This would help the EU socio-economic system to move into a classic virtuous circle mechanism, with the supply-demand dynamics changing from technology-push to demand pull, driven by the momentum of digital transformation improvements. For example, the EC in the recent Communication "Digitising the European Industry" (April 2016) quoted studies estimating that the digitization of products and services could add more than 110 B€ of revenue for industry per year in Europe in the next 5 years[13]. This would be helped by a faster and more harmonized implementation of the Digital Single Market strategy than in the baseline scenario. There will be a risk of a gap of digital skills, especially in new competence areas such as data skills, but with the help of increased wages, training and supportive policies, enterprises will manage to find the necessary human resources.

While digital innovation would be a major driver of economic growth in Europe, this scenario could not happen without worldwide positive economic trends such as continuing growth of international trade and a still positive contribution of Asian economies to global growth, as well as increasing private and public investments in Europe.

Concerning the market of FIWARE technologies, in this scenario the faster increase of demand of digital innovation will accelerate the emergence of the hyper-connected society, create good opportunities for Phase 3 subgrantees and drive global demand for FIWARE-based innovation, both incremental and disruptive. Markets requiring systemic innovation and hindered by traditional mindsets, such as smart cities, healthcare and education, in this scenario will gain momentum and move to a faster digital

13 PwC, opportunities and Challenges of the industrial internet (2015), and Boston Consulting Group: the future of productivity and growth in manufacturing industries (2015)

transformation path. Emerging markets such as precision agriculture and fintech will prosper.

In this scenario we foresee a more favorable environment for start-ups and innovative SMEs, with a likely increase of venture capital and business angels funding. This would result in higher survival and success rates as FIWARE subgrantees would be better able to grow aggressively in the European and worldwide markets.

Pessimistic scenario

This scenario is focused on the potential risks which may undermine the current trends toward positive moderate growth in Europe. There are several factors which may drive this scenario: within Europe, the most relevant now is clearly the impact of the UK leaving the EU. According to most leading sources (IMF, OECD, Brexit may weaken GDP growth in the short term and increase uncertainty, which may affect negatively private and public investments, including in ICT. Worldwide, there is a continuing risk of a badly managed slow-down of the Chinese economy, and/or of the Indian economy, as well as of a deepening crisis in Russia and Brazil, which may affect EU exports. This would result in lower GDP and ICT spending growth to 2020 compared to the Baseline scenario.

The diffusion of innovative digital technologies such as IoT would still grow in this scenario, but at a slower pace than in the baseline. The dynamics of mobile and social technologies should not be much different than in the baseline scenario, given their strong momentum, but for example there could be an uneven deployment of high-speed broadband infrastructures in Europe with the risk of digital infrastructures divides between the Member States.

This is a fragmented scenario, where the policies driving the digital single market would be only partially successful; both supply-side and demand-side digital policies will tend to be deployed more slowly and have weaker impacts, with barriers to for example the free-flow of cross-border data or digital content restraining potential demand. The supply-demand interaction of digital innovation will remain driven by technology-push and demand will remain confined to the leading and more innovative enterprises.

Uneven demand across Europe will not help the FIWARE market and Phase 3 funded initiatives, who would find fewer opportunities to grow across the whole EU and may be tempted to remain close to national or niche markets. In this scenario the availability of venture capital and risk capital for SMEs and start-ups will also be more limited than in the baseline scenario. These factors will drive higher death rates and lower revenue increases in the population of subgrantees.

Distribution of Funded Initiatives by Category and Scenario

The 3 scenarios described above and their different assumptions have been incorporated in the model through a different distribution of Phase 3 funded initiatives by category by scenario. Basically, in the optimistic scenario the categories with higher growth potential are more numerous, while in the pessimistic scenario we have increased the number of subgrantees falling in the categories with negative or slow growth perspectives.

As highlighted above, in the baseline scenario we forecast that about 64% of funded initiatives will fail after their first 4/5 years of life. Among the surviving subgrantees, in all 3 scenarios the majority is represented by companies with stable growth rates

(Runners). "Sprinters" and "Stars" are much stronger in the optimistic than in the baseline or pessimistic scenarios, while "Slow learners" are more numerous in the pessimistic scenario. In all scenarios, the high potential initiatives (stars) are only a small minority of the subgrantee population, but their share of revenues is more relevant than their number.

Table 37 Distribution of funded initiatives by category and scenario

	Distribution of initiatives by category and scenario		
	Optimistic scenario	**Baseline scenario**	**Pessimistic scenario**
CATEGORY 1 - Duds	15%	17%	18%
CATEGORY 2 - Lemons	27%	29%	32%
CATEGORY 3 - Dogs	17%	18%	20%
CATEGORY 4 - Runners	22%	18%	14%
CATEGORY 5 - Sprinters	8%	6%	5%
CATEGORY 6 – Slow Learners	7%	9%	11%
CATEGORY 7 - Stars	4%	2%	1%
Total	**100%**	**100%**	**100%**

Note: These percentages are used to split the number of funded initiatives in each scenario under the assumption that the more positive categories (e. g. category 4) will be more balanced towards the Optimistic scenario, while the more negative ones (e. g. category 3) will be more skewed towards the Pessimistic scenario.

Source: FI-IMPACT elaboration on IDC data, 2016

Average growth rates

The final ingredient to estimate the total amount of revenues generated by Phase 3 funded initiatives up to 2020 is an assumption on the average growth rates that successful funded initiatives will experience in their first six years on the market (we consider the timeframe 2014-2020 as a reference). Of course these values will be much higher than mature companies' average growth rates, as we are just considering funded initiatives whose initial revenues are very low or inexistent and are just entering the market right now. Their survival depends on high revenue growth rates.

Many aspects could influence successful funded initiatives' average 6 years compound annual growth rate (CAGR):

- **The team dimension**: as we are just considering the first 6 years on the market and initial revenues are lower for smaller companies, the average 6-years CAGR for successful funded initiatives will be higher for smaller companies. This is also driven by the fact that new hiring will have a higher impact on companies that starts with 1 or 2 members than realities that already consider more than 10 components.
- **The tech category**: also the type of solutions will slightly influence average 6-years CAGR. Hardware and software solutions (mainly IoT) will often approach a new and not consolidated market, while purely software solutions will reach markets where the competition is already high. Web services instead will usually show their potential just in the longer term, showing lower average growths in a short period of years.

- **The target industry sector**: answering industry sectors' specific business needs and investment plans is essential for conquering the target industry sector. Not all sectors will welcome similar solutions in the same way (e.g. an IoT solution will be more welcomed by the government sector, where the smart city concept is bang on trend, with respect to the banking sector where IoT still lags behind). Average growth rates have been modified by industry sector target, looking at IDC IT Market Forecast Data by Industry Sector.
- **The business model and innovation level**: lastly, also the innovation level of the proposed solutions and their business model will influence the revenue trends in the first years. As an example, funded initiatives addressing a consolidated market could struggle in their first years, while innovative funded initiatives opening a completely new market could explode in their first years in the market, grasping the opportunities given by a low competition level.

Comparing IDC IT Market Forecast Data with several sources on the expansion of digital startups in their first years of life and based on the assumptions above, we have estimated the following average 6-years CAGR which are modulated by the 3 main technology offering clusters and company size.

The average 6-years CAGRs considered have been modified also by primary target industry sector and business model/innovation level.

Table 38 Average 6-years CAGR rates by size and technology cluster

	0-1	From 2 to 5	From 6 to 10	More than 10
Pure software	88%	77%	64%	50%
Non-IT services	84%	74%	61%	48%
Hardware & software	91%	80%	66%	52%

Source: FI-IMPACT elaboration on IDC data, 2016

Changes in Assumptions with respect to Market model release 1

We summarize here the main changes in assumptions that we considered with respect to the previous delivery:

- **Number of Phase 3 funded initiatives**: being now Phase 3 completely closed, we updated the number of funded initiatives to reflect the real final sample, while in D2.3 we considered 1,000 funded initiatives as a proxy. In addition, the duplicates/double-counting adjustment is now considered. All these factors led to a slightly lower number of funded initiatives (936) that is now considered for the market revenue model.
- **Market Entry Year Distribution**: a wider picture of companies included in the global database and a larger sample coming from the Impact Assessment questionnaire, led us to revise the market entry year distribution. The main difference is given by the fact that while in the previous delivery we estimated that 40% of funded initiatives were on the market at the end of 2015 (with 51% expected to enter the market in 2016), now we see that 56% of selected proposals

are on the market at the end of 2015 (with 38% expected to enter in 2016). This is one of the main changes that will lead to a higher revenue forecast for 2020.

- **Team Size and Target Industry Sector Distribution**: the size of the teams is on average bigger compared to the previous delivery. Agriculture and healthcare remained the most exploited sectors. Initiatives addressing more than one sector gained importance compared to the previous delivery, together with the Education sector.
- **1st Year Average Revenue and expected 6 years Growth rates**: Impact Assessment larger sample, Mattermark data analysis, and Accelerators PRs and presentations on their funded initiatives preliminary results, led us to slightly decrease the average 1st year revenues and to slightly increase the expected 6 years growth rates.
- **Death Rates and Trend Categories Distribution**: Due to a different experience and team size distribution, we revised the assumption on the death rates, following the criteria explained above. While we were previously estimating a 46% death rate after 5 years on the market, we increase this assumption to 64% to better describe the high failure rate that characterize young companies and startups that enter the market nowadays.

These changes in market revenue model assumptions led to slightly different potential revenues forecast, that will be presented in the next section.

5.3. Model results

5.3.1. Forecast Revenues to 2020 by Scenario

Building on the assumption illustrated above, the FI-IMPACT market model outputs show that the potential revenues generated by the Phase 3 funded initiatives still surviving will be 394 €M by 2020 in the baseline scenario. According to the optimistic scenarios, these revenues could be as high as 474 €M, while in the pessimistic scenario the revenues could still be 319 €M. The compound annual growth rate (CAGR) for the period 2014-2020 varies between 78% for the baseline, 83% for the optimistic and 73% for the pessimistic scenario. Overall, the optimistic scenario would bring 20% higher revenues than the baseline scenario, and the pessimistic scenario 19% lower revenues.

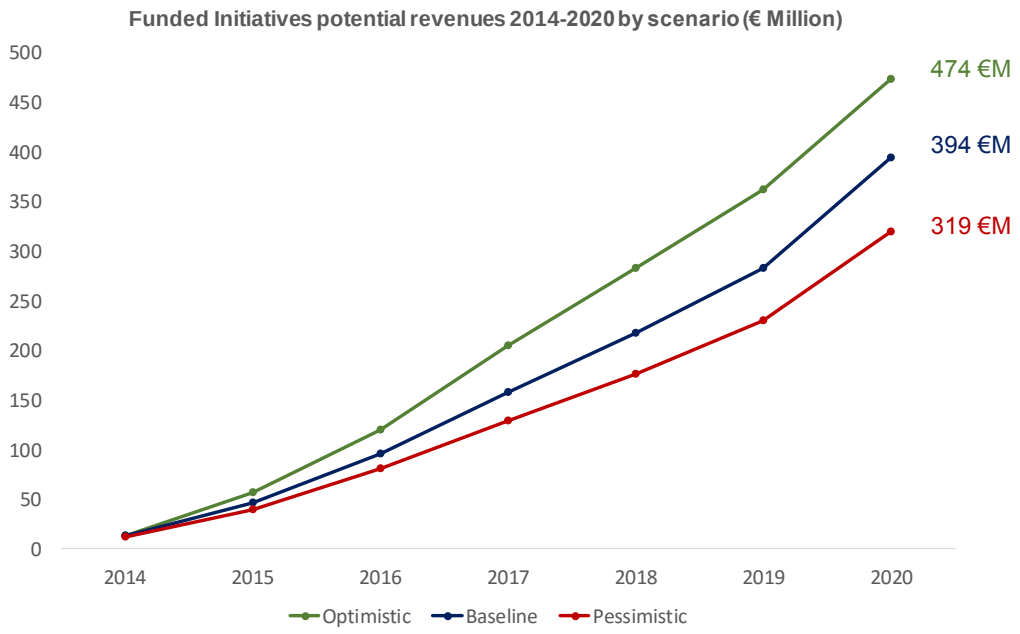
Table 39 2014-2020 funded initiatives Forecast revenues by scenario

(€ M)	2014	2016	2020	2014-2020 CAGR	Cumulative 2020
Optimistic	13	120	474	83%	1,511
Baseline	12	96	394	78%	1,204
Pessimistic	12	81	319	73%	986

Source: FI-IMPACT market model, 2016

The growth paths of the 3 scenarios are similar, as shown by the figure below. The differentiation between the scenarios starts early on (2016-2017) as the different death rates reduce the subgrantee population in the first 3 years, and then the cumulative difference between the scenarios kicks in leading to different outcomes.

Figure 50 Forecast revenues growth paths by scenario



Source: FI-IMPACT Market Model 2016

Comparison of market model results release 1 and 2

Comparing Market Model Release 1 and 2 results, we can see that the cumulative 2020 revenues now appear 54% higher than the previous forecast in the baseline scenario. As explained above (see §5.2), this follows from changes in assumptions due to additional and more complete data sources. In particular, a different market entry year distribution and a revised team size and target industry sector distribution are the main assumptions that led to the increase the table below shows.

Table 40 Cumulative 2020 Revenues Comparison between Market Model Release 1 and Release 2

(€ M)	Market Model Release 1 – 2020 Cumulative Forecast	Market Model Release 2 – 2020 Cumulative Forecast	Market Model Release 2/ Market Model Release 1 (%)
Optimistic	993	1,511	152%
Baseline	779	1,204	154%
Pessimistic	594	986	166%

Source: FI-IMPACT market model, 2016

5.3.2. Forecast revenues by technology cluster and industry

The results of the model allow us to explore the differentiation of revenues' growth to 2020 for the 3 technology offering cluster and their primary industry targets.

In the first years, the largest share of revenues will come from the purely software solutions cluster, but this will change to 2020 when they will be overtaken by the hardware/software initiatives cluster. The revenues share of these initiatives will go from 48% in 2014 to 32% in 2020, with this category expected to generate 125 €M in 2020 at a 66% 2014-2020 CAGR. This is because they address relatively mature markets, so they

will have an easier start than the other clusters but their growth opportunities will be more modest.

On the other hand, the hardware/software initiatives cluster will be able to exploit the IoT wave that is revolutionizing all industry sectors and therefore will generate the fastest growing revenues (with 89% 2014-2020 CAGR). Funded initiatives offering this kind of solutions are expected to generate 203 €M in 2020.

Web services initiatives, that represent 32% of Phase 3 funded initiatives, will count for around 17% of the total revenues expected in the Baseline scenario. This cluster of initiatives has a business model which is likely to lead to low revenues in the first years, and a strong upswing in the second part of the covered period. Their compound growth rate therefore is high at 78%, corresponding to the general average.

Table 41 Forecast revenues by technology cluster, baseline scenario

€ Million	2014	2016	2020	2014-2020 CAGR
Pure software	6	35	125	66%
Web services	2	16	66	78%
Hardware & software	4	45	203	89%
Total	**12**	**96**	**394**	**78%**

Source: FI-IMPACT Market Model 2016

The split of the Baseline scenario revenue forecast by target industry sector gives us an idea of which industry sector will contribute more to revenues generation.

The highest percentage of revenues by far in the Baseline scenario will come from the Consumer sector. Mobile apps among purely software solutions, home IoT tools in the hardware & software bucket, and web services targeting the consumer market will drive this trend. Solutions targeting the consumer sector are expected to generate 128 €M in 2020, at 80% 2014-2020 CAGR, representing 33% of total (see figure below).

Cross-sector solutions, with a horizontal appeal, will generate the second largest amount of revenues (59 €M) corresponding to 15% of total. Among business sectors, the "top spenders" are coherent with those industry sectors that are the most targeted ones (see par. 2.6): agriculture, healthcare and manufacturing. Agriculture accounts for 12% of the 2020 forecast revenues. Together with consumer and cross-sector solutions, they represent 59% of the total expected revenues. All the other industries represent smaller shares of the pie, with manufacturing (8%), healthcare (7%) and government (6%) slightly higher than the others.

Overall, this shows a potential footprint of the funded initiatives which does not correspond at all to the traditional ranking of big IT vertical spenders (which is normally topped by banking, manufacturing and telecom-media), at least in the baseline scenario. On the one hand this means that the majority subgrantees are not prioritizing the richest market segments (see also chapter 4 about potential demand dynamics), which may result in some lost opportunities. For example, it is surprising that very few subgrantees address the banking sector, where the fintech wave of innovation is cresting. Banking is expected to represent only 0.1% of the total revenues in 2020, even though their CAGR is the highest (93%).

On the other hand, the richest vertical markets are also the more mature and competitive ones. The subgrantees forecast revenues appear to be concentrated in the consumer market, which in Europe does require a strong innovation push to fight with transatlantic competition, and in cross-sector solutions, which help to build the technology base for the EU industry. Similarly, the largest vertical market by relevance in terms of revenues, agriculture, is a sector on the verge of a tipping point towards a new wave of adoption of ICT (precision agriculture). This means that the funded initiatives will be playing an important role for the modernization and the competitiveness of the EU economy. We should not forget that the distribution of subgrantees by vertical market is also a consequence of the Accelerators' strategies, for example 3 of them prioritized food-agriculture.

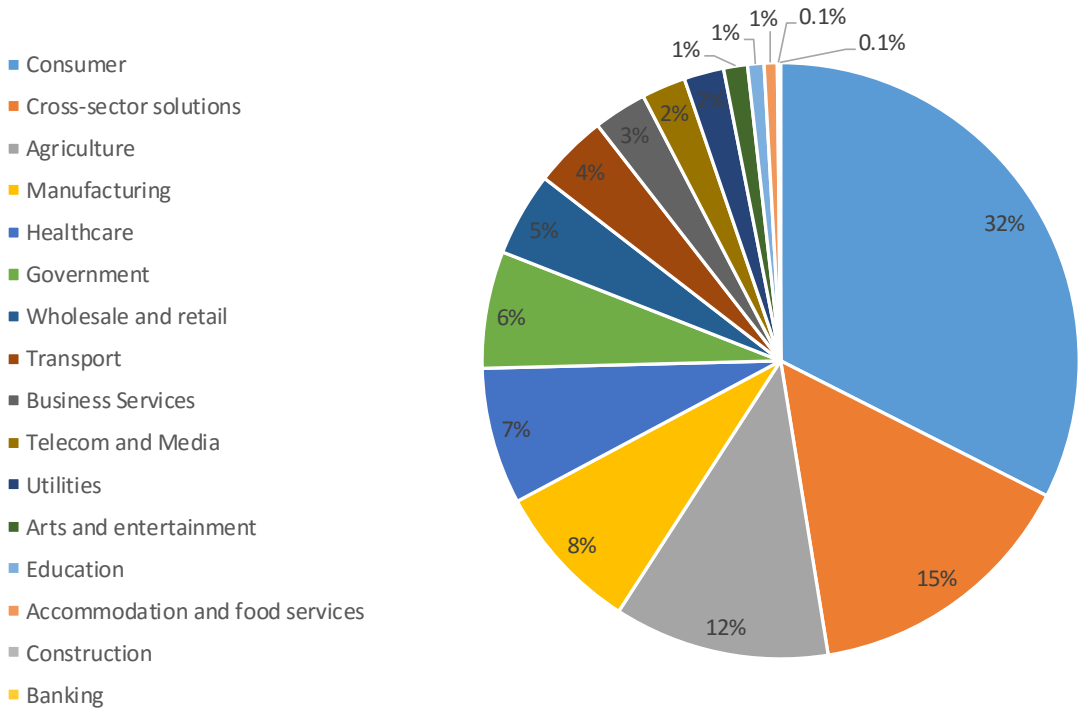
Funded initiatives addressing the public sector will find some challenges due to budget cuts that characterized these sectors in the last years. Education is expected to be one of the slowest growing sector (68% 2014-2020 CAGR), although it represents only 1% of the expected revenues. Also government and in particular healthcare are not among the fastest growing sectors (77% and 71% 2014-2020 CAGR, respectively).

Table 42 Forecast Revenues by primary market target, Baseline scenario

€ Million	2014	2016	2020	2014-2020 CAGR
Accommodation and food services	0.1	0.7	2.8	73%
Agriculture	1.9	12.1	46.0	71%
Arts and entertainment	0.2	1.3	5.1	71%
Banking	0.0	0.0	0.2	93%
Business Services	0.3	2.7	11.4	79%
Construction	0.0	0.2	0.5	52%
Consumer	3.8	30.6	128.4	80%
Cross-sector solutions	1.7	14.0	59.0	81%
Education	0.2	1.0	3.5	68%
Government	0.8	6.0	24.6	77%
Healthcare	1.2	7.6	29.2	71%
Manufacturing	0.8	7.2	31.8	85%
Telecom and Media	0.3	2.2	9.4	80%
Transport	0.5	3.9	15.8	78%
Utilities	0.2	2.0	8.5	83%
Wholesale and retail	0.4	4.0	17.9	87%
Total	**12.3**	**95.7**	**394.1**	**78%**

Source: FI-IMPACT Market Model 2016

Figure 51 Forecast Revenue shares by primary industry target, baseline scenario, 2020



Source: FI-IMPACT Market Model 2016

5.3.3. Number of initiatives and average revenues

In our baseline scenario, FIWARE funded initiatives are forecast to generate 1.2 €B cumulative revenues in the 2014-2020 timeframe. Nevertheless, revenues forecast numbers could assume a deep meaning just when correlated with other two important indicators: the **number of funded initiatives** expected to be still on the market by 2020 and the **number of employees** that will be working for them in the next few years.

