## Deliverable D500.2.3

# Aggregation and Feedback to Generic Business Model and FI-PPP

## WP 500

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| **Authors:** | Sven Lindmark, Uschi Buchinger, Sander Spek |
| **Contributors:** | |
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## The FIspace Project

Leveraging on outcomes of two complementary Phase 1 use case projects (FInest & SmartAgriFood), aim of FIspace is to pioneer towards fundamental changes on how collaborative business networks will work in future. FIspace will develop a multi-domain Business Collaboration Space (short: FIspace) that employs FI technologies for enabling seamless collaboration in open, cross-organizational business networks, establish eight working Experimentation Sites in Europe where Pilot Applications are tested in Early Trials for Agri-Food, Transport & Logistics and prepare for industrial uptake by engaging with players & associations from relevant industry sectors and IT industry.

## Project Summary

As a use case project in Phase 2 of the FI PPP, FIspace aims at developing and validating novel Future-Internet-enabled solutions to address the pressing challenges arising in collaborative business networks, focussing on use cases from the Agri-Food, Transport and Logistics industries. FIspace will focus on exploiting, incorporating and validating the Generic Enablers provided by the FI PPP Core Platform with the aim of realising an extensible collaboration service for business networks together with a set of innovative test applications that allow for radical improvements in how networked businesses can work in the future. Those solutions will be demonstrated and tested through early trials on experimentation sites across Europe. The project results will be open to the FI PPP program and the general public, and the pro-active engagement of larger user communities and external solution providers will foster innovation and industrial uptake planned for Phase 3 of the FI PPP.

## Project Consortium

- DLO; Netherlands
- ATB Bremen; Germany
- IBM; Israel
- KocSistem; Turkey
- Aston University; United Kingdom
- ENoLL; Belgium
- KTBL; Germany
- NKUA; Greece
- Wageningen University; Netherlands
- PlusFresc; Spain
- FloriCode; Netherlands
- Kverneland; Netherlands
- North Sea Container Line; Norway
- LimeTri; Netherlands
- Kühne + Nagel; Switzerland
- University Duisburg Essen; Germany
- ATOS; Spain
- The Open Group; United Kingdom
- CentMa; Germany
- iMinds; Belgium
- Marintek; Norway
- University Politecnica Madrid; Spain
- Arcelik; Turkey
- EuroPoolSystem; Germany
- GS1 Germany; Germany
- Mieloo & Alexander; Netherlands
- OPEKEPE; Greece
- Innovators; Greece

## More Information

Dr. Sjaak Wolfert (coordinator)
LEI Wageningen UR
P.O. Box 35
6700 AA Wageningen

e-mail: sjaak.wolfert@wur.nl
phone: +31 317 485 939
mobile: +31 624 135 790
www.FIspace.eu

## Dissemination Level

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| **PP** | Restricted to other programme participants (including the Commission Services) | |
| **RE** | Restricted to a group specified by the consortium (including the Commission Services) | |
| **CO** | Confidential, only for members of the consortium (including the Commission Services) | |

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## Document Summary

This deliverable contributes to the objectives of Work package WP500 of the FIspace project. WP500 aims at: (1) Mobilizing, engaging and preparing stakeholders across Europe for participation as application and service developers building on and extending the large scale trials; (2) Fostering and demonstrating potential for innovation of FIspace (related to market impact in the transport, logistics and agri-food sector), and (3) Delivering a consistent plan to move into Phase 3.

Task 520 'Business Models' supports the above objectives through the construction of the FIspace value network and the outline of a number of business models for (i) the FIspace platform as such, taking into account its open and generic infrastructure and set-up and (ii) for selected, representative trials.

The objective of this deliverable is to translate the insights of Deliverable D500.2.1 (M6) and D500.2.2 (M21) to recommendations towards the other WPs in the project, towards T550 and T570 as well as towards the FI-PPP. It is a living document to be updated iteratively during the project lifetime. The deliverable at this point (M6) draws on the insights of D.500.2.1 (FIspace Value network and General Business Model), it will summarise the conclusions of that deliverable and put forward some implications for the FIspace project.

## Abbreviations

| | |
|---|---|
| App | Software Application |
| B2B | Business-to-Business |
| B2C | Business-to-Consumer |
| D | Deliverable |
| DoW | Description of Work |
| EBM WG | The Exploitation And Business Model Working Group of the FI PPP |
| EC | European Commission |
| e.g. | Exempli gratia = for example |
| EU | European Union |
| FFV | Fresh Fruit and Vegetables (FFV) |
| FIA | Future Internet Assembly |
| FI-PPP | Future Internet Public Private Partnership |
| FMS | Farm Management System |
| FP7 | Framework Programme 7 |
| GA | Grant Agreement |
| GE | Generic Enabler |
| HW | Hardware |
| ICT | Information and Communication Technology |
| i.e. | id est = that is to say |
| IoT | Internet of Things |
| IP | Intellectual Property |
| IPR | Intellectual Property Rights |
| ICT | Information and Communication Technology |
| KPI | Key Performance Indicator |
| LSP | Logistics Service Provider |
| M | Month |
| PF | Plants and Flowers |
| RTD | Research and Technological Development |
| SAF | SmartAgriFood |
| SE | Specific Enabler |
| SDK | Software Development Kit |
| SME | Small and Medium Sized Enterprise |
| ST | Sub-Task |
| SW | Software |
| TIC | Tailored Information for Customers (TIC) |
| TIS | Tailored Information System |
| T | Task |
| WP | Work Package |