Considering estimated death rates and market entry year dynamics, we expect 751 funded initiatives to be on the market at the end of 2016 in the baseline scenario, decreasing to 325 by 2020. In the optimistic scenario this number could be higher by 15% to 373, or it could decrease to 278 companies.

Table 43 Number of Funded Initiatives on the Market

(N)	2014	2015	2016	2017	2018	2019	2020
Optimistic Scenario	330	477	761	679	572	474	373
Baseline Scenario	330	473	751	658	541	435	325
Pessimistic Scenario	330	468	740	638	511	396	278

Source: FI-IMPACT elaboration on IDC data, 2016

Due to the fact that the majority of funded initiatives will have already entered the market by the end of 2016 and that death rates still have a relatively low effect, the number of funded initiatives on the market will reach its peak this year, 2016. When comparing these numbers with the revenue forecast, we see that successful funded initiatives that will still be on the market in 2020 will generate on average more than 1.2 €M in 2020.

Table 44 Average revenues per funded initiative (€ 1,000)

(€ 1,000)	2014	2015	2016	2017	2018	2019	2020
Optimistic Scenario	38	117	158	300	494	763	1,268
Baseline Scenario	37	96	128	239	401	648	1,211
Pessimistic Scenario	37	84	109	202	344	580	1,146

Source: FI-IMPACT elaboration on IDC data, 2016

The strong increase of average revenues from 2014 to 2020 should not mislead the reader: many funded initiatives survive in their first years of activity thank to early stage funding from external investors, and are far from breaking even, with revenues representing just a fraction of their costs and investments. Only after at least 3 years on the market, the majority of successful start-ups will generate sufficient revenues to become self-sustaining (while the others will disappear).

To provide some perspective on this value, we should consider that according to Eurostat[14], the average revenues of the 439,000 companies active in the EU Information and Communication sector in 2015 were around €900,000. This is lower than the 1.2 €M we forecast for our companies in the year 2020, but in the same ballpark range. Actually, the Eurostat average includes large enterprises (which are less than 1% of the total universe, though), so the average revenues for small enterprises of the same size as those in our reference population are probably closer to €500-600,000 per year. The IT sector is characterized by a high number of very small IT companies with very low turnover, whose destiny is never to grow. This is not the case of the subgrantees examined in this report, whose dynamism and ambition foresee better than average growth perspectives in the years after 2020 (also thanks to the selection process they underwent).

5.3.4. Number of Employees and Average Revenues

Another critical indicator is the average revenues per employee, both because it provides a quick view of the sustainability of these enterprises, and because it leads to the estimate of jobs creation. Considering the employee expansion that successful funded initiatives will have over the next few years, the number of employees working for FIWARE subgrantees is expected to increase from around 1,800 total employees in 2014 to around 5,000 employees in 2020, with a peak in 2018 (see table below). The jobs creation due to indirect impacts of the subgrantees activities (for example their users and customers) is presented in the next chapter.

Table 45 Number of employees working for funded initiatives yearly

(N)	2014	2015	2016	2017	2018	2019	2020
Optimistic Scenario	1,804	3,302	5,759	6,562	6,933	6,746	5,949
Baseline Scenario	1,804	3,246	5,594	6,217	6,376	5,994	5,000
Pessimistic Scenario	1,804	3,191	5,437	5,888	5,854	5,290	4,112

[14] Eurostat Structural Business Statistics, Turnover EU28 NACE J Information and Communication services, for companies with 0+ employees, accessed in 2015 and number of companies

Source: FI-IMPACT Market model, 2016

This estimate translates into an average number of employees per funded initiative that will grow from more than 5 in 2014 to 15 in 2020. This is driven by the organic employment growth of successful initiatives and by a slightly lower death rate across larger and more experienced organizations in our database compared to the very small ones.

These results of the model are validated by the first data coming from some accelerator. For example, Finodex communicates that the average number of employees among its top 15 selected companies is expected to be around 7 by November 2016, while FI-Adopt forecasts this number to be around 8 for their funded initiatives at the end of 2016.

Table 46 Average Number of employees per funded initiative

(N)	2014	2016	2020
Optimistic Scenario	5.5	7.6	15.9
Baseline Scenario	5.5	7.5	15.4
Pessimistic Scenario	5.5	7.4	14.8

Source: FI-IMPACT elaboration on IDC data, 2016

Based on these parameters, we have estimated average revenues per employee. While this number will be relatively small in 2014, being below € 7,000 per employee, it will increase to around € 80,000 in 2020, a year when many successful initiatives will have reached their maturity and will fully show their revenue potential.

Table 47 Average revenues per employee

(€)	2014	2016	2020
Optimistic Scenario	6,988	20,835	79,614
Baseline Scenario	6,847	17,116	78,814
Pessimistic Scenario	6,706	14,862	77,612

Source: FI-IMPACT Market model, 2016

Although some funded initiatives will still partially depend on external funding in 2020, this number gives a better idea of the maturity and success that FIWARE projects could reach in the next few years. It is in particular interesting to relate and compare these estimates with European business statistics and the most famous examples on the market.

According to a 2015 Expert Market analysis the top 12 (in terms of annual revenues) major tech companies' revenues per employee drastically differ, ranging from around € 240,000 for IBM and Panasonic to much more than 1€M for Google, Facebook, and Apple. Although this gives an idea of how much this indicator could strongly change by company, there is no realistic comparison with our subgrantees. These data refer to tech giants with completely different scale, business structure, economies of scale, maturity, and position on the market with respect to FIWARE funded initiatives.

5.4. Sensitivity and counterfactual analyses

5.4.1. Sensitivity analysis

This section is devoted to the Market Revenue Model sensitivity analysis: we are going to explain how forecast results would change when modifying initial assumptions behind the Market Revenue Model and which variable has the strongest impact on the model final output.

Our sensitivity analysis will focus on two of our main model assumptions (see §5.2) and will answer the following questions:

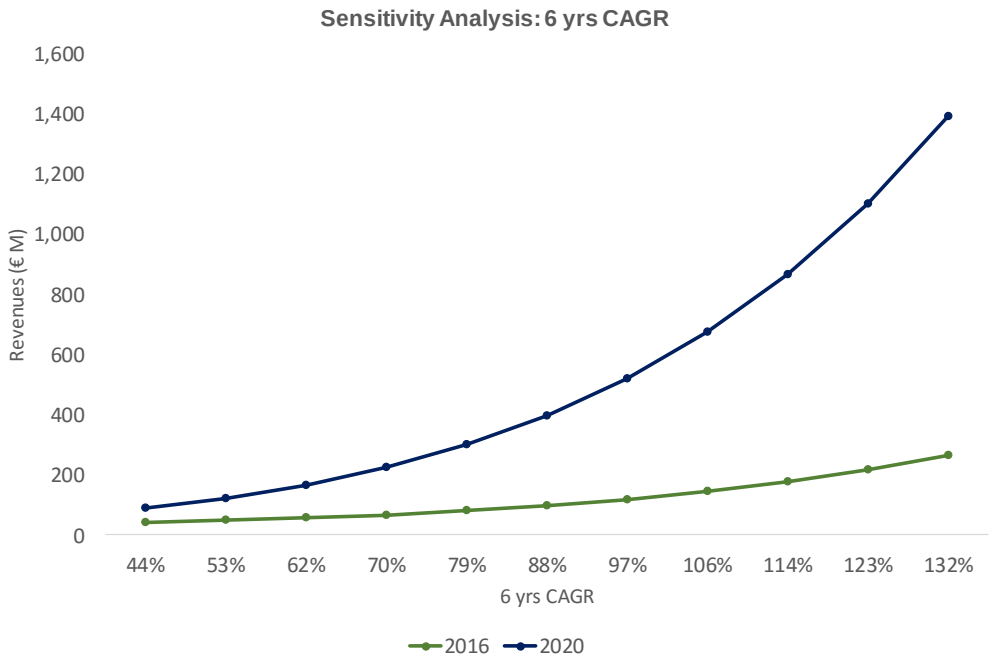
- **6 years average growth rate**: how our assumption on the average companies' growth rate is related to the overall revenue forecast result? How total revenue forecast changes from varying this assumption?
- **Death rates and growth trends**: would a different average death rate have a strong impact on total revenue generated? How could a higher percentage of "stars" benefit the overall revenue forecast scenario?

6 years average growth rates

Growth rate assumptions are a key input for the model. In order to test this assumption's impact on final results, we run our model varying it while keeping all other variables the same. As an example, for the purely software initiatives cluster, 0-1 employees' size class, (see Table 34) we test a variation of the 6 years average growth rate between 44% and 132%, compared to the 88% used for the current revenue models. We use a similar approach for the growth rate for all clusters and company size classes.

The impact of these variations is limited on the 2016 revenues but becomes substantial on the 2020 revenues. As Table 47 shows, a 50% increase of the average 6 years CAGR leads to a 2.7-multiplier effect on 2016 revenues. This multiplier becomes 3.5 when considering only 2020. This means that higher growth rates will have a much stronger effect on the long-term period, when they will have been on the market for at least 4 years and will be expected to start reaping the fruits of their success.

Figure 52 Sensitivity Analysis to CAGR variations



Source: FI-IMPACT elaboration on IDC data, 2016

The effect on the cumulative 2020 forecast revenues is a mix of previous years' impacts. Our analysis shows that a 1.5-times higher 6 years CAGR would lead to cumulative revenues 3.2-times higher than the current baseline forecast. Determining the average growth rates that successful funded initiatives will experience in their first years on the market is certainly one of the critical decisions for the model. This analysis underlines the disruptive effect that a strong average growth rate could have on generated revenues and highlights the central role that this assumption plays in the Market Revenue Model.

Table 48 Sensitivity analysis: Multiplier effect of CAGR variations on revenues

Average 6 Years Growth Rate (x)	2016 Revenues (x)	2020 Revenues (x)	Cumulative 2020 Revenues (x)
0.5	0.4	0.2	0.3
1.0	1.0	1.0	1.0
1.5	2.7	3.5	3.2

Source: FI-IMPACT elaboration on IDC data, 2016

Death rates and growth trends

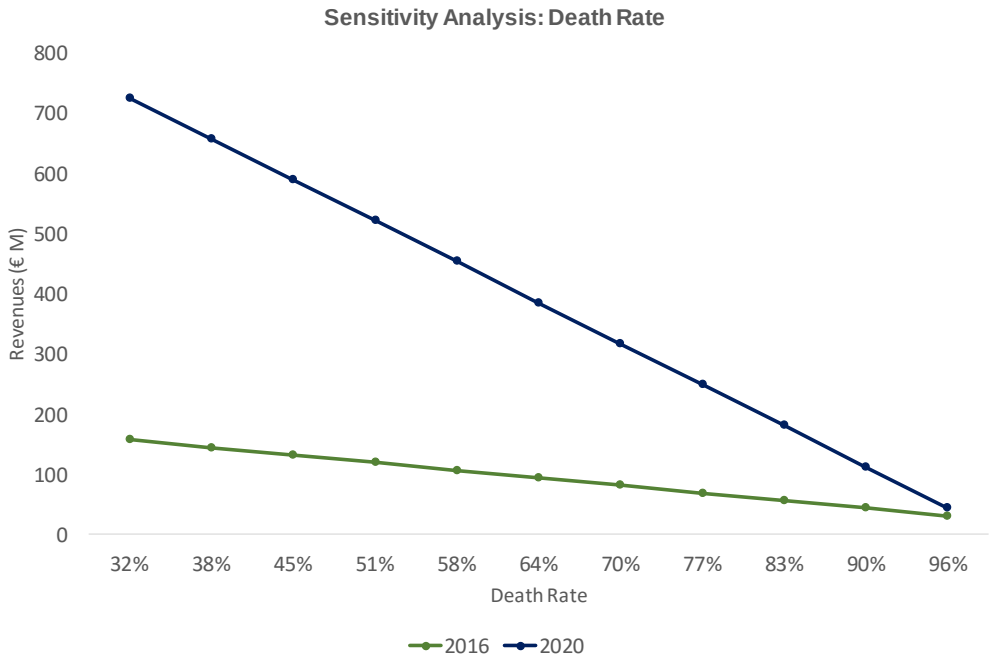
Similarly, to what we have done for the average 6 years' growth rate, we analyze now how our revenue forecast would change when varying the death rate assumption. As explained in §5.2.1, we estimated an average death rate of 64% for the baseline scenario.

In order to test the death rate assumption's impact on the final model results, we run our model varying the death rate assumption and keeping all other variables the same. Our

testing range varies from 32% (i.e. half of the death rate considered in the market revenue model) to 96% (i.e. 1.5-times the death rate used in the baseline scenario).

As expected, the effect is opposite to what we have seen varying the average 6 years' growth rate. A higher death rate assumption will have a negative impact on forecast revenues both in the short and long term, while a lower death rate will lead to higher revenues. Although the death rate impact will be more evident in 2020, its effect does not drastically change across the years. When halving the death rate assumption, potential revenues will almost double in 2016 and 2020 (x1.7 and 1.9, respectively), leading to a x1.8 effect on cumulative 2020 revenues. On the opposite side, having a death rate to a very high 96% (1.5-times what we currently assume in the model) would lead to a strong cut of expected revenues that would become 20% of what we currently forecast on a 2020 cumulative base.

Figure 53 Sensitivity Analysis: Death Rate assumptions



Source: FI-IMPACT elaboration on IDC data, 2016

There is no secret recipe for granting a low death rate to phase-3 selected projects, as companies' survival will depend on many factors beyond the accelerators' will and capabilities (such as market competition or disruptive new technologies appearing in the future). Nevertheless, this sensitivity test confirms the importance that the death rate will have on phase-3 revenues generation and highlights how sensitive the Market Revenue Model is to different assumptions on the death rate.

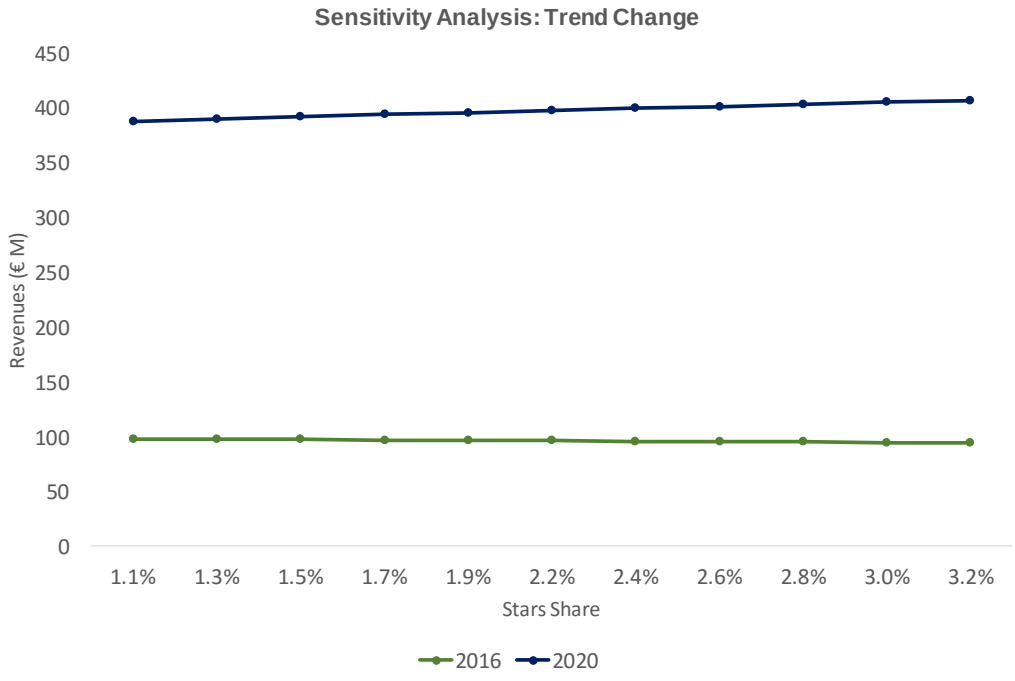
Table 49 Sensitivity analysis: Multiplier effect of death rate variations on revenues

Average 6 Years Growth Rate (x)	2016 Revenues (x)	2020 Revenues (x)	Cumulative 2020 Revenues (x)
0.5	1.7	1.9	1.8
1.0	1.0	1.0	1.0
1.5	0.3	0.1	0.2

Source: FI-IMPACT elaboration on IDC data, 2016

The last point of our sensitivity analysis concerns the distribution of phase-3 projects across the 7 trend categories we considered in the Market Revenue Model (see Section 5.2.2), in particular we focus on the so called "stars", i.e. those funded initiatives high potential growth. For our baseline scenario we considered that around 2% of funded initiatives will fall into this category. What would be the impact of a higher/lower percentage of star initiatives on the final revenue forecast?

Figure 54 Sensitivity Analysis: impact of variation of Category 7 (stars)



Source: FI-IMPACT elaboration on IDC data, 2016

Contrary to what we have seen with the previous assumptions, the impact of this variable on the final output is limited both for 2016 and 2020. While a 50% increase of the percentage of "stars" will slightly decrease 2016 revenues (0.98 multiplier), a slightly positive effect will emerge on 2020 revenue forecast. This will translate into a nearly null modification of the cumulative revenues forecast. The "stars' effect" would probably become more evident in the longer term beyond 2020, but not in the time period considered by our Market model.

Table 50 Sensitivity analysis: Multiplier effect of category 7 (stars) variations on revenues

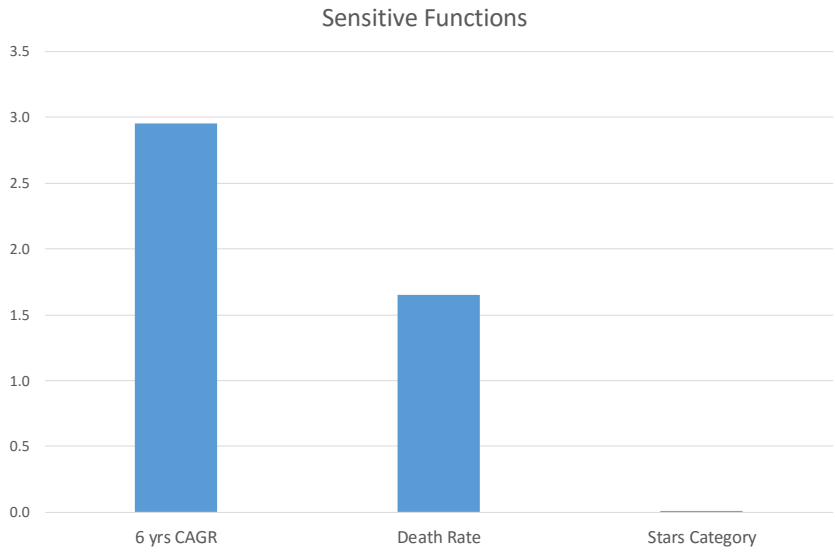
Average 6 Years Growth Rate (x)	2016 Revenues (x)	2020 Revenues (x)	Cumulative 2020 Revenues (x)
0.5	1.02	0.98	1.01
1.0	1.0	1.0	1.0
1.5	0.98	1.02	0.99

Source: FI-IMPACT elaboration on IDC data, 2016

Summarizing, we can now answer the following question: which of the previous variables has the strongest impact on the Market Revenue Model output?

To answer this question, we computed the so-called sensitive functions [15] on the cumulative 2020 revenues forecast. This gives us an indication of the model's sensitivity level with respect to the considered variables. As highlighted in the chart below, the model is strongly sensitive to the 6 years CAGR assumption, slightly less to the death rate and nearly not impacted by the variation of the share of category 7 (Stars).

Figure 55 Market Revenue Model Sensitive Functions



Source: FI-IMPACT elaboration on IDC data, 2016

15 The sensitive functions are a normalized ratio of the final output range (in this case subgrantees generated revenues) and the considered variable range (in this case 6 years CAGR, death rate, category 7/stars share, respectively). They are used in sensitivity analysis to measure the impact that model's inputs and variables have on the final model output.

It is important to underline that the changes in forecast revenues resulting from the sensitivity analysis have a different meaning from the changes in revenues resulting from the 3 scenarios.

First of all, the approach is quite different. The 3 scenarios results are a consequence of a different allocation of selected funded initiatives across the 7 trend categories (with no modifications of the average growth rate) and represent a "snapshot" of 3 discrete different combinations of assumptions. The sensitivity analysis focuses on understanding how the model could respond to a wide and continuous variation of specific model's variable, investigating which model variable has the strongest impact on the final revenues' model output.

The presence of a high percentage of "stars" among the subgrantees is certainly important for a real success of the Phase 3 programme and the FIWARE ecosystem. Only those companies experiencing a real market breakthrough before 2020 will get themselves talked about, putting FIWARE under the spotlight.

Nevertheless, as seen in this section, when restricting our market analysis to the next 4 years (up to 2020) a high or low presence of stars will not have a disruptive effect on 2020 cumulative revenues. The real revenues driver will be the average growth rate that surviving subgrantees will experience over the next few years. If surviving companies grow fast enough, this will counterbalance even an increase in the overall death rate. This is an important message for accelerators and for all the entrepreneurs funded by the programme: it is not enough to bring an idea to the market, a growth-oriented mindset is equally important if the objective is not simply survival but true market success.

5.4.2. Counterfactual Scenario

The support that the FIWARE project and ecosystem provided to subgrantees is not just in terms of funding, but also of technology support, mentoring and networking. The aim of this section is to answer this question: what would have happened to funded initiatives without FIWARE? How would our revenue forecast change without FIWARE?

Main Assumptions

The counterfactual scenario is based on 3 main assumptions:

A. **Without the FIWARE Acceleration programme, lower seed capital availability would have reduced the number of start-ups and/or slowed down their time to market.**

The FI-PPP Phase 3 provided 80 €M of seed / early phase funding across all of the EU, therefore its lack would disproportionately hurt potential entrepreneurs in the countries where the availability of risk capital is historically low. According to the most recent data from the EBAN association, the FIWARE investment represented approximately 5% of available early stage funding by business angels in Europe in 2015 [16] for the ICT and mobile sectors (which accounted for approximately 30% of all EBAN investments). About 45% of this investment was concentrated in 5 countries, with the UK by far the largest

[16] http://www.eban.org/eban-2015-statistics-compendium-angel-investment-grows-to-e61-billion/#.V3FBOqLxpDI

source, followed by Spain, Germany, France and Finland. Venture capital funds raised 1.3 €B in the 4th Quarter of 2015[17], while equity financing into Europe-based venture capital backed companies reached 3.3 €B in the same period. Of this, approximately 20 €M were for seed funding and 725 €M for first round funding. Information technology attracted the largest share of funding, approximately 26%. The total equity funding was strongly concentrated in a few countries, with the UK, Germany and France counting for 75%. Finally, as shown by the most recent European Accelerators Report 2015 [18] a survey which measured the investments of 113 professional accelerators in 2,574 start-ups, 52% of the funding was again concentrated in 3 countries, the UK, Denmark and Spain. Based on these considerations and taking into account that the A16 communication campaigns reached out to potential entrepreneurs in many countries with low seed capital availability, it is realistic to assume that without the Phase 3 Acceleration programme many of the funded initiatives would not have existed. At the very least many initiatives would have had to spend more time chasing potential investors and would have postponed their market entry.

B. Without the FIWARE technological platform and support, the subgrantees would have suffered from more difficulties in the development of their solutions and their market strategies.

It is true that technology standards different from FIWARE and infrastructure alternatives exist and are already used in many contexts and by many companies, nevertheless the existence of FIWARE infrastructure and technological support helped many selected initiatives to leveraged a standardized platform and better deploy their products and solutions. This added-value did not include only software codes and standards, but also technical assistance and support and being part of a widespread community and network. These factors help initiatives to a faster deployment of their ideas and a stronger IT background for their solutions, a vital ingredient to launch successful products on the market. Their lack would have hurt their chances of success and reduced their growth rates.

C. Without the accelerator programme providing business development consulting, mentoring, interaction with potential customers, investors and a community of peers, the chances of success and growth rates of the funded initiatives would have been lower.

The 16 accelerators mentoring and business support programme has certainly been one of the successful factors for the FIWARE subgrantees. It is true that some of the 16 accelerators would have existed and done their job even without the presence of the Phase 3 programme, but the unique approach to collaboration and networking organized by the FI-PPP has created many learning opportunities and helped to educate the potential entrepreneurs. This translated to a better support for funded initiatives that could count on a stronger support and assistance with respect to traditional accelerators activities. The positive impact of the collective A16 community activities is proven also by

17 http://images.dowjones.com/wp-content/uploads/sites/43/2016/01/26153144/DJ-VentureSource-EU_4Q15-Final.pdf

18 http://gust.com/european-accelerator-report-2015/

the accelerator benchmarking analysis, which found a positive correlation between these activities and the performance indicators of the subgrantees. Therefore, we assume that the lack of this unique programme would have had negative consequences for the potential entrepreneurs.

Impact of the Counterfactual Assumptions on the Model input indicators

At the light of these 3 disruptive factors, our counterfactual analysis led us to reconsider our market model with the following adjusted assumptions with respect to the baseline scenario:

- **A smaller reference population**: instead of considering 936 initiatives as a starting point of the scenarios, we assume that only 690 new initiatives would have found enough seed capital to start their journey to the market (a reduction of 26%). This follows from assumption A, and was implemented by assuming a lower number of funded initiatives per country compared to the current status (documented in par.2.5), linked with the availability of early stage funding. Without FIWARE many funded initiatives would not exist nowadays.
- **A delayed market entry year**: some of the funded initiatives that would exist even without FIWARE would have probably delayed or postponed their go-to-market strategies, as explained in assumption A.
- **Slightly lower 6 years' growth rates and higher death rates**: Assumptions B and C translate into slightly lower growth rates and a higher death rate for the selected initiatives. Thanks to FIWARE technological setup and "accelerator effect", companies fine-tuned their solutions, boosted their market strategies, decreasing the failure rate that characterize startups and organizations with no or low experience.

The results of these different inputs to the model are shown in the table below.

Table 51 The Counterfactual Revenues Scenario

	Revenues 2014 (€ M)	Revenues 2016 (€ M)	Revenues 2020 (€ M)	2014-2020 CAGR
Baseline Scenario	12	96	394	78%
Counterfactual Scenario	4	25	110	73%

Source: FI-IMPACT Market Model, 2016

These results show the beneficial effect that FIWARE had on potential entrepreneurs and in general on the European economy. Without the existence of FIWARE we forecast a 67% reduction of our revenue estimates in 2014, that becomes a 72% reduction in 2020. Cumulative revenues to 2020 decrease from 1,204 €M to 348 €M, with a 71% reduction.

Many of the funded initiatives would not exist without FIWARE and those who exist anyway would have encountered higher market challenges and growth obstacles than what they experience now. Instead of 325 start-ups and SMEs generating 394 €M in 2020, we would be now analyzing nearly 250 initiatives generating 110 €M in 2020.

Table 52 The Additional Impact

	Cumulative Revenues 2014-2020 (€M)	Phase 3 Funding (€M)	Cumulative Revenues – Phase 3 Funding (€M)	Phase 3 Initiatives on the Market in 2020
Baseline Scenario	1,204	80	1,124	325
Counterfactual Scenario	348	0	348	250
Additional Impact in the Baseline scenario			776	65

Source: FI-IMPACT Market Model, 2016

The counterfactual scenario is helpful to understand the additional impact that Phase III Funding (80 €M) will have on the European economy in the period 2014-2020. In the baseline scenario we estimated that Phase III funding initiatives would have a 2014-2020 cumulative direct impact (i.e. the sum of yearly revenues generated by funded initiatives) of 1,204 €M, which, on the other hand, would be only 348 €M in the counterfactual scenario. This, as explained above, is due to a lower reference population, delayed market entry year, and higher growth hurdles and failure rates. The difference between these two cumulative estimates, 856 €M (i.e. 1,204 €M - 348 €M), is essential to understand the Phase 3 additional direct economic impact. Subtracting the 80 €M Phase III funding, we see that the additional Impact of Phase III on the European economy in 2014-2020 is 776 €M.

5.5. Key Findings

In conclusion, the market model results show that:

- By the year 2020, we expect that Phase 3 will have created or accelerated over 300 healthy enterprises, the survivors of a group of 985 funded initiatives, selected from over 7700 submissions.
- We expect these enterprises to generate approximately 394 €M of revenues in the year 2020, which correspond to 1.2 €B cumulative revenues in the 2014-2020 timeframe. This is a very positive direct impact of the 80 €M invested by Phase 3 in the acceleration programme.
- Compared to the 1st release of the model in September 2015, the forecast estimate of the 2020 revenues in the baseline scenario has increased from 279 €M of revenues (with a 46% cumulative death rate) to 394 €M (with a 64% cumulative death rate). This is due to additional data collected by the study team which has made us update our assumptions as follows:
    - The first release was based on a proxy population of 1000 subgrantees, extrapolated from a database with approximately 700 cases; we now have 985 subgrantees in the database with more details and depth.
    - The date of market entry has been substantially anticipated, based on the more complete dataset and surveys. Basically we expected half of the subgrantees to be on the market only in 2016, while this happened by the end of 2015, with another 38% expected to enter by 2016. This has added the equivalent of more than 1 year of revenues to the model results.

  - Better information on the share of start-ups in the population and feedback from start-up experts led us to revise and increase the average death rate, while at the same time raising the average revenues to 2020 for the surviving companies to insure a realistic sustainability after 4 to 5 years on the market.
- The profile and business models of the subgrantees are different. We have identified 3 main clusters by technology offering with different dynamics:
  - Providers of pure software solutions, who will generate 125 €M of revenues in 2020, with a gradual growth progress;
  - Providers of hardware and software solutions, who will exploit the IoT wave of innovation and will generate the fastest growing revenues, reaching 203 €M in 2020;
  - Providers of web services, who will count for around 17% of the total revenues by 2020 with 66 €M, even if they include 32% of total funded initiatives. These initiatives have a business model likely to lead to low revenues in the first years, and a strong upswing in the second part of the covered period, but with high failure rates.
- The average revenues per company are expected to be around 1.2 €M in 2020, with approximately 15 employees per company corresponding to about 5000 jobs created.
- The average revenues will be about €79,000 per employee, enough for sustainability if not yet full profitability. This compares to approximately €900,000 average revenues in 2015 sourced from Eurostat for the sector j – information and communication. The higher level of average revenues estimated for Phase 3 SMEs compared to the whole sector information and communication points to a dynamic population of enterprises in a rapid growth path.

To provide a more accurate picture of the market and take into account the potential range of variation of the forecast revenues to 2020 under positive or negative economic and framework conditions, we have developed 3 alternative scenarios: a baseline, based on the extrapolation of current trends, an optimistic one, based on the expectation of faster digital innovation take-up in Europe providing better opportunities for our subgrantees, and a pessimistic one where less favourable economic and framework conditions constrain the potential revenues of the subgrantees. The scenarios include different assumptions about the interplay of the main macroeconomic factors (including estimates of alternative GDP and ICT spending growth to 2020, reported in Annex), the policy/regulatory developments, the global megatrends of digital innovation (sourced from IDC quarterly updated forecast assumptions) and the specific ICT/FIWARE market dynamics, focused on the main supply-demand dynamics.

The chances of an optimistic scenario depend on more favorable framework and economic conditions in the period to 2020, accompanied by higher ICT investments and digital innovation moving to a faster adoption curve compared to the baseline scenario.

In the optimistic scenario:

- the forecast revenues would be 15% higher, reaching 474 €M by 2020 generated by 374 enterprises, with almost 6 thousand jobs created; cumulative revenues would reach 1,511 €M in 2020;

- The average revenues per company would be 1.27 €M, with average revenues per employee around € 79,600 instead of € 78,800 as in the baseline scenario.

The pessimistic scenario is focused on the potential risks which may undermine the current trends toward positive moderate growth in Europe, which may include the negative impacts of the UK leaving the EU, a slow-down of emerging economies such as China, and the failure of policies removing barriers to digital innovation, such as the Digital Single Market strategy provisions. The supply-demand interaction of digital innovation will remain driven by technology-push and demand will remain confined to the leading and more innovative enterprises.

In the pessimistic scenario:

- the forecast revenues would be only 319 €M by 2020 generated by 278 enterprises, with slightly more than 4 thousand jobs created, almost 2 thousand less than in the optimistic scenario.
- Cumulative revenues would reach 986 €M in 2020
- The average revenues per company would be 1.14 €M, with average revenues per employee around € 77,600 instead of € 78,800 as in the baseline scenario.

In order to validate the potential impact of these scenarios, we have developed also a counterfactual scenario, analyzing the consequences in case the Phase 3 Acceleration programme had never happened. The counterfactual scenario assumes a reduction of the number of start-ups being created and a slow-down of their growth potential due to 3 main factors:

- Lower access to early stage funding especially in countries with low local business angel or venture capital activity;
- More difficulties in the technical development because of the lack of the FIWARE open platform, tools and applications;
- Slower growth due to the lack of the business and networking support by the accelerators programme.

Given these negative factors, a potential counterfactual scenario results in the following estimates:

- the forecast revenues would be only 110 €M in 2020 generated by nearly 250 subgrantees, compared to 379 €M in 2020 of the baseline scenario generated by 325 subgrantees that will still be on the market in 2020;
- Cumulative 2020 revenues would reach 348 instead of 1,204.

Finally, we carried out a sensitivity analysis of the model by varying the death rates, the 6 years average growth trends, and the number of subgrantees falling into the top performers category, the "stars". The growth rate turned out to be the variable most strongly affecting the model, with a multiplier impact on revenues of almost 3, while the death rate had a multiplier impact of about 1.5. Accelerating the growth rate in the first years of life of the subgrantees has a strong impact because it adds cumulative revenues to the overall total, even more than increasing survival rates. The variations in the number of companies in the "stars" category had almost no effect, probably because the incidence on total is small even if these companies have very high average revenues.

5.6. Users forecast

5.6.1. Estimate of Potential Users

This section estimates the number of potential users of the funded initiatives. With the term "user" we define the buyer of the solution, which may coincide or not with the actor (person or organization) actually using the solution.

We can have different examples:

A. A funded initiative targeting the healthcare sector sells a software solution to hospitals which allows also private consultation giving the chance to patients to access information on their medical records. Even if patients are also using the software, the user is the hospital, which bought the solution.
B. A manufacturing company adopts an IoT solution, which is provided to and used by all the employees. Also in this case the user is the manufacturing company which bought the solution.

For consumer applications, we consider the number of users, not to be confused with the number of downloads: the download is just the installation of the application on a device, while the active use of the application makes the customer a user. Please note that there is a huge difference between the number of users and the number of downloads, which is difficult to estimate on average but that, according to available data and literature can vary from 1 to 5%, meaning that on average only something like 3% of the downloads actually convert into users.

The aim of this chapter is to estimate how many users will adopt the funded initiatives by the end of 2020. While in theory a user can adopt more than one of the funded initiatives, for the sake of this estimate, we count the users of each solution separately. As a result, the same user can be counted more than once if using more than one solution. Example: consumer X is downloading an app which provides the service of learning a new language. At the same time, the same consumer X is buying a game. Even if this should be counted as one user, we count it twice, under the assumption that this situation is quite rare.

5.6.2. Methodology

The methodology we developed is based on the results on revenues obtained from the market model. Estimations are made considering all the funded initiatives (936 initiatives selected at the end of FI-PPP Phase 3), based on the following steps:

- **Estimate of average spending per user** based on elaboration on IDC data for each type of solution: Purely Software, Hardware and Software, and Web Services. The growth rates of average spending are differentiated by type of solution and target industry over the forecast period. This took into account the different business models (e.g. subscription/freemium/license/usage fees/advertising, among others)
- Use of the different **market entry year** of the funded initiatives (see section 5.2.1).
- Use of the **death rate** of funded initiatives on the market (see section 5.2.1).
- **Estimate of the user population** by dividing total revenues by the average spending per business or consumer user.

The assumptions used in the model on average spending per user follow:

- Purely Software: average spending ranges from € 8 to € 600
- Hardware & software: average spending ranges from € 100 to € 6,500
- Web services: average spending ranges from € 3 to € 1,000

5.6.3. Estimate of the Number of Users

The table below shows the potential number of users of the funded initiatives in 2014, 2016, and their projected increase to 2020 for the 3 main groups of initiatives.

Table 52 Number of Users by technology cluster (Baseline scenario)

Units	2014	2016	2020	CAGR (2014-2020)
Purely software	243,000	1,235,000	4,400,000	62%
Web services	126,000	1,600,000	12,000,000	114%
Hardware & software	19,000	300,000	2,330,000	123%
TOTAL	**388,000**	**3,135,000**	**18,800,000**	**91%**

Source: IDC European Vertical Markets, 2015

The first group includes all the funded initiatives categorized as **purely software** solutions. This group is the first in terms of number of users in 2014 but it becomes the second by 2020 (moving from a share of 63% among the three categories to a share of 23%). The estimated users at 2020 are around 4.4 million, the 77% of which will be consumers (estimated at 2020). This category shows a slower growth with respect to the other two, with a 2014-2020 CAGR of 62%, which is the lowest one, leading to the mentioned users' share of only 23% by 2020. The other spaces, besides the consumer one, which show a relatively higher users' share, are the cross-sector solution (8% of users estimated at 2020), followed Agriculture (4%), Wholesale and Retail (3%), Business Services and Healthcare (2%). In particular, Agriculture shows a high number of users because the specific focus of some accelerators led to more investments on this sector. This effort is also confirmed by the revenues generated by this sector, which are among the highest.

The second group refers to **Web related initiatives**. Web services do not provide a technology but use a technology to provide a service. This is the market on which there is the number of users is the lowest in the first year but increases becoming the highest among the three categories, showing a share of 64% by 2020, growing at a 2014-2020 CAGR of 114%. Most of these services are marketplaces where companies or consumers can buy or exchange goods, look for specific services, find information, and so on. Their target market can include B2B and B2C, and because of their specific features (they offer useful services, they are easy to access, most often they are free, or at least cheap) they turn out to be potentially appealing to a wide audience.

The third group refers to **hardware and software solutions**. As highlighted before in this delivery, it is worth noting that most of the hardware and software solutions are IoT solutions. Because of the specific way in which these solutions are modeled, the presence of the hardware part makes these solutions more expensive for users. This can be translated in a smaller number of potential buyers, and therefore data shows that for this

category we estimate a lower number of users among the three groups (12% of users in 2020). However, these solutions are expected to grow healthily in the period under consideration, showing the highest 2014-2020 CAGR at 123%. This trend is supported also by the expansion, for example, of IoT solutions. Also for these solutions, Consumers, Healthcare, Wholesale and Retail, Accommodation, Cross-sector solutions, and Agriculture show the highest number of users. For Consumers, these solutions include intelligent devices, such as "smart" homes, cars, wearables, or consumer electronics. As before, solutions for Healthcare and Agriculture are supported by accelerators' investments.

Table 53 Number of users by industry sector (Baseline Scenario)

	2014	2016	2020	CAGR (2014-2020)
Accommodation and food services	1,900	20,000	117,000	98%
Agriculture	13,000	78,000	320,000	70%
Arts and entertainment	2,000	12,700	52,000	72%
Banking	30	350	1,900	98%
Business Services	2,400	25,300	136,000	96%
Construction	100	640	3,000	77%
Consumer	332,000	2,700,000	16,700,000	92%
Cross-sector solutions	12,000	106,000	550,000	89%
Education	800	4,700	18,000	67%
Government	2,200	12,200	39,000	62%
Healthcare	9,500	66,000	300,000	78%
Manufacturing	3,000	26,700	103,000	77%
Telecom and Media	700	5,600	28,000	88%
Transport	2,500	16,500	69,000	74%
Utilities	500	3,700	14,000	75%
Wholesale and retail	4,600	49,000	280,000	98%
Total	388,000	3,135,000	18,800,000	91%

Source: IDC European Vertical Markets, 2016

The segmentation by industry sector confirms that consumers are the leading subject of the increase in the number of users. Also the role of accelerators in the financial support of some industry sectors is confirmed by the relative high percentage of users in Agriculture and Healthcare, even if they still hold a very small percentage of the total users (between 1.6% and 1.7%). Clearly, there is also a correspondence between revenues and users' growth among industry sectors.

6. Economic Impact Model

6.1. Introduction

This chapter is built on the results of the Revenues Forecast Market Model by investigating the success of these new businesses and the broader, indirect effects they generate on the whole European economic system. For this purpose, we developed an Economic Impact model based on a sound and well-referenced methodology for the assessment of the macroeconomic and employment impacts of the FI-PPP acceleration program of Phase 3 in the period 2014-2020. These impacts extend beyond the direct economic activities of the 985 subgrantees selected and funded by the 16 accelerators by potentially creating additional revenues and jobs in the user industries as well as increased welfare for all customers. Demonstrating this impact is the objective of this analysis. The design of the macroeconomic impact model is based on the estimation of the direct, indirect, and induced quantitative impacts on EU economic and employment growth and is aligned with best practice and the economic literature in this field.

The chapter is organized as follows:

- Introduction and definition of the type of impacts measured by the model;
- Description of the methodological approach;
- Presentation of final results;
- Presentation of different economic scenarios;
- Sensitivity analysis.

We also provide a technical appendix (see par. 8.4) with a more detailed description of the methodology used.

6.2. Measurement approach

This section is devoted to the description of the measurement approach we used in each step of the analysis as follows:

- The direct impacts correspond to the forecast revenues and jobs estimated by the Market Model in the previous chapter, under the 3 main scenarios;
- Indirect impacts are measured in two different steps according to backward and forward linkages of the funded initiatives;
- The measurement approach of induced impacts derives from the aggregated direct and indirect impacts;
- Alternative scenarios are calculated in the same manner as for the Market Model first we extrapolate present trends to calculate the impacts for a baseline scenario; then based on a set of assumptions we calculate the impacts for optimistic and pessimistic scenarios.

6.3. Identification and classification of economic impacts

This section is dedicated to the identification and description of the main impact categories. As already specified, the funded initiatives are innovative companies with the capability to generate positive spin-off effects in the whole economic system. The main results of the Market model (see chapter 5) in terms of potential current and future revenues and jobs created under 3 scenarios by the subgrantees represent the starting

point of the Economic model. The profile and characteristics of the funded initiatives which will survive to 2020 in terms of technical offering, number of team members, industry sector target, geographical scope and so on are also important inputs for the economic model. All these factors contribute to shape the economic environment and its absorption capacity of the innovation brought by these new enterprises, determining the intensity and scope of the potential benefits. These new businesses are components of supply value chains, whether they buy inputs and services from other businesses or sell outputs and services to other businesses or consumers. This model investigates the footprint of the funded initiatives in the EU economy in terms of their backward and forward linkages with other enterprises, identifying the specific industry sectors they target and analyzing how the adoption of FIWARE-based solutions can improve the productivity and growth of the user industries.

The model does not however estimate the overall impact of the whole FIWARE ecosystem because of lack of data about the actual and potential revenues related to the FIWARE platform itself.

For the sake of this model, we adopt the following definitions of the main categories of impacts, which are aligned with mainstream economic literature[19]:

6.3.1. Direct Impacts

Direct Impacts are the initial and immediate economic activities potentially generated by the funded initiatives, through the value and the nature of company's product, services and employees, as well as their associated revenues, once they enter the market. Direct impacts coincide with the first round of revenues generated by the selling of the funded initiatives' products and with new jobs created, which is the number of staff employed inside these initiatives. They have been calculated by the Revenues Market Model. Direct Impacts are designed to answer the question "What revenues will Phase 3 subgrantees generate every year? How many new jobs will they create?".

6.3.2. Indirect impacts

Indirect Impacts are the economic activities generated along the company's supply chain by the activity of Phase 3 initiatives. They encompass impacts generated in those businesses that supply inputs (services and materials) to the funded initiatives, and impacts generated in those businesses to which funded initiatives sell their products. They are generated at the same time as the direct impacts, because they are a function of direct impacts. Indirect Impacts are designed to answer the question " Do these solutions allow inputs suppliers and solutions adopters to generate more revenues and create new jobs?". In the framework of an input-output analysis, these relationships are usually identified respectively as "**backward linkages**" and "**forward linkages**": "the term backward linkage is used to indicate the interconnection of a particular sector to other sectors from which it purchases inputs (demand side); while the term forward linkage is

[19] Miller, Ronald E. and Peter D. Blair. 2009. *Input-Output Analysis: Foundations and Extensions.* 2nd ed. New York: Cambridge University Press, and *Eurostat Manual of Supply, Use and Input-Output Tables*, Eurostat Methodologies and Working papers, 2008 Edition.

used to indicate the interconnection of a particular sector to those to which it sells its output."[20]

6.3.3. Induced Impacts

Induced Impacts are the economic activities (new jobs and additional spending) generated in the whole economy as a secondary effect, by the combination of direct and indirect impacts. Induced additional spending is generated both by the new employees, who receive a new wage, and by the increased wage of existing jobs. This spending induces new revenues and new jobs creation in nearly all sectors of the economy. Induced Impacts are designed to answer the question "Did the economy benefit from the increased revenues and the new jobs created by boosting new jobs and additional spending?"

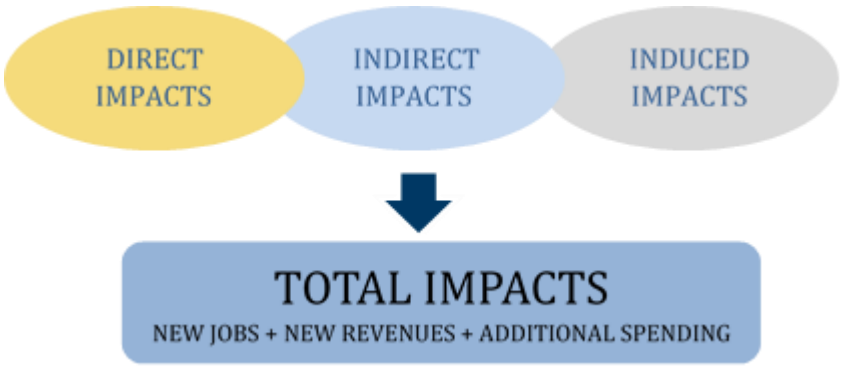
In this model, we did not take into account the contribution to the public sector generated by the tax stream revenues (employee taxes, business taxes, VAT). We just conside red the impact that is generated from the consumer side, through the evaluation of consumption habits by the use of disposable income and consumption rates. As we will show later, the consequence of this decision is that induced impacts will be substantially lower than indirect impacts, and lower than might be expected.

6.3.4. Overall Impacts

The sum of direct, indirect and induced impacts of all the Phase III funded initiatives defines the total economic impact. The indicators chosen to measure these impacts are the following:

- Absolute value of the direct, indirect, and induced impacts of all the Phase III funded initiatives, in €M;
- Incidence of this value as a % of EU GDP;
- Number of jobs created.

Figure 56 Direct, Indirect, and Induced Impacts, Graphic View



Source: FI-IMPACT 2016

[20] *Eurostat Manual of Supply, Use and Input-Output Tables*, Eurostat Methodologies and Working papers, 2008 Edition.

6.4. Measurement of Direct Impacts

Direct impacts correspond to the total amount of potential revenues generated by the subgrantees under the 3 scenarios and the total amount of jobs created under the 3 scenarios.

The potential revenues that could be generated by the funded initiatives are expected to reach 394 €M under the baseline scenario, with a 2014-2020 CAGR of 78%. Since according to our estimates, of the 985 funded initiatives only 325 companies will survive in 2020, then the amount of revenues they will generate is a considerable return on the initial EC investment. The figure below shows the amount of revenues split by technology offering cluster.

Figure 57 Direct impacts: forecast revenues by technology cluster, Baseline scenario

Source: FI-IMPACT 2016

The split by technology cluster reflects the distribution of revenues: the largest share derives from the Hardware and software solutions, which includes the innovative IoT solutions. The split remains approximately the same along the period, even if the Hardware and software revenues share tends to grow slightly faster than the purely software revenues share.

Table 54 Direct Impacts: Number of Jobs created, by year and cumulative, Baseline scenario

DIRECT JOBS	2014	2015	2016	2017	2018	2019	2020
New jobs every year	1,302	1,443	2,362	1,606	1,279	874	620
Cumulative new jobs	1,302	2,527	4,458	5,269	5,606	5,439	5,010

Source: FI-IMPACT 2016

As part of our estimation, we also look at the number of new jobs that have been created by the funded initiatives (par. §6.5.2). The table presented here excludes the number of already existing jobs (workers who are involved in a FIWARE project even if the main focus of their business is not FIWARE).

6.5. Measurement of Indirect Impacts

Indirect Impacts are the economic activities generated along the company's supply chain by Phase 3 initiatives. As anticipated, we will measure separately:

- Backward indirect impacts, which are generated in those businesses that supply inputs (services and materials) to the funded initiatives (in this channel are generated incremental revenues due to the selling of input to start the new business and to produce these FIWARE solutions;
- Forward indirect impacts, which are generated in those businesses to which funded initiatives sell their products (in this channel are generated incremental revenues due to the utilization of these FIWARE solutions).

In the table below we provide some examples of subgrantees solutions, and their backward and forward linkages.

Table 55 Examples of funded initiatives and linkages

FUNDED INITIATIVE	BACKWARD LINKAGE	FORWARD LINKAGE and VERTICAL MARKET
Connect your cultivation to the cloud IoT (Digigrow Electronics)	• All services and materials providers for the business activity • Electronics components and sensors providers	Agricultural firms install this device in or near cultivations to monitor environmental variables such as temperature, air humidity, wind speed, luminosity. An improvement of their production can help them to increase revenues. (Agriculture)
Drone Delivery Management Platform Drone (Connect Robotics)	• All services and materials providers for the business activity • Hardware providers	Adopters are logistic operators, who want to offer a wide range of transport modals, and postal service companies, who effort to reduce the delivery cost to its compulsory service. (Transportation)
Real Time Multifunctional biomedical Sensor Smart wearable (Integrated Systems Design and Development)	• All services and materials providers for the business activity • HW and SW providers	The usage of this device that provide pre-diagnosis to the patient, private hospitals can increase their revenues by increasing the number of medical exams bookings. (Healthcare)
Wearable device for blind and visually impaired people Smart wearable (Horus)	• All services and materials providers for the business activity • Electronics components and sensors providers	Museums, cinemas, and all art and entertainment businesses can increase their revenues by providing impaired people new experiences by using these wearables. (Arts and Entertainment)

Source: FI-IMPACT 2016 ON IDC data

We assumed that funded initiatives need inputs from almost all the sectors of the economy. Since they are establishing new activities that need to start a new business, they face all kind of costs, that are:

- Cost of materials and inputs, which are technology specific (tech provider);

- Labor and capital costs, administrative and all operational costs, transport and delivery costs, electricity, rent, office materials costs, and so on (businesses providing these inputs are referred as "All services and materials providers for the business activity").

We follow two distinct methodologies to estimate these two different types of impacts. In particular, in order to estimate the indirect backward impacts, we refer to a method known as the Input-Output (I/O) analysis, while for the indirect forward impacts we developed a methodology based on IDC data on IT spending and its relation with companies' turnover and employment, in order to estimate the economic impact that technologies could have on boosting adopters' revenues, and as a consequence generating new jobs.

6.5.1. Estimate of Revenues generated through Backward linkages

The Input-Output (I/O) methodology was introduced by Wassily Leontief in 1966,[21] and quantifies "the mutual interrelationships among the various sectors of a complex economic system".[22] This method is based on national input-output tables that describe the flow of goods and services between all sectors of an economy over a period of time. These tables provide information on all inputs used in production: labor, capital, land, and intermediates, which are the intermediate inputs in production.[23] The structure of each sector's production process is represented by a defined vector of structural coefficients that describes in quantitative terms the relationship between the inputs it absorbs and the output it produces. The objective is to calculate the output of individual sectors for the given final demand.

For the purpose of our analysis, which is the estimation of backward linkages (the interconnection of a particular sector to other sectors from which it purchases inputs) inside the European economy, we only consider the part of the table that deals with the domestic inter-industry linkages, that is the interactions between domestic industry sectors for inter-industrial inputs, used in the production of final goods.

It should be mentioned that we do not consider either imports' or exports' contribution to the total output.

The main step is to calculate the output multipliers, which reflect the cumulative revenues of the economy, which are induced by one additional unit of final demand of a certain commodity.[24] Output multipliers allow us to estimate the indirect backward impact that the funded initiatives have on the economy of their suppliers.

Assumptions:

- Funded initiatives need inputs from almost all the sectors of the economy. Since they are establishing new activities that need to start a new business, they face all kind of costs. We consider labor and capital costs, administrative and all operational costs, costs of materials and inputs, transport and delivering costs, electricity, rent, office materials costs, and so on.

[21] *Input-output economics*, New York, Oxford University Press, 1966.
[22] *Input-Output Economics,* Second Edition, Oxford University Press, 1986.
[23] For a detailed explanation of I/O table see the Technical Appendix.
[24] For a detailed methodology on the output multipliers calculation see the Technical Appendix.

- Since I/O tables are based on NACE 2categories,[25] we classified the funded initiatives by NACE 2 code, leveraging the technology clusters and the detailed information of the global database. The classifications results are presented in the table below.

Table 56 Classification of funded initiatives by NACE 2 code

Type of Solution provided	NACE code	Description
Hardware and Software	C26 J58	Computer, electronic and optical product Publishing services (include 58.2: software publishing)
Purely Software	J58	Publishing services (include 58.2: software publishing)
Web Services	J62_J63	Computer programming, consultancy and related services; Information services (include 63.1: web portals)

Source: FI-IMPACT 2016 and Eurostat NACE Rev. 2

Once we identified the most appropriate NACE codes, we calculated the output multipliers,[26] which are then applied to the revenues of the funded initiatives.

Table 57 Output Multipliers for the funded initiatives

Type of Solution provided	NACE code	OUTPUT MULTIPLIERS
Hardware and Software	C26 J58	**0.98** **0.91**
Purely Software	J58	**0.91**
Web Services	J62_J63	**0.75**

Source: IDC 2016 on Eurostat NACE codes classification 2014

Here we present the calculated multipliers that represent the net revenues of the economy, which are induced by one additional unit of final demand of a certain commodity. Hardware and software solutions show multipliers (average between 0.98 and 0.91) higher than Purely software (0.91) and Web services solutions (0.75): it means for example that the production of Hardware and software solutions creates more revenues along the supply chain than the production of Web services, when there is the same increase of the final demand of these solutions.
An explanation can be found by looking at the single net multipliers by each NACE code in the table provided in the Technical Appendix: the Manufacturing sector (NACE code C) generates more revenues when contributing to the production of a Hardware and software solution (0.30) than in the case of production of a Purely Software (0.25) or a Web service solution (0.11), because the contribution of manufacturing inputs is higher in the first case and the sector receives an higher return in terms of generated revenues.

[25] Eurostat, NACE Rev.2, Statistical classification of economic activities in the European Community.
[26] Multipliers are values greater than 1, since they account for direct and indirect impacts overall. We consider separately direct and indirect impacts, so we consider "net multipliers" (multiplier-1) to account just for indirect backward impacts. For a detailed explanation about data and calculation, please refer to the Technical Appendix.

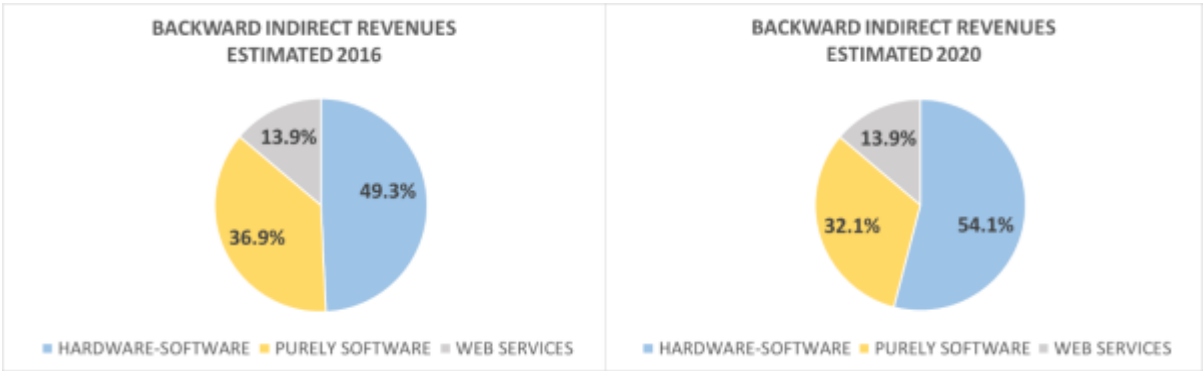
The following tables show the estimated backward indirect impacts of the funded initiatives for the period 2014-2020 and the revenues split by technology solution for 2016 and 2020.

Table 58 Backward Indirect Revenues 2014-2020, in €M, Baseline scenario

BACKWARD INDIRECT IMPACTS (€M)	2014	2015	2016	2017	2018	2019	2020
TOTAL	11	40	83	133	180	229	320

Source: FI-IMPACT 2016

Figure 58 Backward Indirect Revenues Split by technology cluster, %, Baseline scenario



Source: FI-IMPACT 2016

The estimates of the backward indirect revenues represent the incremental revenues that are generated among the subgrantees' suppliers' businesses. These results directly depend on the value of the Output multipliers and on the results of the Revenue model, the direct impacts.

The estimation shows that the supply chain in the backward linkage is expected to generate around 83 €M in 2016, with the supply of inputs for the Hardware and software solutions production generating half of the total revenues for that year, and around 320 €M in 2020, with a 2014-2020 CAGR of 75%. The split by technology reflects the picture seen for the direct impacts. The Web services revenues' share on total is expected to remain stable in the forecast period, while the Purely software initiatives will grow at a slower pace compared to the other two clusters.

6.5.2. Estimate of Jobs generated through Backward linkages

In order to understand how the revenues are generated in the supplier firms and how are related to the creation of new jobs, we estimated how much of the new revenues generated in these firms could have been translated in new jobs. We based our approach on IDC internal data and desk research. We first considered how the change in turnover among the users affect the change of the employment by using a regression model.[27] We then evaluated a sample of international companies, looking at time series of revenues,

[27] We found that a change in turnover of 1% leads to an employment change of 0.3%.

the number of employees, and the cost of labor, as the average annual wage[28]. The aim was to estimate how much of the change in revenues for the sample of companies could be transformed into new (or lost) jobs. Our assessment revealed that the average ratio between the change in the cost of labor and the change in revenues is around 12%. The table below shows the results of our estimation in terms of potential new jobs created by the backward linkages impacts.

Table 59 Backward Indirect Impacts: Number of new Jobs by year and cumulative, baseline scenario

BACKWARD INDIRECT JOBS	2014	2015	2016	2017	2018	2019	2020
New jobs every year	33	121	254	417	572	741	1,054
Cumulative Sum	33	154	408	825	1,397	2,138	3,192

Source: FI-IMPACT 2016

Figure 59 Backward Indirect Impacts: number of jobs by technology cluster, 2016 vs 2020, baseline scenario, %

Source: FI-IMPACT 2016

The results on the number of jobs that are created along the supply chain as a backward impact show more distributed shares between Hardware and software solutions and Purely software solutions in 2016, while by 2020 the number of jobs that are expected to be created will be higher in the backward linkage related to the production of Hardware and software solutions with respect to Purely software solutions. This is due to the trend of the revenues generated at the backward side, with IoT solution that will take hold in the market and will generate more new jobs as a consequence, with almost 3,200 cumulative new jobs created in 2020.

[28] OECD.Stat, Definitions of Structural Business Statistics Regulation (Commission Regulation (EC) No. 2700/98 of 17 December 1998). "Wages and salaries include the values of any social contributions, income taxes, etc. payable by the employee even if they are actually withheld by the employer and paid directly to social insurance schemes, tax authorities, etc. on behalf of the employee. Wages and salaries do not include social contributions payable by the employer". We slightly increased the value of wages in order to take into account the social contributions payable by the employer, and we find an average cost of labor of 35,000€.

6.5.3. Estimate of Revenues generated through Forward linkages

The approach we used to calculate the forward impacts started from trying to answer the fundamental question of "How will the solutions provided by the funded initiatives allow customers to increase their revenues and jobs?". Our aim is to understand how adopters' revenues respond when their overall IT spending increases by buying FIWARE solutions.

We can divide our approach in the following steps:

- Leveraging our analysis of the subgrantees population and our estimates about their potential users by industry, we collected data about the average turnover of the user companies and their average number of employees. This allowed us to estimate the turnover per employee by industry sector.[29]
- Based on IDC internal data on average external IT spending per company[30] and an estimate of the average cost of FIWARE subgrantees solutions, we assumed that the average increase of final users' IT spending embedding FIWARE solutions is 2%. We then ran a regression that analyses how companies' turnover responds to changes in companies' IT spending.
- Finally, we differentiated the impact of IT spending growth on turnover by the type of solution provided by the funded initiatives and also by industry sector, through the application of differentiation multipliers. From a technological point of view, we considered that there are solutions that do not increase revenues but lead to costs saving. Examples: an online accommodation booking website helps hotels in increasing bookings and then revenues, while smart lights in a city helps to decrease costs, but they do not help to increase municipalities incomes. By an industry sector point of view, instead we considered for example that a hardware and software solution, such as an IoT solution, in the Manufacturing sector could have a greater impact on turnover than in the Education sector.[31]

The following tables show the estimated forward indirect impacts of the funded initiatives for the period 2014-2020, and the revenues split by technology solution for 2016 and 2020:

Table 60 Forward Indirect Revenues 2014-2020, in M€

FORWARD INDIRECT IMPACTS (€M)	2014	2015	2016	2017	2018	2019	2020
TOTAL	215	747	1,621	2,694	3,764	4,971	6,608

Source: FI-IMPACT 2016

[29] Source for turnover and employment data is Eurostat, 2014, Annual enterprise statistics for special aggregates of activities (NACE Rev. 2) [sbs_na_sca_r2].
[30] Source for IT Spending is an IDC survey on external IT spending per employee on a sample of 1,404 companies.
[31] For a detailed overview of all differentiation multipliers for industry sector and technology solutions differentiation see the Technical Appendix.

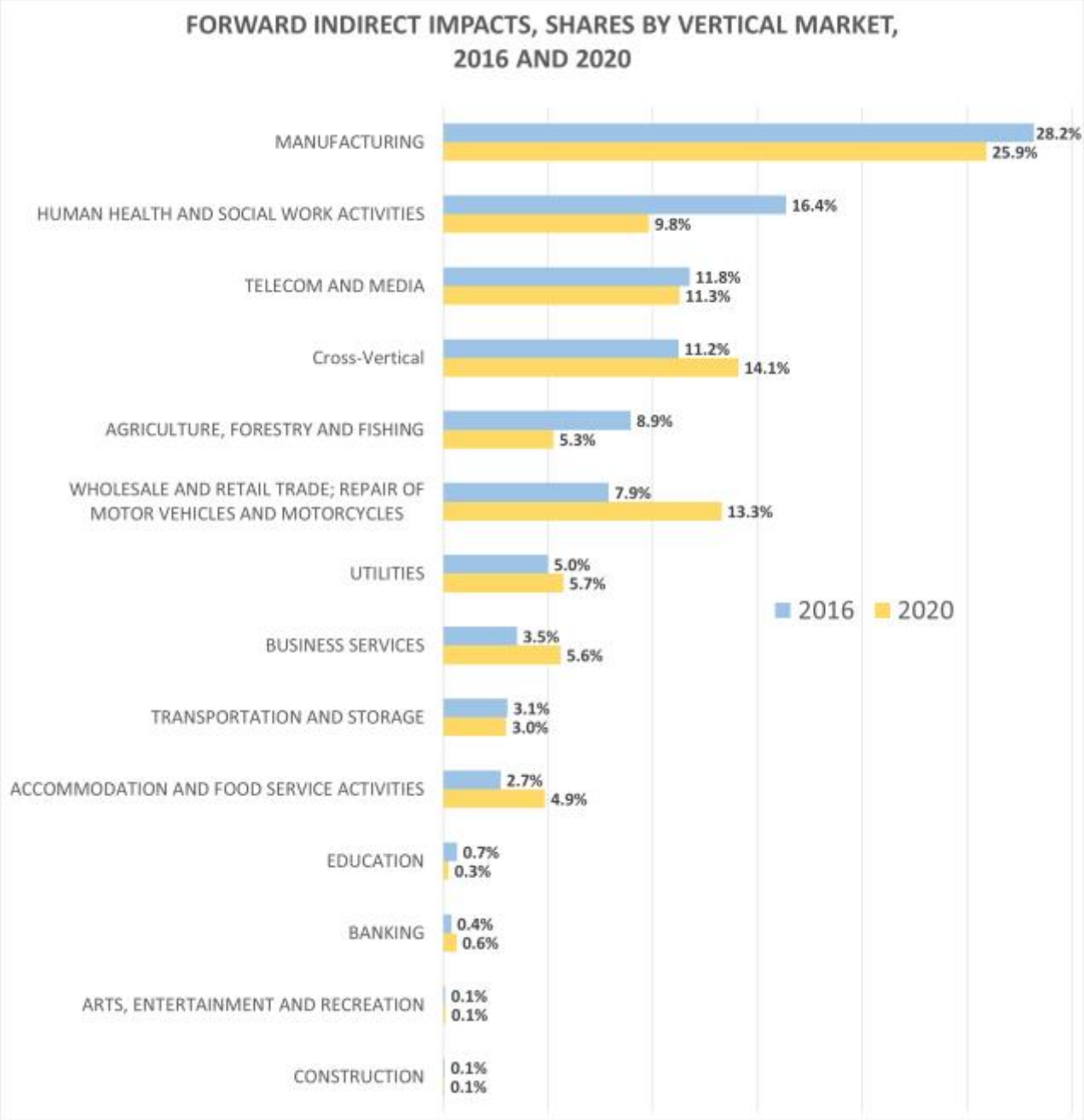
Table 61 Forward Indirect Revenues Split by type of solution, 2016 vs 2020, %

Source: FI-IMPACT 2016

Results for additional revenue generated in those businesses that are adopting a FIWARE solution show the size of forward indirect impacts: they are 20 times the backward impacts and 17 times the direct impacts. Indeed, here we are considering all the potential market that is addressed by the funded initiatives, and these results highlight the potential success inside the overall FIWARE project. By 2020, more than 6 €B are expected to be created by the funded initiatives as an indirect forward impact, with a 2014-2020 CAGR of 77%. Results by technological category show how the adoption of Purely software solution has an undoubtedly powerful impact. In 2016 almost two third of the expected additional revenues generated are due to Purely software solutions. In 2020 these solutions are expected to keep pace in helping increasing revenues for those businesses which adopt them, but slowly decrease their share in favor of Web services, that in turn accrue more importance, as they are expected to account for more than 28% in 2020, with respect to the 24% share of 2016. A small share of revenues is expected to be generated by Hardware and software solutions, as by a technological point of view, this category is likely to include solutions that do not increase revenues but lead to costs saving.

For forward impacts, we are also able to provide a split by industry sector for 2016 and 2020.

Figure 60 Forward Indirect Revenues Split by industry sector, 2016 vs 2020, %



Source: FI-IMPACT, 2016

6.5.4. Estimate of Jobs generated through Forward linkages

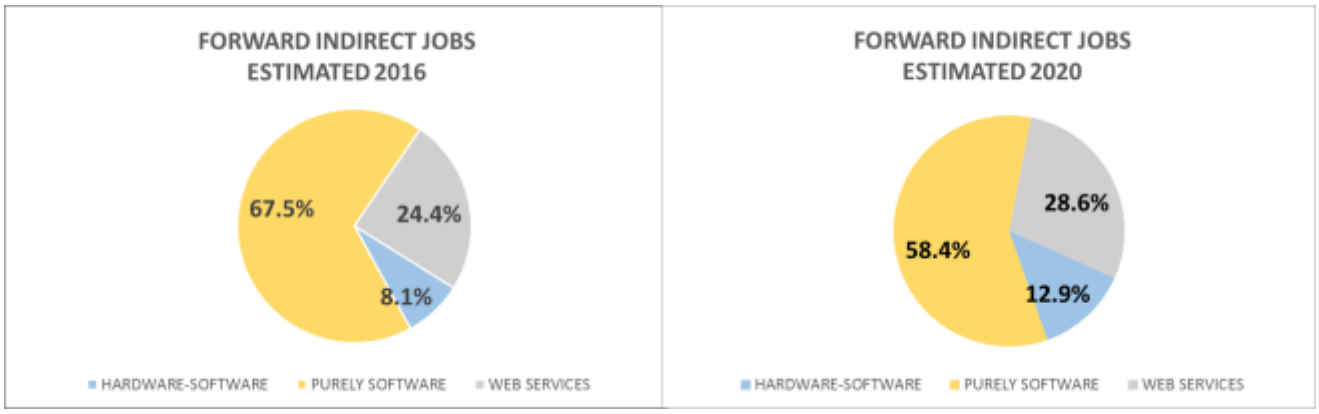
To estimate the potential number of jobs that could be created in the economy due to the presence in the economy of the Phase III projects, we applied the same methodology we used for the backward linkage jobs.[32]

Table 62 Forward Indirect Jobs 2014-2020

FORWARD INDIRECT JOBS	2014	2015	2016	2017	2018	2019	2020
New jobs every year	687	2,396	5,120	8,561	12,211	16,308	22,495
Cumulative sum	687	3,083	8,203	16,764	28,975	45,283	67,778

Source: FI-IMPACT 2016

Figure 61 Forward Indirect Jobs Split by type of solution, 2016 and 2020 in %



Source: FI-IMPACT 2016

Results for new jobs created reflect the trend that has been seen for the revenues. Businesses that generate more revenues due to the adoption of FIWARE solutions are also expected to create more jobs, as the underlying assumption is that a share of the revenues generated is transformed in new jobs, as business increase and there will be the need for more employees. By 2020 are estimated to be in the market around 68,000 new employees, the 58% of which are expected to be employed in businesses adopting Purely software solutions.

6.6. Measurement of Induced Impacts

Induced Impacts are the economic activities generated in the whole economy as a second effect by the combination of direct and indirect impacts. As we have already mentioned in the introduction to this chapter, here we only consider the impact of private consumption spending by all employees in the economy. We consider increase in production, both as a direct and indirect impact, new jobs and increased wages. As people spend part of their wages, this creates an increase of the final demand and therefore a further increase in production, spending, and jobs.

[32] See paragraph A2.

We consider both the number of new salaries and new employees through the creation of new jobs, and the number of already existing workers. Existing workers are employees working on a FIWARE funded initiative, as part of their activity within a company whose main business is not a FI-WARE project. These employees have not been enrolled to work specifically on these initiatives, but they were already part of organizations that are now developing these funded projects as one of their business activities. Then, they receive a higher salary, due to the fact that they work on FIWARE projects as a second business.

To estimate additional spending and jobs, we followed the following steps:

- We identified the disposable income[33], which is the sum of wages and salaries, mixed income, net property income, net current transfers and social benefits other than social transfers in kind, less taxes on income and wealth and social security contributions paid by employees, the self-employed and the unemployed. According to OECD.Stat, the disposable income in EU 28 is on average 23,000 euro.
- We then identified the consumption rate through the gross household saving rate.[34] Saving rate is 10.3%, meaning that the remaining 89.7% of the salary is spent in the economy.
- The assumption made at this point is that induced spending is generated both by new jobs created, and by the increase of salaries of existing workers.
- The number of new jobs created is calculated following the same approach we used to calculate backward and forward jobs.

Table 63 Induced Spending 2014-2020 by technology, in M€

INDUCED IMPACTS (€M)	2014	2015	2016	2017	2018	2019	2020
Induced additional spending (from new jobs created)	42	122	280	492	777	1,144	1,652
Induced additional spending (from the increase of salaries of existing workers)	17	55	112	176	233	288	364
TOTAL	59	177	392	668	1,010	1,432	2,016

Source: FI-IMPACT 2016

Table 64 Induced Jobs 2014-2020

CUMULATIVE INDUCED JOBS	2014	2015	2016	2017	2018	2019	2020
TOTAL	200	604	1,351	2,357	3,690	5,413	7,884

Source: FI-IMPACT 2016

[33] Source: https://data.oecd.org/hha/household-disposable-income.htm and OECD.Stat Net National Disposable Income 2014, Constant prices, OECD base year. The definition is: "the sum of wages and salaries, mixed income, net property income, net current transfers and social benefits other than social transfers in kind, less taxes on income and wealth and social security contributions paid by employees, the self-employed and the unemployed".

[34] Definition at http://ec.europa.eu/eurostat/cache/metadata/en/nasa_10_nf_tr_esms.htm

Total induces impacts are estimated to be around 400 €M in 2016, and they will reach in 2020 more than 2 €B, one third of the 2020 forward impacts. Induced impacts represent the additional spending that is created in the economy as a secondary effect of the direct and indirect impacts. In this study only the consumer side has been calculated, and no government additional spending is considered. Around 80% of total induced impacts are generated from the additional spending deriving from new jobs created (1.6 €B). A smaller amount accounting for less than 20% is additional spending generated by the increase of salaries of existing workers.

6.7. Alternative Scenarios Assumptions

As performed for the Revenue Model, we have developed alternative assumptions for three alternative scenarios: baseline, optimistic and pessimistic scenarios. The main storyline and the factors described in the previous chapter (par. 5.2) also hold for these scenarios. It is necessary to adopt additional assumptions, which include:

- Baseline scenario: this is based on the extrapolation of recent trends of moderate growth of the EU economy and moderate progress in the policy for the digital single market supporting digital innovation demand development.
- Pessimistic Scenario: this scenario is driven by more negative economic and framework conditions, reducing the main trend from moderate to low GDP growth in the next years. In this scenario the take-up of digital innovation is slower than in the baseline scenario, with low demand from firms and from consumers, as well as low production levels compared to the baseline.
- Optimistic Scenario: represents the best case scenario, characterized by growing firms and production, high inter-sectorial demand and high consumption demand, thanks to more favorable framework and economic conditions in the period to 2020.

Here is a brief description of what are the assumptions under these two scenarios.

Pessimistic Scenario Assumptions by type of impact:

- **Backward indirect impacts**: if the revenues of the funded initiatives are lower, then the impacts on the backward side will be smoothed. The assumption is simple: if the economic conditions of the funded initiatives suffer a backlash, then they spend less in inputs and services, and suppliers will register lower revenues all other things remaining equal. On the employment side, if the economic conditions become unstable, the percentage of revenues that firms supplying inputs will allocate for new jobs will be lower.
- **Forward indirect impacts**: if the economic conditions deteriorate, businesses will suffer from lower production, and then turnover per employee will decrease. Revenues will be lower, due to a most likely softer impact of IT spending on turnover. If revenues decrease, as for the backward side, the percentage of revenues that adopters will allocate for new jobs will drop.
- **Induced impacts**: finally, for the induced impacts, negative economic conditions could translate in lower consumption both in terms of disposable income (if, for example, people are requested to pay higher taxes for a restrictive economic policy) and in terms of lower consumption rate (in favor of a higher saving rate).

Again, all businesses will be less willing to hire, and the percentage of revenues that they will allocate for new jobs will decrease.

Table 65 Pessimistic Scenario Results 2016

ESTIMATED 2016	ECONOMIC IMPACT (M€)	NUMBER OF JOBS CREATED	% OF GDP
DIRECT IMPACTS	81	2,300	
INDIRECT IMPACTS	1,095	3,811	
INDUCED IMPACTS	296	936	
TOTAL	**1,472**	**7,047**	**0.011%**

Source: FI-IMPACT 2016

Table 66 Pessimistic Scenario Results 2020

ESTIMATED 2020	ECONOMIC IMPACT (M€)	NUMBER OF JOBS CREATED
DIRECT IMPACTS	319	516
INDIRECT IMPACTS	4,260	16,005
INDUCED IMPACTS	1,339	4,800
TOTAL	**5,918**	**21,321**

Source: FI-IMPACT 2016

Optimistic Scenario Assumptions by type of impact:

- **Backward indirect impacts**: if the revenues of the funded initiatives are higher, then the impacts on the backward side will raise. The assumption is simple: if the economy expands, then the funded initiatives will spend more in inputs and services, and suppliers will register higher revenues, all other things remaining equal. On the jobs side, if the economic conditions become stable, the percentage of revenues that firms supplying inputs will allocate for new jobs will be higher.
- **Forward indirect impacts**: if the economic conditions improve, businesses will face higher production, and turnover per employee is likely to increase. Moreover, a higher impact of IT spending on turnover it is very likely. This will generate higher revenues. If revenues expand, as for the backward side, the percentage of revenues that adopters will allocate for new jobs will increase.
- **Induced impacts**: finally, for the induced impacts, positive economic conditions could translate in higher consumption both in terms of disposable income (if, for example, people are requested to pay lower taxes for an expansive economic policy) and in terms of higher consumption rate (in favor of a lower saving rate). Again, all businesses will be more willing to hire, and the percentage of revenues that they will allocate for new jobs is likely to increase.

Table 67 Optimistic Scenario Results 2016

ESTIMATED 2016	ECONOMIC IMPACT (M€)	NUMBER OF JOBS CREATED	% OF GDP
DIRECT IMPACTS	120	2,430	
INDIRECT IMPACTS	2,630	7,914	
INDUCED IMPACTS	521	1,872	
TOTAL	**3,271**	**12,216**	**0.025%**

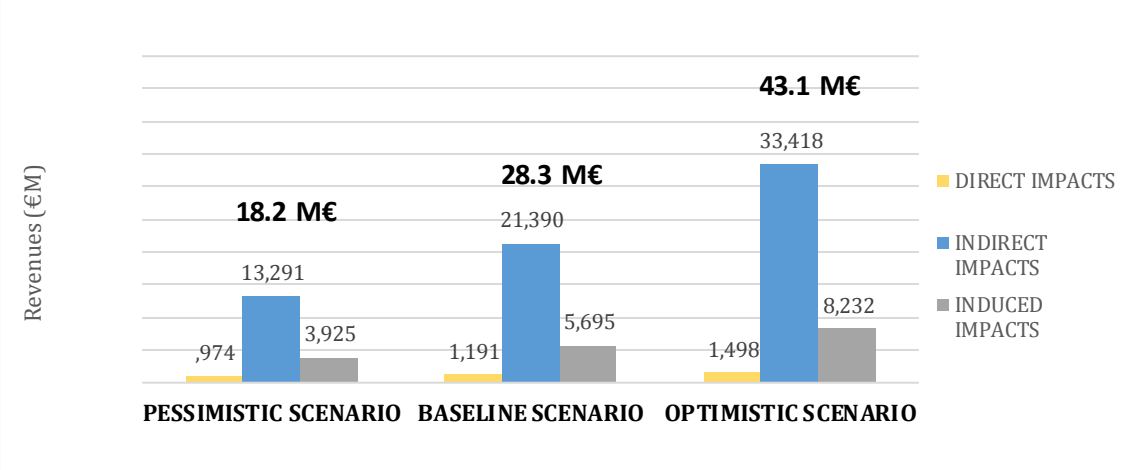
Source: FI-IMPACT 2016

Table 68 Optimistic Scenario Results 2020

ESTIMATED 2020	ECONOMIC IMPACT (M€)	NUMBER OF JOBS CREATED
DIRECT IMPACTS	474	736
INDIRECT IMPACTS	10,500	34,030
INDUCED IMPACTS	2,962	12,065
TOTAL	**13,936**	**46,831**

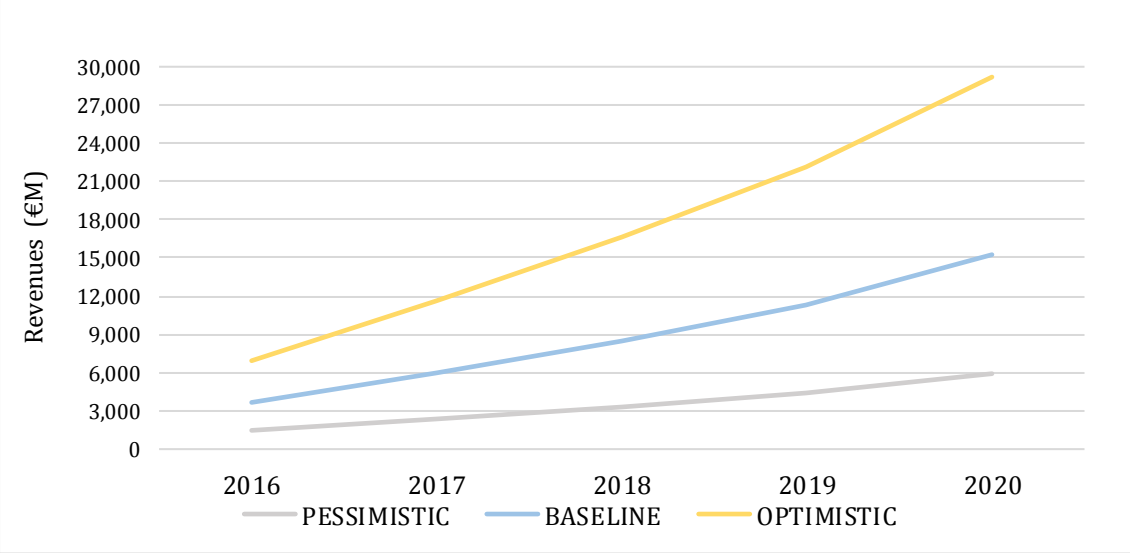
Source: FI-IMPACT 2016

Figure 62 Cumulative Revenues for the three Scenarios, 2020



Source: FI-IMPACT 2016

Figure 63 Revenues for the three Scenarios 2016-2020



Source: FI-IMPACT 2016

6.8. Sensitivity Analysis

The final part of our analysis includes also a sensitivity analysis, which is the study of how the uncertainty in the output can be assigned to the uncertainty in the inputs. In our case, we considered the response of the revenues to different changes in the inputs, which means to what extent the model is affected by the inputs.

In particular, our analysis focuses on indirect forward impacts, for which a series of assumptions are made outside the structural characteristics of the economy, so they are susceptible to changes. Forward impacts are generated in those businesses to which funded initiatives sell their products, so the variables on which they depend are the turnover of the companies which buy FIWARE products (the end users), their IT spending growth (i.e. the growth of end users IT spending after the purchase of FIWARE products), and the degree to which the change in IT spending growth affect the end users' turnover (turnover elasticity). These variables do not depend on the structure of the economy, because for example companies' turnover can change because the funded initiatives target a different kind of companies, smaller or bigger. Alternatively, if we consider backward impacts, they depend on the multipliers derived from the input/output tables, which instead reflect the structure of the economy, and cannot be changed. The same reasoning can be done for induced impacts, for which we cannot change the disposable income or the consumption rate.

Looking more in detail at the sensitivity analysis, we considered two of the variables above mentioned:

I. End users' IT spending growth (with the purchase of FIWARE products);
II. End users' turnover.

In particular, we considered that

a. Turnover varied from a minimum of 25,000 € to a maximum of 75,000 €;
b. IT spending growth varied from a minimum of 1% to a maximum of 3%;
c. Turnover elasticity is fixed at 0.338.

The following sections provide a detailed examination of these factors.

6.8.1. Change in IT Spending Growth

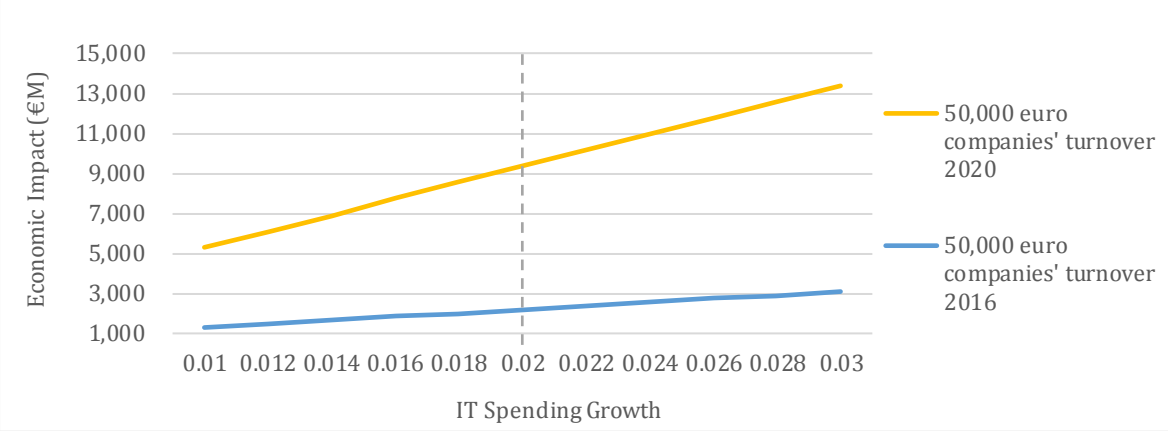
We first show the results for a change in the IT spending growth, keeping end users' turnover and turnover elasticity fix.

Here we present the results for a company initial turnover on the average (50,000€) for 2016 and 2020 (Figure 64) and then the results for 2016 and 2020 for three different values of company initial turnover (Figure 65).

Figure 64 represents the total economic impacts (the sum of direct, indirect and induced impacts), for different values of the IT spending growth. If we consider the case in which the increase in IT spending has the fix value of 2% for 2016 (grey dotted line), then we get the baseline result of around 2.2 €B (along the blue line), and for 2020 we get 9.3 €B (along the yellow line). As the IT spending increases more, the total economic impact increases. The impacts for a company's turnover on the average (50,000€) for different

IT spending growth variations and with a turnover elasticity of 0.338, will vary in 2016 from 1.3 €B to 3.1 €B, and in 2020 they will vary from 5.3 €B to 13.4 €B.

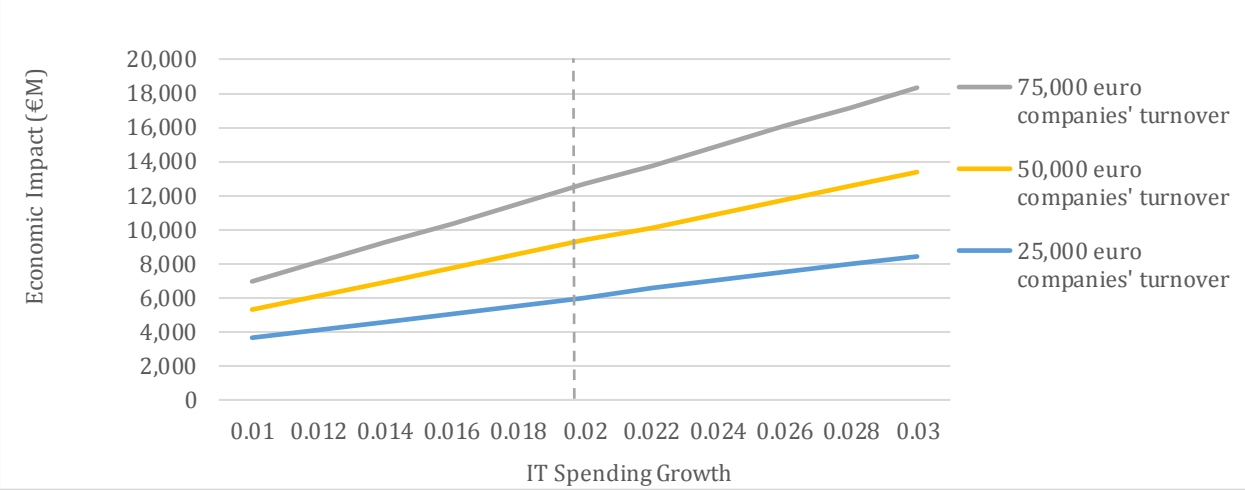
Figure 64 Economic impacts for different values of IT spending changes and an average company turnover in 2016-2020



Source: FI-IMPACT 2016

Figure 65 represents the total impact for 2020, consider three different end users' initial turnover. The result is trivial: the greater the size of the company in terms of turnover, the higher the impact as the IT spending increases more. This means that bigger companies could better exploit the potential of FIWARE solutions. The impact in 2020 with the maximum increase in IT spending for different companies' turnover size, will vary from 8.4 €B to 18.3 €B.

Figure 65 Economic impacts for different values of IT spending changes and different company turnover in 2020



Source: FI-IMPACT 2016

In terms of percentage changes:

- in 2016 for a 50% increase in IT spending growth (from 1% to 2%), the economic impacts increase around 41%, when considering an average company's turnover of 50,000€.

- in 2020 for a 50% increase in IT spending growth, the economic impacts increase around 43%, when considering an average company's turnover of 50,000€.

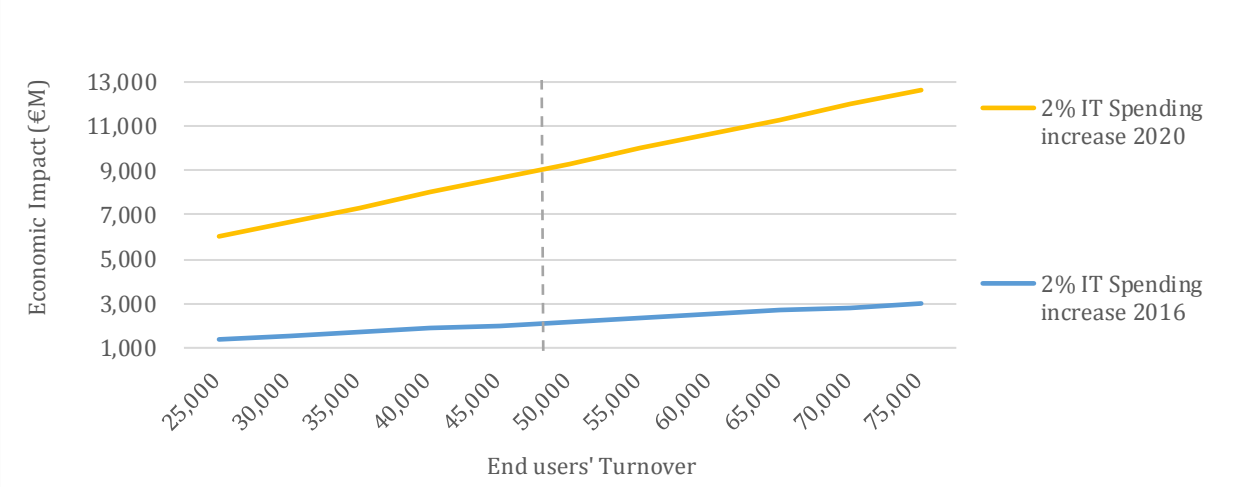
6.8.2. Change in End Users' Turnover

Next we examined the results for a change in the end users' turnover, keeping IT spending growth and turnover elasticity fixed.

In this case we show the results for a company's IT spending growth on the average (2%) for 2016 and 2020 (Figure 66) and then the results for 2016 and 2020 for three different values of the increase in IT spending (Figure 67).

Figure 66 represents the total economic impacts (the sum of direct, indirect and induced impacts), for different values of company's turnover. If we consider the case in which the company's turnover is on the average (50,000€) for 2016 (grey dotted line), then we get the baseline result of around 2.2 €B (along the blue line), and for 2020 we get 9.3 €B (along the yellow line). As the company's turnover increases, the total economic impact increases. The impacts for an IT spending growth on the average (2%) for different end users' turnover and with a turnover elasticity of 0.338, will vary in 2016 from 1.4 €B to 3 €B, and in 2020 they will vary from 6 €B to 12.6 €B.

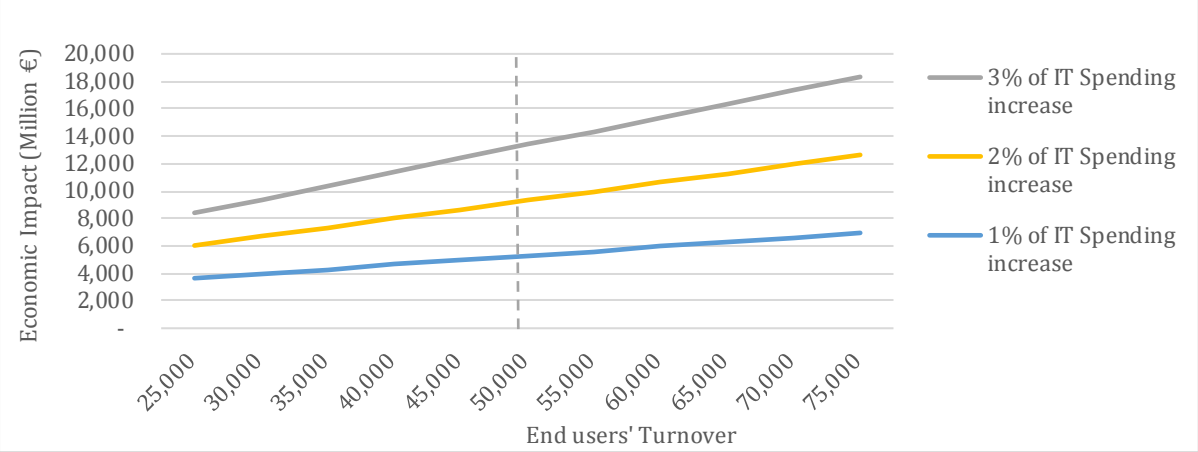
Figure 66 Economic impacts for different values of end users' turnover and an average increase of IT spending in 2016-2020



Source: FI-IMPACT 2016

Figure 67 represents the total impact for 2020, consider three different end users' IT spending increases (1%, 2%, and 3%). The result is trivial: the higher the IT spending growth, the higher the impact as the end users' turnover increases. This highlights the importance of investing in FIWARE solutions. The impact in 2020 with the maximum end users' turnover for different IT spending increases, will vary from 6.9 €B to 18.3 €B.

Figure 67 Economic impacts for different values of end users' turnover and different increases of IT spending in 2020



Source: FI-IMPACT 2016

In terms of percentage changes:

- In 2016 for a 50% increase in company's turnover, the economic impacts increase around 37%, when considering an average IT spending growth of 2%.
- In 2020 for a 50% increase in company's turnover, the economic impacts increase around 41%, when considering an average IT spending growth of 2%.

The results show that the model responds similarly to changes in IT Spending growth and to changes in Turnover elasticity. It means that the model is not sensitive to one specific variable, which could have determined a biased model. Nevertheless, more specifically, we can highlight some differences in the responses, in particular that the model seems to have higher responses for changes in the IT spending growth. This can be shown by considering the sensitivity function, which explains the sensitivity of a parameter on the output, i.e. how the model responds to a variation of the inputs. In particular, the sensitivity function shows that the model responds more to a variation in IT spending growth than to a variation of company's turnover. The resulting values that has been calculated to assess the sensitivity of the model to the inputs are as follows.

Table 69 Sensitivity values to changes in IT spending growth and end users' turnover

	IT spending increase	Company's Turnover increase
2016	**0.82**	**0.74**
2020	**0.86**	**0.71**

Source: FI-IMPACT 2016

6.9. Key findings

The results of the economic impact model provide a clear picture of the relevant economic and employment benefits potentially created by the Phase 3 Accelerators programme for the European economy in the period 2016-2020. In addition, we are able to provide a

clear footprint of the funded initiatives in the EU economy by technology cluster and by targeted industry sector.

In summary, the model results show that under the baseline scenario, the economic impacts on the EU economy are expected to increase **from 2.2 €B in the year 2016, to 9.3 €B in the year 2020**. In the same years, the number of jobs created by the FIWARE subgrantees should increase from approximately 9,000 to 32,000.

This means that the 80 €M of investments in the Phase 3 will ultimately generate **cumulative economic impacts of 29 €B as well as 100,000 new jobs** in the period 2014 to 2020. In other words, for one euro invested by the EC there will be approximately 350 euros of total economic benefits, a substantial multiplier. Or, each new job will have cost only 900 euros of investment by the EC.

The direct impacts consist of the forecast revenues and jobs created by the FIWARE subgrantees, but they represent only a fraction of the overall economic impacts, 4%.

The lion's share of impacts is represented by the additional revenues and jobs created by the business customers of the subgrantees, leveraging the FIWARE-based solutions. Estimated through a sophisticated set of multipliers differentiated by industry sector and type of technology solution, these forward indirect impacts are expected to exceed 6 €B by 2020 in the baseline scenario, with a 2016-2020 CAGR of 77%.

Induced impacts, consisting of the additional spending (second order effects) driven by the direct and indirect impacts, are expected to reach 2 €B by 2020 in the baseline scenario, corresponding to 22% of total impacts. This does not include the positive impacts on tax returns, so it is a conservative estimate of induced impacts.

Table 70 Economic Impacts and Jobs, Baseline scenario 2016

ESTIMATED 2016	ECONOMIC IMPACT (M€)	NUMBER OF JOBS CREATED
DIRECT IMPACTS	96	2,362
INDIRECT IMPACTS	1,704	5,374
INDUCED IMPACTS	392	1,351
TOTAL	2,192	9,087

Source: FI-IMPACT Economic Impact Model 2016

Table 71 Economic Impacts and Jobs, Baseline scenario 2020

ESTIMATED 2020	ECONOMIC IMPACT (M€)	NUMBER OF JOBS CREATED
DIRECT IMPACTS	394	620
INDIRECT IMPACTS	6,928	23,549
INDUCED IMPACTS	2,016	7,884
TOTAL	9,338	32,053

Source: FI-IMPACT Economic Impact Model 2016

The indirect impacts on business users estimated by our model are 20 times the size of the backward indirect impacts (the revenues generated by the sub-suppliers of the Phase 3 companies) and 17 times the size of direct impacts.

This means that for every euro of revenues generated by the FIWARE initiatives, there will be 17 euros collected by their business customers. This is a sound confirmation of the capability of the FIWARE ecosystem to improve the competitiveness and innovation of the EU industry.

The distribution of the indirect impacts by vertical market in 2020 (Figure 60) shows a strong concentration of value in manufacturing (28%), healthcare (16%), telecom and media (12%). This does not correspond exactly to the distribution of funded initiatives by target market, or to the distribution of direct impacts in 2020. For example, the direct impacts in agriculture represent 12% of total, while the indirect impacts represent only 9%. By contrast, manufacturing represents 8% of the total value of direct impacts, but 28% of indirect impacts. This is due to the different multipliers estimated leveraging IDC's data on IT spending and its impacts on revenues.

These results become more evident when looking at the cumulative results by 2020, in which induced jobs in the economy are expected to be one third of direct and indirect jobs, and the induced economic impact is predicted to be one fourth of direct and indirect revenues, suggesting a positive response of the economic environment to the spreading out of these FIWARE products and the related business creation.

Table 72 Cumulative Economic Impacts and Jobs, Baseline scenario 2020

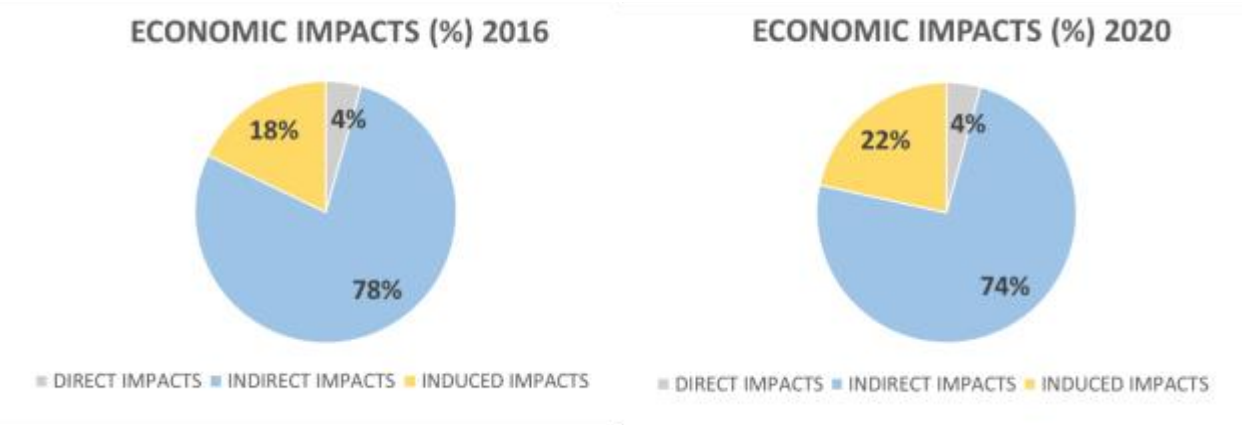
Baseline Scenario		
2020 CUMULATIVE	ECONOMIC IMPACT (M€)	NUMBER OF JOBS CREATED
DIRECT IMPACTS	1,204	9,486
INDIRECT IMPACTS	21,616	70,970
INDUCED IMPACTS	5,754	21,499
TOTAL	28,574	101,955

Source: FI-IMPACT Economic Impact Model 2016

The analysis by type of technology offering is also interesting. The purely software solutions cluster generates very high indirect impacts (58% of total by 2020), because it feeds directly into the creation of new services and therefore additional revenues by the user industries. The hardware/software solutions cluster, which includes IoT systems, is expected to create efficiency benefits mainly related to cost savings, with a proportionally lower share of indirect impacts (13% in 2020 according to the baseline scenario). Finally, web services fall somewhere between these two clusters in terms of benefits for the user companies.

The indirect impacts on employment are also remarkable. Already in 2016 the number of potential new jobs created through indirect and induced impacts is nearly 3 times the number of direct jobs (6.7 thousand indirect and induced jobs versus 2.4 direct thousand). Moreover, the number of jobs that are generated as a secondary effect (induced) are one fifth the number of direct and indirect jobs, which is an important result considering first, the small amount of funded initiatives and second, the fact that these impact are for the first business years.

Table 73 Baseline scenario: Direct, Indirect, Induced impacts, value, %

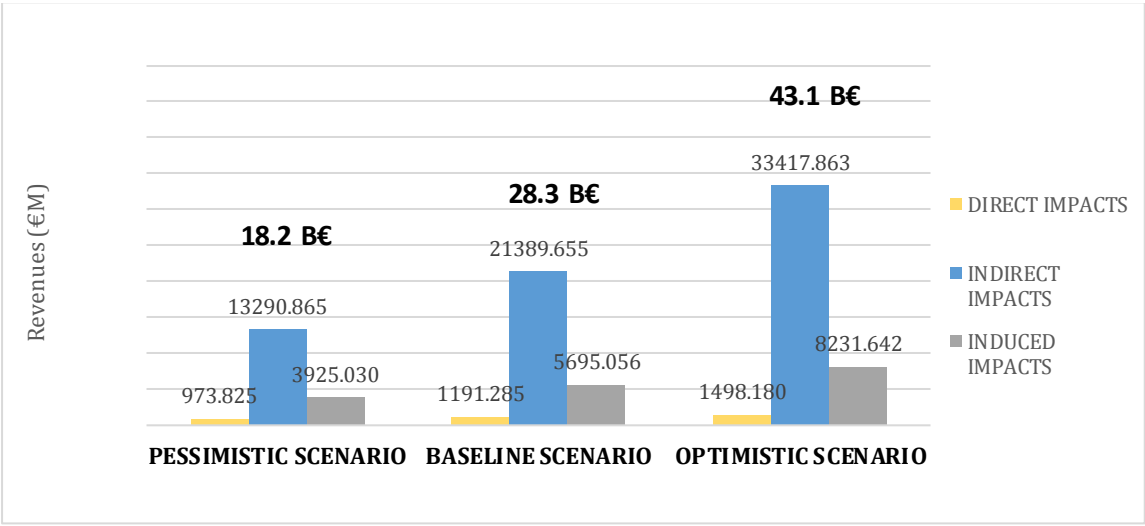


Source: FI-IMPACT Economic Impact Model 2016

Last but not least, the level of potential impacts depends also on the evolution of market and framework conditions, which we have considered under 2 alternative scenarios, an optimistic one based on more favourable economic and framework conditions compared to the baseline scenario, and a pessimistic one with lower growth and digital innovation take-up (par.6.7).

In the optimistic scenario (Figure 68), cumulative economic impacts could reach 43 €B by 2020, 150% of the baseline impacts; on the contrary, in the pessimistic scenario cumulative impacts could be 18.2 €B, corresponding to 65% of baseline impacts. This wide range of variation (much wider than the differentials between the forecast revenues scenarios) shows clearly the multiplier mechanism of indirect and induced impacts, which amplifies strongly the variation of direct impacts. The results of the economic impact model, justified in detail by the data and methods described above, confirm the relevance of the benefits for the European economy of investments in start-ups and innovative SMEs such as the ones involved in Phase 3.

Figure 68 Cumulative Revenues by scenario, 2020



Source: FI-IMPACT Economic Impact Model 2016

7. General Conclusions

This report presents the results of 2 years of constant monitoring and assessment by the FI-IMPACT team of the FI-PPP Phase 3 Accelerator programme.

Phase 3 of the FIWARE Acceleration Programme is reaching its end at the time of writing. Since its launch, in September 2014, the programme has attracted more than 8,000 start-ups and SMEs that applied their FIWARE-based business idea to the 16 Accelerators to get funding to develop their solutions. Of them, at May 2016, almost 1,000 proposals (985) have been selected for grants by the 16 Accelerators. This confirms that the original performance objectives set by the European Commission for the programme have largely been met or exceeded.

Along the course of the programme, FI-IMPACT has been mapping the subgrantees and the evolution of the FIWARE ecosystem. Our mapping analysis detailed the profile of the 985 subgrantees. A third of them have been selected and accelerated by Soul-FI, FINODEX, and Speed-Up Europe. In terms of geographical distribution, 95% of the projects that have been granted funds from accelerators were generated by an organization in the EU territory: across the EU Member States, Spain, Italy and Germany were the countries where most of the subgrantees come from. There is a strong correlation between the home country of the Accelerator and the geographical origin of the subgrantees. As it was reported by the previous analyses, the Accelerators were more successful in attracting proposals in their home countries.

Our analysis found that the Accelerator programmes were particularly attractive for potential entrepreneurs in the countries where there is limited access to seed capital for new business ideas, which is the case for Southern European countries. This means that the FI-PPP Phase 3 helped to fill a gap in innovation funding across the EU. A look outside the EU suggests that FIWARE was successful in reaching out to tech entrepreneurs from Serbia, Israel, and Switzerland. The majority of subgrantees are very small companies (67% have less than 5 team members) or start-ups (38% have no or less than 1 year of business experience, another 24% have less than 4 years' experience). The size of teams is correlated with the years of experience, with the smaller teams having less experience. This shows that Phase 3 achieved its objective to find and select new or very small innovative enterprises.

The FIWARE programmed have called for new players in the European ICT market. In fact, we found that 47% of the subgrantees are start-ups. They have less than one year of professional experience in running a company, and we can say that these companies were born with FIWARE. Another 25% of the subgrantees have between two and 5 years of professional experience. Also the team dimensions suggest that, in this programme, the majority (55%) of funded projects are start-ups, as they are at this phase of their development, micro-companies with up to 5 members.

The subgrantees are marketing very concrete tools that are pertinent in today's economy. They are addressing a wide range of vertical markets, mostly providing FIWARE enabled applications for use in production environments: 60% of them are offering solutions for the B2B market, another 20% address B2C customers and the rest is providing cross-solutions.

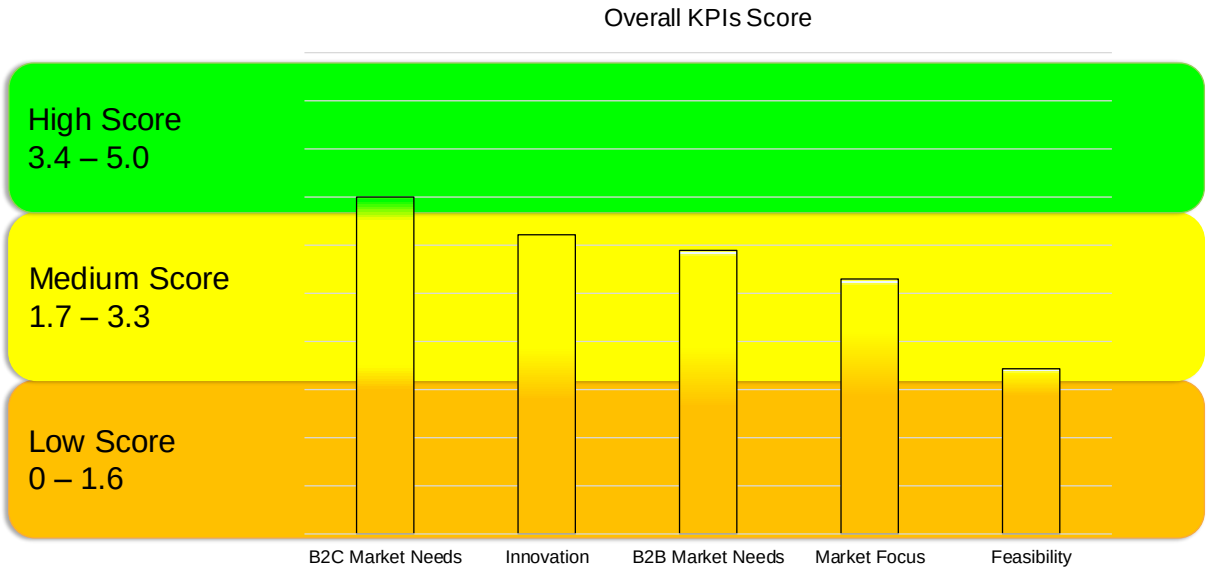
FIWARE is contributing to the digitation of the European economy, especially in industries that have been traditionally low IT-oriented. This is the case of Agriculture that, according to the FI-IMPACT analysis, was consider the most attractive market, selected by 18% of the subgrantees who are contributing to the sector innovation. Healthcare is another key market of these companies, as 16% of them are developing health-related ICT solutions. The focus of several Accelerators on these 2 markets (FICHe for health, Fractals, Smart AgriFood for the agrifood sector) is the driver of these results. Another strong focus is on Smart Cities, including all technological city-life related solutions aimed to develop an ecosystem based on elements such as sustainability, innovation, and citizen engagement. According to the FI-IMPACT analysis, 25% of the subgrantees are offering smart city-related solutions: 36% related to the transportation sector (both B2B and B2C), 32% related to the government/public sector, 9% targeting the utilities market.

Subgrantees are making use of the most advanced tech tools to provide their solutions, what IDC calls 3rd platform: we found that 396 subgrantees (40%) focus on Mobility, 326 (33%) on Big Data, 321 (33%) on Cloud and 139 on Social Media (14%). Initiatives focusing on IoT are 261 (27%). On the basis of the type of solution they are offering, FI-IMPACT classifies the subgrantees in 2 main groups: technology providers (68%), and web-service provider that leverage technology to offer services (32%). The tech providers offer both purely software solutions, like the app, (68% of them), and solutions embedding both hardware and software components (32%, mostly offering IoT solutions with sensors). The analysis on the use of the FIWARE Generic Enablers highlights that the most often employed belong to the Security (75%), Cloud Hosting (65%) and Advanced Web-based User Interface (61%).

In the second year of the project, FI-IMPACT performed a second round of the KPI assessment of the FIWARE subgrantees. 648 subgrantees responded to our survey by May 2016. The latest results are similar to the previous assessment: the subgrantees perform moderately well on average for the Innovation Focus, Market Focus and Market Needs KPIs (both B2C and B2B), while the level of performance for the Feasibility KPI is still lower and could indicate a potential weak point in their path towards commercial success. Since the first round of assessment the Accelerators have launched several calls for proposals attracting mainly young entrepreneurs and start-ups, as the data presented above confirms, so again our analysis generally reflects the early phase of development of their plans and business ideas.

The figure below presents a comparative view of the average scores of the Key Performance Indicators. This view of all the KPI scores shows a better performance of the subgrantees for the aspects concerned with the development of their business idea and their vision of the market (innovation and business needs indicator) rather than the practical go-to-market activities (feasibility).

Figure 69 KPI Assessment: Overview of average scores by KPI



N= 648 respondents to the FI-IMPACT Assessment Tool, May 2016

Source: FI-IMPACT 2016

Looking at the score of each KPI:

- The Consumer Market Needs KPI assesses to what extent the benefits provided by the subgrantee's solution are close to the potential needs of their customers in the consumer market segment targeted. The indicator is measured on 254 subgrantees, targeting the consumer market B2C), and scores on average 3.5, which is in the higher step of our scale. Among the consumer markets we are assessing, we found the highest coherence between expected benefits and real consumer needs in the Consumer Leisure and Gaming (targeted by 44 subgrantees); also the subgrantees int he Consumer Health and Wellness (49) market match quite well the real customer needs.
- Innovation Focus: measures the level of innovation and positioning in the go-to-market process of the suggested solution. The indicator is measured on the overall group of subgrantees that responded to our survey. The average score is 3.1, corresponding to a medium-high level of performance. This indicates that most funded initiatives show a good level of originality and innovation in their offerings.
- The Market Focus KPI measures the level of knowledge of target customers and of development of an appropriate market strategy. As in the previous assessment, the average score is 2.7, corresponding to a medium level of performance. About a third of the funded initiatives already have a potentially strong market strategy, but another third needs to improve their market plans to have a better chance of success.
- The Business Market Needs KPI measures the coherence of the benefits the subgrantees are expecting to deliver to their customers in B2B markets, therefore their satisfaction, and real market needs. The average score is 2.9 corresponding to a medium-high level of performance. Subgrantees targeting the Healthcare sector, and Transport show a good alignment with market needs.

- The Feasibility KPI measures the performance in the development of the business and financial plan of the funded initiatives. The result of this assessment is the same as the first carried out by FI-IMPACT in summer 2015: the average score is 1.7, corresponding to a medium-low level of sustainability and feasibility. This confirms that the majority of the subgrantees is represented by companies in their very early phase of development that are still working to strengthen their go-to-market strategies.

Based on these data and 2 sophisticated impact models, on forecast revenues and macroeconomic impacts, we can conclude that the Phase 3 is on track to achieve all of its objectives.

To justify this statement, it is useful to remind the original objectives of the Phase 3, as summarized by the Second Interim Evaluation Report of the FI-PPP in March 2015:

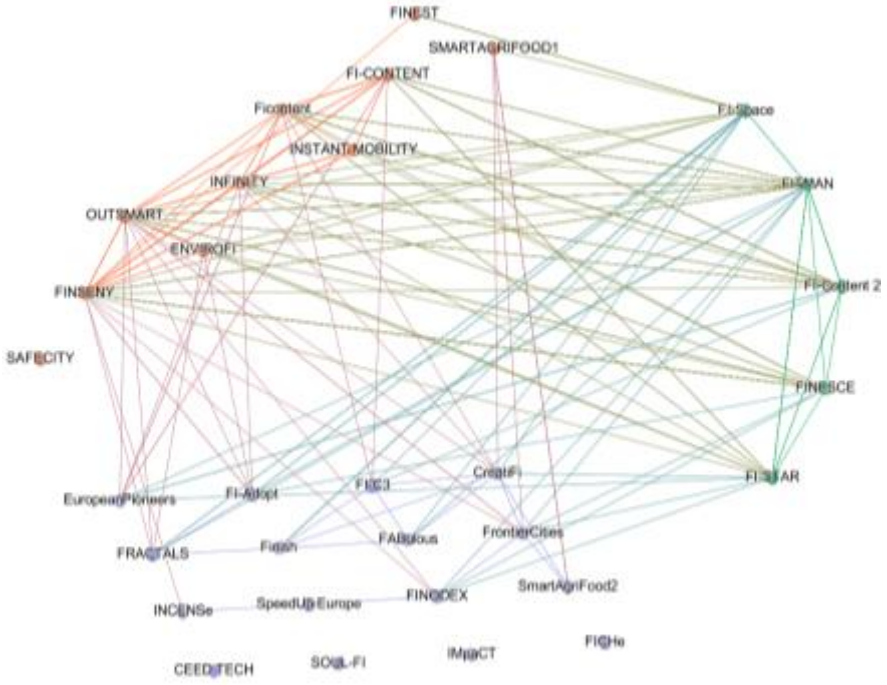
- To bring the FI-PPP results, i.e. FIWARE technology, closer to the market by consolidating the open, market-ready platform resulting from earlier phases as a standard.
- To accelerate and help the SMEs, startups and web entrepreneurs being supported under Phase 3.
- To create a European innovation ecosystem around the FIWARE technology.
- To facilitate SMEs, startups and entrepreneurs in delivering innovative applications and services to make public service infrastructures and business processes significantly smarter.

The evaluation report anticipated that the potential economic impacts of this programme could be relevant.

The first objective was to extend the FIWARE ecosystem beyond the "usual" community of participants to FP projects. This has been fully achieved: by May 2016 the A16 had attracted more than 7,700 submissions from potential entrepreneurs and innovative SMEs from Europe and several non-EU countries, selecting 985 for funding and accompanying them to market. In fact, as documented in this report, the majority of the subgrantees were already on the market by end 2015 and the rest will follow them by end 2016- early 2017.

The network analysis of the FI-PPP projects partners (Figure below) shows a strong continuity between the partnerships of Phase 1, 2 and 3 projects for 12 out of 16 accelerators: 4 of them instead are completely new to the FIWARE community and are characterized by a strong presence of professional accelerators. As discussed in the Accelerator benchmarking report, this combination of FIWARE technology development actors and professional accelerators in the consortia has been a positive element, generating mutual learning processes and injecting in the FP projects the capability to support and stimulate start-ups in the very early phase of development. A key success factor which is unusual in European programmes has been the capability to help the funded initiatives to meet potential investors, venture capitalists and even network with potential customers. This is documented by the number of FIWARE subgrantees who have received additional funding (see Accelerator benchmarking report) and by their gaining traction on the market (as documented by the Mattermark Growth indicator).

Figure 70 Network analysis of the partnerships of FI-PPP Phase 1, 2, 3 projects



Source: FI-IMPACT 2016

The 985 funded initiatives profiled by FI-IMPACT are a varied group, which we have segmented in 3 main technology clusters by type of offering (pure software solutions, hardware/software solutions, web services), addressing innovative and emerging markets. Our mapping results document that the subgrantees are developing new tools, solutions and services, leveraging the FIWARE platform, and extending its reach across the economy. This objective, too, has been achieved.

Even though we expect that over 60% of these funded initiatives will disappear over the next few years, according to our market model forecast there are good chances that a group of approximately 300 dynamic start-up and innovative SMEs will prosper, reaching overall revenues of 394 €M by the year 2020. The average revenues per employee will be about €79,000, enough for sustainability if not yet full profitability.

The average revenues per company are expected to be around 1.2 €M by 2020. This compares to approximately €900,000 average revenues in 2015 sourced from Eurostat for the sector j – information and communication. The higher level of average revenues estimated for Phase 3 SMEs compared to the whole sector information and communication points to a dynamic population of enterprises in a rapid growth path.

How realistic are these estimates? To test their reliability, we have carried out a sensitivity analysis (which has confirmed the overall solidity of the model). In addition, we have developed 2 alternative scenarios (an optimistic and a pessimistic one) to estimate the range of variation of potential revenues under different economic and framework conditions. The resulting variations appear relatively limited, with potential revenues ranging between 474 €M by 2020 in the optimistic scenario (15% higher than

the baseline scenario) and only 319 €M by 2020 (14% lower than the baseline scenario). This too provides a sound basis to our impacts estimates.

The results of the economic impact model, justified in detail by the data and methods described in the report, confirm in turn the potential relevance of the benefits for the European economy. The potential cumulative economic impacts are substantial, reaching 27€B in the period 2016 to 2020, in the baseline scenario. In other words, for one euro invested by the EC there will be 350 euros of economic benefits, a substantial multiplier.

The lion's share of impacts is represented by the additional revenues and jobs created by the business customers of the subgrantees, leveraging the FIWARE-based solutions. These forward indirect impacts are expected to exceed 6 €B by 2020 in the baseline scenario, with a 2014-2020 CAGR of 77%. **This means that for every euro of revenues generated by the FIWARE initiatives, there will be 17 euros collected by their business customers.** This is a sound confirmation of the capability of the FIWARE ecosystem to improve the competitiveness and innovation of the EU industry.

In terms of social impacts, a high share of FIWARE subgrantees aim at improving social welfare, with activities ranging from education to healthcare, to creative peer-to-peer services. **But perhaps the most relevant social impact will be the potential** creation of new jobs, estimated at up to more than 100,000 new jobs within the observed period.

The economic model shows how, because of the multiplier mechanism of indirect and induced impacts, the differentiation between the alternative scenarios is much greater than in the market model. In the optimistic scenario (Figure 67), cumulative economic impacts could reach 43 €B by 2020, 150% of the baseline impacts; on the contrary, in the pessimistic scenario cumulative impacts could be 18.2 €B, corresponding to 65% of baseline impacts. Even in the pessimistic scenario there would be substantial economic impacts on the European economy.

Finally, to complete the analysis we have investigated the potential impacts of a counterfactual scenario, where the Phase 3 investments do not occur. According to this scenario, there would be a smaller and less dynamic group of start-ups, generating 110 €M of revenues in 2020, corresponding to less than a third of the baseline scenario revenues.

8. Annex

8.1. Glossary

Subgrantee or funded initiative = project funded by the FIWARE Acceleration Programme through the 16 Accelerators.

Cross-sector solution = product or service developed by a subgrantee that has a horizontal scope rather than industry-specific, so it may address a wide range of sector.

Smart City = in IDC understanding Smart City is not a vertical market. We use this term to refer to a wide concept that encompasses all technological city-life related solutions. A Smart City solution is aimed to develop an ecosystem based on elements such as sustainability, innovation, and citizen engagement.

Tech provider = we define a subgrantee as technology provider when the solution developed is a software product (app), or it embeds both hardware and software components (sensors, RFID).

Web-service provider = we define a subgrantee as a web-service provider when the core business is not about offering a technological product but an online service to both business and consumer customers.

Software Taxonomy (IDC):

- **Collaborative Applications** enable groups of people to work together by sharing information and processes.
- **Consumer Application** are software products for recreation, education, and/or personal productivity enhancement.
- **Content Applications** include content management software; authoring and publishing software; content analytics, discovery, and cognitive software; and enterprise portals
- **CRM Applications** automate the customer-facing business processes within an organization irrespective of industry specificity (i.e., sales, marketing, customer service, and contact center).
- **Data Access, Analysis, and Delivery Software** are end user–oriented tools for ad hoc data access, analysis, and reporting as well as production reporting. Products in this category are most commonly used by information consumers or power users rather than by professional programmers. Examples include query, reporting, multidimensional analysis, and data mining and statistics tools.
- **Engineering Applications** automate all of the business processes and data management activities specific to ideas management, concept planning, and design and the handoff of a design to execution (manufacturing, construction, or other).
- **ERM Applications** are designed to automate and optimize business processes related to resources required to meet business or organizational objectives but are not customer or prospect facing or specialized to various types of engineering.
- **Operations and Manufacturing Applications** are enterprise applications that automate and optimize processes related to the planning and execution of services operations and manufacturing activities, as well as other back-office activities.

- **SCM Applications** software automates supply- and demand-side business processes that bring a product or a service to market, including multisite organizations involved in a complex supply chain process, including raw materials suppliers, contract manufacturers, 3PL and 4PL providers, and individual transportation and warehousing organizations.

8.2. Main sources

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8.3. Scenario Methodology

8.3.1. Approach

IDC's approach is based on a consolidated scenario methodology which corresponds to standard practice in market forecasting and builds on the company worldwide continuous monitoring of main trends and their interactions. As the company is specialized in ICT, our scenario methodology is specifically focused on ICT trends and the forecasting of emerging ICT markets. This methodology has been applied and validated in

multiple studies for policy clients and specifically the European Commission in the last 10 years. IDC's main specialty is in the development of medium-term scenarios (3 to 5 years).

The process is based on the following main steps:

1. Analysis of the main trends and framework conditions affecting the development of the targeted market, based on desk research and IDC analysts' expertise, as well as data collection on the specific topic;
2. Identification and selection of the main critical factors affecting the evolution of the targeted market segment characterized by:
   2.1. High level of impact on the targeted market
   2.2. High level of uncertainty and potential role of driving alternative market trajectories
3. Development of key assumptions on the main trends to 2020, using the IDC's Assumption Builder tool and leveraging IDC's worldwide Market Forecast Assumptions, quarterly updated;
4. Development of a baseline scenario and of alternative growth scenarios storylines, based on the different combination of key assumptions about the main trends and the evolution of main framework conditions;
5. Calculation of indicators measuring the key trends by scenario, where this is foreseen (for example GDP forecast estimates).
6. Description of each scenario's qualitative and quantitative impacts feeding into
7. Forecast calculations projecting the indicators under the alternative scenarios;
8. Communication of the scenarios results and feedback collection from the EC, the peer reviewers, the stakeholder community;
9. Revision and finalization of forecasts and scenarios.

In this case we have developed key assumptions for 3 main scenarios for the period 2014-2020, which feed into the 2 main models developed by the study team, the market model forecasting revenues and the economic impact model estimating the direct, indirect and induced impacts.

To develop the specific scenario assumptions for this study we have been able to leverage IDC's forecasting scenario model based on the interaction between four main groups of key factors shaping the ICT market evolution.

As illustrated in the Figure 57 below and Table 55 they are:

- Macroeconomic factors;
- Policy/regulatory conditions, with a specific focus on EC policies on the Digital Single Market and other ICT policies by national governments;
- Global megatrends of digital innovation
- Fiware/ICT market dynamics

Each cluster aggregates a set of interrelated key factors; their combination differentiates the three scenarios. The scenarios are characterized by the interaction and co-dependency of these factors; no scenario can be explained only by one factor or one group of factors, not even GDP growth.

This conceptual framework:

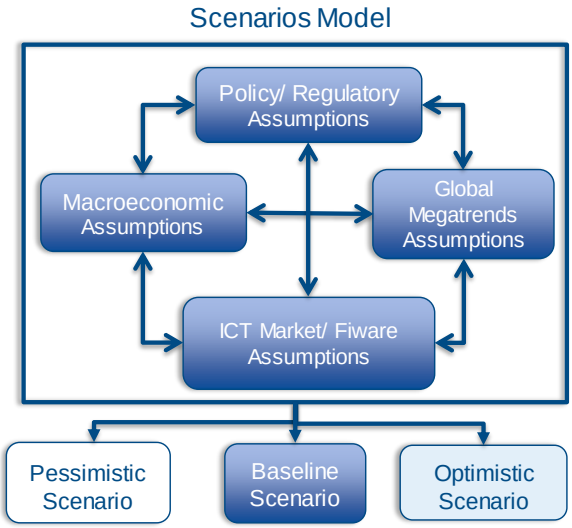
- is focused on factors with a high level of impact on the development of ICT markets

- is used to identify the level of uncertainty of main trends over the next 5 years, so that:
  - trends with low uncertainty are similar for all scenarios;
  - trends with high uncertainty determine the differences between scenarios.

As part of its forecast methodology[35], IDC updates quarterly a set of worldwide Market Forecast Assumptions which are developed jointly by the company analysts through an internal tool called the IDC Assumption builder. Assumptions are edited and assembled by IDC Global Research Organization which feeds them back to the analyst teams.

The scenario assumptions presented in this report build on the 2016 Q1 Market Forecast Assumptions.

Figure 71 Conceptual Model of the Scenarios



Source: IDC 2016

35 http://www.idc.com/about/methodology.jsp

Table 74 Description of the key factors driving the scenarios

Key Factors	Rationale	Inputs to the forecast models
Macroeconomic factors	Strong influence of the macroeconomic context on the ICT market growth	Alternative forecasts of: EU GDP growth 2014-2015-2020 ICT spending growth 2014-2015-2020 Alternative economic growth conditions
Policy/Regulatory conditions	Strong influence of the policy/regulatory framework on the model of development of the ICT market	Alternative policy and regulatory conditions by scenario
ICT Market/ FIWARE dynamics factors	Strong influence of alternative supply-demand dynamics on the market development paths	Alternative supply and take-up models by scenario
Global megatrends	Strong influence of global digital innovation trends on the EU ICT market growth	Alternative assumptions on the development of IoT, Cloud Computing, Mobile technologies based on IDC's 2020 forecasts

Source: IDC 2016

8.3.2. Macroeconomic assumptions

The macroeconomic context will have a strong direct impact on the pace of development of the Fiware/ICT market, influencing the availability of risk capital, the amount of investments, and the willingness to spend on new products and services. Another important factor is the pace of growth of ICT investments, which is correlated to GDP; this factor is, to some extent, counter-cyclical, as ICT is used by enterprises to improve their efficiency and cut costs, even during a recession. As a result, the amount of ICT spending tends to diminish at a slower pace during a crisis than other types of investments, and is likely to bounce back faster when the recovery occurs. The diffusion of innovative data technologies is positively correlated with overall ICT investments, which include complementary technologies both traditional (servers, network infrastructures) and innovative (cloud computing, mobile and social technologies).

IDC has developed alternative estimates of GDP growth and ICT investments under the three main scenarios, for the EU and each of the EU28 Member States. The following Tables present the forecast value and growth rates of EU GDP and ICT spending.

They were developed for the three scenarios as follows[36]:

- The EU GDP value was estimated on the basis of EIU and EC forecasts (sourced in February 2016).

36 The macroeconomic forecasts were developed by IDC for the European Data Market Monitoring Tool on behalf of DG CONNECT

- The Baseline scenario value of ICT spending was sourced from IDC's Black Book, 4th Q 2015; the pessimistic and optimistic scenarios' values were estimated leveraging IDC's database historical series of ICT to GDP correlations.

The main considerations correlating these ICT and GDP forecasts in the three scenarios are the following:

- The growth rate of total ICT spending is faster in the Optimistic scenario than in the Baseline scenario, because digital innovation plays a stronger role in driving economic growth.
- In the Pessimistic scenario, the growth rate of ICT spending is much lower than in the Baseline scenario, but so is the GDP growth rate, therefore the share of ICT on GDP is not radically different.

Table 75 Macroeconomic Variables used for the Forecast Scenarios – Absolute Values

Macroeconomic variables	2013 (2014 €-$ exchange rate)	2014 (2014 €-$ exchange rate)	2015 (2014€-$ exchange rate)	2020 Pessimistic scenario	2020 Baseline scenario	2020 Optimistic scenario
EU ICT spending (€M)	582,285	585,358	721,345	622,628	789,503	928,494
EU GDP (€M)	13,518,092	13,957,764	14,582,724	15,325,208	20,256,873	20,915,701
ICT/GDP %	4.31%	4.19%	4.95%	4.06%	3.90%	4.44%

Legend: GDP growth, €M, at constant exchange rates (2014) and current prices (includes growth of production and prices)

Source: IDC 2016

8.3.3. Global Megatrends: Background and Relevance

Digital innovation is driven by global trends affecting the world as a whole. The combination of Big Data, Cloud Computing, Mobile technologies and Social media is the most powerful driver of change of the economy and the best opportunity for Europe to move back to a growth path. According to IDC, these four technologies together already account for about 29% of worldwide IT spending, but almost 90% of the spending growth. In addition, innovation will be accelerated in the next years by new developments such as Cognitive Systems, Robotics, 3D Printing and most definitely by the IoT, the Internet of Things, whose networks of sensors will generate huge amounts of data and create "smart environments". The interconnection of these technologies is spreading to all industry sectors, pervading and reshaping business processes and leading to the digital transformation of all enterprises, without exception.

Within this cluster of technologies, Big Data plays a special role as the enabler of most of the innovative services and applications being currently developed. Particularly the combination Big Data, IoT and Cloud Computing is highly effective for digital transformation in the business environment. The diffusion of IoT solutions will generate huge amounts of data for real-time processing and predictive analytics, while cloud computing is the delivery channel enabling the transmission of data and the use of remote

data-based services to all enterprises, with pay-as-you-go models. The diffusion of mobile and social technologies in turn generates huge amounts of consumer and business data. IDC tracks digital innovation developments worldwide and in Europe. IDC's research is the source of the key factors presented in the table below which have been used to differentiate the scenarios. In addition, we have recently developed alternative IoT and Cloud Computing market development scenarios to 2020, which feed into these scenario assumptions.

Table 76 Global Megatrends key factors driving scenarios assumptions

Key Factors	Rationale and Sources	Level of uncertainty
Diffusion of the Internet of Things (IoT)	The IoT is an emerging market with a very strong positive correlation and complementarity with Big Data and the Future Internet. IDC's IoT 2020 scenarios identify alternative development paths to 2020. Source: https://ec.europa.eu/digital-single-market/en/news/definition-research-and-innovation-policy-leveraging-cloud-computing-and-iot-combination	High
Diffusion of Cloud Computing	Cloud Computing is an emerging market with a very strong positive correlation and complementarity with the future internet markets. IDC's Cloud 2020 scenarios identify alternative development paths influencing the scenario. Source: https://ec.europa.eu/digital-single-market/en/news/final-report-study-smart-20130043-uptake-cloud-europe	High
Development of the European Data Market	Scenarios of the development of the EU data market to 2020, in the context of the study on the European Data Market Monitoring tool for DG CONNECT, study ongoing Source: www.datalandscape.eu	
Digital transformation in Europe	Digital transformation requires enterprises to employ digital technologies coupled with organizational, operational, and business model innovation to create new ways of operating and growing businesses. Because of digitization, enterprises in all sectors are moving towards digital business models; Big Data and Analytics are one of the key enabling factors of this transformation. Source: IDC's Digital Transformation Benchmark survey, 2016 (not yet published); IDC MaturityScape Benchmark: Digital Transformation in Europe, August 2015, http://www.idc.com/ getdoc.jsp? containerId= DTS03X	High

Source: IDC 2016

8.4. Methodological Annex of the Economic Impact Model

8.4.1. The Input / Output tables

The Input-Output (I/O) methodology was founded by Wassily Leontief in 1966, and quantifies "the mutual interrelationships among the various sectors of a complex economic system". This method is based on national input-output tables that describe the flow of goods and services between all sectors of an economy over a period of time. These tables provide information on all inputs used in production: labor, capital, land, and intermediates, which are the intermediate inputs in production. The structure of each

sector's production process is represented by a defined vector of structural coefficients that describes in quantitative terms the relationship between the inputs it absorbs and the output it produces. The objective is to calculate the output levels for the individual sectors (endogenous variables) for the given final demand (exogenous variables). This approach is based on national input-output tables that describe the flow of goods and services between all sectors of an economy over a period of time. They also provide information on all inputs which are used in production: labor, capital, land, and intermediates, which are the intermediate inputs in production.

The following table is an example on how an I/O table appears. This is a basic model for an economy with 3 sectors:

Table 2 Example of Input/Output Table

		Agriculture	Industry	Services	Final Demand	**Output**
		1	2	3	4	
	Domestic Production of goods and services	**Quadrant I: inter-industrial linkages**			**Quadrant II: Final use of goods and services**	
1	Agriculture	x_{11}	x_{12}	x_{13}	x_{1d}	**x_1**
2	Industry	x_{21}	x_{22}	x_{23}	x_{2d}	**x_2**
3	Services	x_{31}	x_{32}	x_{33}	x_{3d}	**x_3**
	Imports of goods and services					
4	Agriculture, Industry, Services	x_{41}	x_{42}	x_{43}		
	Components of Value Added	**Quadrant III: requirements for primary inputs**			**Quadrant IV**	
5	Wages and Salaries	x_{51}	x_{52}	x_{53}		
6	Consumption of Fixed Capital	x_{61}	x_{62}	x_{63}		
7	Operating surplus	x_{71}	x_{72}	x_{73}		
8	**Input**	**x_1**	**x_2**	**x_3**		

Source: FI-IMPACT 2016 and Eurostat 2008

The basic input-output table is composed as follows: the columns of the matrix represent all the economic activities of the economy (agriculture, industry, services) and categories

of final demand (consumption, investment), while the corresponding inputs of these activities are reported in the rows of the matrix: products (agriculture, industry, services) and primary inputs (wages and salaries, operating surplus). Then, the columns of an input/output table represent the cost structure of a sector and the rows represent the composition of its revenues.

The table is composed by 4 quadrants: Quadrant I includes the requirements for intermediate inputs in production, and the it describes the goods and services that are provided by firms to other firms. Quadrant II reports the final use of goods and services for consumption and investment (final demand). Quadrant III contains the requirements of each sector for primary inputs (labor, capital, land). In quadrant IV normally no transactions are denoted, as very few market transactions are reported in the sphere.

For the purpose of our analysis, which is the estimation of backward linkages (the interconnection of a particular sector to other sectors from which it purchases inputs), we only consider the domestic section of Quadrant I (domestic inter-industrial linkages). It indeed focuses on inter-industry linkages, that is the interactions between industry sectors for inter – industrial inputs, used in the production of final goods. Rows of this quadrant represent then the contribution of each sector in the production of final output, while columns represent the inputs used by each sector in the production of final output.

The balance between total input and outputs can be described by the following set of equations:

(1) $x_{11} + x_{12} + x_{13} + x_{1d} = x_1$ these are the Definition equations

(2) $x_{21} + x_{22} + x_{23} + x_{2d} = x_2$

(3) $x_{31} + x_{32} + x_{33} + x_{3d} = x_3$

x_{ij} = intermediates from sector i to sector j

x_{id} = final demand for commodity i

x_j = output of sector j

We assume that all sectors produce with linear Leontief production functions. All inputs intermediates, capital, labor, land) are used in fixed proportions in relation to output. It is assumed that a substitution of inputs is impossible. Therefore, changing factor prices have no influence on the technical input coefficients.

8.4.2. The input coefficients

For quadrant I (domestic intermediates) the input coefficients of a sector are defined as

(4) $a_{11} = x_{11} / x_1$

(5) $a_{21} = x_{21} / x_1$

where a_{11} = input coefficient for domestic intermediates. Then Quadrant I can be rewritten as:

Table 77 Inter-industrial linkages quadrant

		Agriculture	Industry	Services
		1	2	3
		Quadrant I: inter-industrial linkages		
1	Agriculture	$a_{11}* x_1$	$a_{12}* x_1$	$a_{13}* x_1$
2	Industry	$a_{21}* x_2$	$a_{22}* x_2$	$a_{23}* x_2$
3	Services	$a_{31}* x_3$	$a_{32}* x_3$	$a_{33}* x_3$

Source: FI-IMPACT 2016 and Eurostat 2008

The matrix of input coefficients ("Matrix A" from now on), can take the following form:

Table 78 Example of Input Coefficients, Matrix A

		Agriculture	Industry	Services
		1	2	3
1	Agriculture	a_{11}	a_{12}	a_{13}
2	Industry	a_{21}	a_{22}	a_{23}
3	Services	a_{31}	a_{32}	a_{33}

Source: FI-IMPACT 2016 and Eurostat 2008

The direct requirements for intermediates can be defined as the set of input coefficients weighted with the corresponding output level

(6) $x_{11} = a_{11} x_1$ Direct requirements for intermediates

If we accept the assumption that the sectors produce with fixed technical input coefficients, the equation system (1)-(3) can be rewritten by replacing x_{11} by $a_{11} x_1$. These equations serve to make explicit the dependence of inter-industry flows on the total output of each sector:

(7) $a_{11}x_1 + a_{12}x_2 + a_{13}x_3 + x_{1d} = x_1$ Input-Output System

(8) $a_{21}x_1 + a_{22}x_2 + a_{23}x_3 + x_{2d} = x_2$

(9) $a_{31}x_1 + a_{32}x_2 + a_{33}x_3 + x_{3d} = x_3$

In matrix terms the Input-Output System can be rewritten as

(10) $Ax + y = x$

Where vector Ax reflects the direct requirements for intermediates, while vector $y^{-1}= [x_{1d}\ x_{2d}\ x_{3d}]$ represents the exogenous aggregate final demand.

8.4.3. The output multipliers

Once the input coefficients for the direct requirements for intermediates are found, we then need to calculate the output multipliers, which represent the cumulative revenues of the economy which are induced by one additional unit of final demand of a certain commodity.

First, the set of equations of the I/O system is transformed into a Leontief matrix, which takes the form of

(11) (I – A) Leontief Matrix

where I is a diagonal identity (or unit) matrix, final demand is isolated on the right side, and on the diagonal of the Leontief Matrix the net output (output less intra-sectoral consumption) is given for each sector with positive coefficients (revenues), while the rest of the matrix covers the input requirements with negative coefficients (costs).

If the vector of final demand and the technical coefficients are known, the Leontief equation system is simply a set of linear equations with unknown output levels. The objective is to derive the activity levels of industries for the given level of demand.

Table 79 Example of Leontief Matrix (I-A)

	Agriculture	Industry	Services		Final Demand (y)
Agriculture	$(1- a_{11})x_1$	$-a_{12}x_2$	$-a_{13}x_3$	=	x_{1d}
Industry	$-a_{21}x_1$	$+(1-a_{22})x_2$	$-a_{23}x_3$	=	x_{2d}
Services	$-a_{31}x_1$	$-a_{32}x_2$	$+(1-a_{33})x_3$	=	x_{3d}

Source: FI-IMPACT 2016 and Eurostat 2008

Which in matrix terms is:

(12) $x – Ax = y$

(13) $(I – A) = y$

Second, to have both the direct and indirect requirements for intermediates we need to calculate the inverse of the Leontief Matrix:

(14) $(I – A)^{-1}$ Leontief Inverse Matrix

The inverse can be approximated by the power series of A matrices:

(21) $(I – A)^{-1} = I + A + A^2 + A^3 + ... + A^n$ Power series approximation of the inverse.

Then, the solution of the linear equation system is:

$$(22)\ x = (I - A)^{-1} y$$

In this notation of the inverse, the unit matrix I denotes, on the diagonal, one unit of the commodity for final demand. Matrix A represents the direct input requirements of the producer for intermediates and matrices A^2 until A^n the indirect requirements for intermediates at the previous stages of production.

Table 80 Numerical Example of the Inverse of Leontief Matrix $(I-A)^{-1}$

	Agriculture	Industry	Services
Agriculture	1.0339	0.0350	0.0030
Industry	0.2896	1.4292	0.0596
Services	0.1842	0.2071	1.4126
Total	**1.5077**	**1.6713**	**1.5052**

Source: FI-IMPACT 2016 and Eurostat 2008

The column sum of the inverse can be interpreted as output multiplier which reflects the cumulative revenues of the economy which are induced by one additional unit of final demand of a certain commodity. In this numerical example (not referring to any real data) we have an output multiplier for Agriculture of 1.5077. This multiplier shows that if final demand for agricultural products increases by 1.0 m EUR, cumulative revenues of 1.5077 m EUR would be induced in the economy. In this example, Industry sector has the highest output multiplier.

Table X Inverse of Leontief Matrix $(I-A)^{-1}$ and output multipliers for Europe 27 countries

TOTAL	**OUTPUT MULTIPLIERS**	**CPA_C26**	**CPA_J58**	**CPA_J62_J63**
T_ROWS2		**Computer, electronic and optical products**	**Publishing services**	**Computer programming, consultancy and related services; Information services**
CPA_A01	Products of agriculture, hunting and related services	0.0027	0.0022	0.0026
CPA_A02	Products of forestry, logging and related services	0.0010	0.0022	0.0006
CPA_A03	Fish and other fishing products; aquaculture products; support services to fishing	0.0001	0.0001	0.0001
CPA_B	Mining and quarrying	0.0064	0.0043	0.0039

CPA_C10-C12	Food, beverages and tobacco products	0.0055	0.0052	0.0057
CPA_C13-C15	Textiles, wearing apparel, leather and related products	0.0030	0.0019	0.0014
CPA_C16	Wood and of products of wood and cork, except furniture; articles of straw and plaiting materials	0.0048	0.0034	0.0020
CPA_C17	Paper and paper products	0.0102	0.0631	0.0079
CPA_C18	Printing and recording services	0.0054	0.0937	0.0101
CPA_C19	Coke and refined petroleum products	0.0104	0.0091	0.0084
CPA_C20	Chemicals and chemical products	0.0293	0.0199	0.0097
CPA_C21	Basic pharmaceutical products and pharmaceutical preparations	0.0008	0.0005	0.0006
CPA_C22	Rubber and plastic products	0.0259	0.0079	0.0058
CPA_C23	Other non-metallic mineral products	0.0101	0.0028	0.0032
CPA_C24	Basic metals	0.0418	0.0066	0.0074
CPA_C25	Fabricated metal products, except machinery and equipment	0.0418	0.0085	0.0089
CPA_C26	Computer, electronic and optical products	1.1017	0.0047	0.0110
CPA_C27	Electrical equipment	0.0351	0.0044	0.0065
CPA_C28	Machinery and equipment n.e.c.	0.0222	0.0064	0.0053
CPA_C29	Motor vehicles, trailers and semi-trailers	0.0115	0.0030	0.0041
CPA_C30	Other transport equipment	0.0038	0.0014	0.0015
CPA_C31_C32	Furniture and other manufactured goods	0.0073	0.0022	0.0018
CPA_C33	Repair and installation services of machinery and equipment	0.0186	0.0089	0.0060

CPA_D35	Electricity, gas, steam and air conditioning	0.0294	0.0254	0.0182
CPA_E36	Natural water; water treatment and supply services	0.0012	0.0011	0.0009
CPA_E37-E39	Sewerage services; sewage sludge; waste collection, treatment and disposal services; materials recovery services; remediation services and other waste management services	0.0077	0.0066	0.0051
CPA_F	Constructions and construction works	0.0168	0.0182	0.0179
CPA_G45	Wholesale and retail trade and repair services of motor vehicles and motorcycles	0.0112	0.0077	0.0072
CPA_G46	Wholesale trade services, except of motor vehicles and motorcycles	0.0944	0.0501	0.0426
CPA_G47	Retail trade services, except of motor vehicles and motorcycles	0.0185	0.0116	0.0058
CPA_H49	Land transport services and transport services via pipelines	0.0275	0.0295	0.0148
CPA_H50	Water transport services	0.0049	0.0054	0.0029
CPA_H51	Air transport services	0.0031	0.0034	0.0032
CPA_H52	Warehousing and support services for transportation	0.0243	0.0250	0.0175
CPA_H53	Postal and courier services	0.0045	0.0102	0.0069
CPA_I	Accommodation and food services	0.0085	0.0072	0.0087
CPA_J58	Publishing services	0.0056	1.0447	0.0116
CPA_J59_J60	Motion picture, video and television programme production services, sound recording and music publishing; programming and broadcasting services	0.0047	0.0211	0.0118
CPA_J61	Telecommunications services	0.0134	0.0282	0.0247

CPA_J62_J63	Computer programming, consultancy and related services; Information services	0.0303	0.0497	1.1181
CPA_K64	Financial services, except insurance and pension funding	0.0261	0.0293	0.0314
CPA_K65	Insurance, reinsurance and pension funding services, except compulsory social security	0.0046	0.0056	0.0059
CPA_K66	Services auxiliary to financial services and insurance services	0.0056	0.0063	0.0099
CPA_L68B	Real estate services excluding imputed rents	0.0283	0.0377	0.0393
CPA_L68A	Imputed rents of owner-occupied dwellings	0.0000	0.0000	0.0000
CPA_M69_M70	Legal and accounting services; services of head offices; management consultancy services	0.0456	0.0529	0.0605
CPA_M71	Architectural and engineering services; technical testing and analysis services	0.0218	0.0167	0.0234
CPA_M72	Scientific research and development services	0.0385	0.0072	0.0100
CPA_M73	Advertising and market research services	0.0143	0.0272	0.0146
CPA_M74_M75	Other professional, scientific and technical services and veterinary services	0.0078	0.0136	0.0123
CPA_N77	Rental and leasing services	0.0189	0.0208	0.0265
CPA_N78	Employment services	0.0182	0.0142	0.0188
CPA_N79	Travel agency, tour operator and other reservation services and related services	0.0027	0.0031	0.0036
CPA_N80-N82	Security and investigation services; services to buildings and landscape; office administrative, office support and other business support services	0.0249	0.0343	0.0343

CPA_O84	Public administration and defence services; compulsory social security services	0.0044	0.0040	0.0041
CPA_P85	Education services	0.0041	0.0046	0.0077
CPA_Q86	Human health services	0.0008	0.0011	0.0012
CPA_Q87_Q88	Residential care services; social work services without accommodation	0.0001	0.0018	0.0002
CPA_R90-R92	Creative, arts, entertainment, library, archive, museum, other cultural services; gambling and betting services	0.0009	0.0160	0.0021
CPA_R93	Sporting services and amusement and recreation services	0.0010	0.0026	0.0021
CPA_S94	Services furnished by membership organisations	0.0019	0.0027	0.0023
CPA_S95	Repair services of computers and personal and household goods	0.0016	0.0013	0.0020
CPA_S96	Other personal services	0.0018	0.0020	0.0028
CPA_T	Services of households as employers; undifferentiated goods and services produced by households for own use	0.0000	0.0001	0.0001
CPA_U	Services provided by extraterritorial organisations and bodies	0.0000	0.0000	0.0000
MULTIPLIERS		**1.98**	**1.91**	**1.75**

Source: IDC calculation on Eurostat Input coefficients for domestic production 2014 [naio_agg_adom]

Table 81 Multipliers for Industry Sector and Technology Solutions Differentiation

	Hardware and Software	Purely Software	Web Services
Accommodation and Food Service Activities	0.30	0.40	1.30
Agriculture, Forestry, and Fishing	1.20	1.00	0.20
Arts, Entertainment, and Recreation	0.10	0.01	0.15
Business Services	0.60	0.80	0.40
Education	0.15	0.40	0.15
Cross-Industry	0.30	0.30	0.30
Human Health and Social Work Activities	0.20	0.50	0.15
Manufacturing	2.00	0.80	1.00
Public Administration and Defense; Compulsory Social Security	0.00	0.00	0.00
Telecom and Media	0.10	1.00	0.20
Transportation and Storage	1.20	0.40	0.20
Utilities	1.40	0.70	0.20
Wholesale and retail; Repair of Motor Vehicles and Motorcycles	0.20	0.15	1.50

Source: IDC calculation

8.5. Accelerators' Good Practice Report

This document is presented as a separate annex to this deliverable.