## Table of Contents

**1 Introduction ..... 7**
1.1 Business modelling in the context of FIspace ..... 7
1.1.1 FIspace ..... 7
1.1.2 WP500 and the T520 Business Model Task ..... 9
1.2 Objective ..... 9
1.3 Approach ..... 9
1.4 Overview of deliverable ..... 10
**2 FIspace Business Model Canvas ..... 11**
2.1 FIspace in the context of the FI-PPP Business model work ..... 11
2.2 Towards a FIspace Business Model Canvas ..... 11
**3 FIspace as a B2B platform ..... 18**
**4 Generic Value Network ..... 20**
**5 Generic Business Model Scenarios ..... 24**
5.1 Initial business model scenarios ..... 24
5.2 Archetype scenarios ..... 27
5.2.1 Commercial archetype ..... 27
5.2.2 Neutral platform archetype ..... 28
5.2.3 Industry-specific archetype ..... 28
5.3 List of options to be defined ..... 29
5.3.1 Platform ..... 29
5.3.2 Platform and business user interplay ..... 29
5.3.3 Platform and app developer interplay ..... 30
5.3.4 App developers ..... 30
5.4 List of values to be provided ..... 31
**6 Implications ..... 32**
**References ..... 34**

## List of Figures

Figure 1: FIspace overall vision ..... 18
Figure 2: FIspace Generic Value Network ..... 20
Figure 3: Main partners in the value network mapped to their roles ..... 22

## List of Tables

Table 1: FIspace merged canvas ..... 13
Table 2: Description of roles of the value network ..... 21
Table 3: Comparison of business model scenarios ..... 26

# 1 Introduction

This deliverable summarises the conclusions of Deliverable D500.2.1 and put forward some implications for the FIspace project. This chapter will first put the deliverable into context (Section 1.1). Subsequently, the objective of the deliverable will be specified (Section 1.2) and a brief overview of the approach given (Section 1.3). Section 1.4 outlines the further structure of this deliverable.

## 1.1 Business modelling in the context of FIspace

The business modelling for the FIspace project concentrates in WP500, and in particular in task 520. In the subsequent subsections, the FIspace project as well as the work package and the task will be introduced.

### 1.1.1 FIspace

The FIspace FI-PPP Phase 2 project aims to develop a multi-domain business collaboration and integration platform, based on the FI-WARE Generic Enablers and Future-Internet technologies, enabling new business models that overcome a number of deficiencies in modern business networks.

Latter tend to be highly distributed inter-organizational constructions that span country boundaries and are composed of several business partners. They are confronted with the challenges and opportunities of provided by disparate ICT developments. However, there are still quite a few problems in the current ICT landscape, including:

- Interoperability between inter-enterprise information systems is limited. Current ICT services generally provide only basic support for inter-organizational data and process integration. This means that complex inter-organizational collaboration activities today must be accomplished through manual efforts (still use of paper, fax, phone, etc.).
- Tracking and tracing possibilities are still narrow. New technologies for gathering data on field activities, such as new sensor technologies, scanners, and RFID, are creating data collection, distribution and management problems for existing Internet technology. Sharing of these data is also problematic as existing internet services poorly support the requirements for privacy and security.
- Especially for SMEs, business software is relatively expensive, while the need for flexible, customised solutions has increased.

These are major reasons for the current limited ICT support of business collaboration networks, hampering innovation in general and creating problems for SMEs in particular. FIspace aims to develop a multi-domain business collaboration and integration service that will allow for (1) seamless cross-organizational collaboration (information exchange, communication, coordination of activities), (2) transparency, visibility and control of processes (sensors and IoT devices), (3) rapid, easy, low cost development and deployment of customised solutions (apps and services), and (4) agile formation of business networks and ecosystems (social networks and app/service markets).

The central features of the FIspace collaboration service will be:

- provisioning of the FIspace service, following the Software-as-a-Service (SaaS) as well as Platform-as-a-Service (PaaS) delivery model, which means that FIspace services can be accessed anywhere at any time via any device;
- an open service that can be extended and customised for specific stakeholder demands by integrating domain apps (similar to the iPhone and Android business models);
- a domain app store, which facilitates the marketing of targeted applications that take advantage of the collaboration and mash up services of the FIspace and its underlying FI-WARE generic enablers;
- a collaboration manager for business-to-business networks that supports the planning and execution of business operations from a global perspective with message-based coordination among the involved business partners;

- integrated techniques for monitoring and tracking on the basis of data integration from the Internet of Things, including sensor systems and smart item technologies accessible via FI-WARE generic enablers;
- information integration from legacy and third-party systems enabled through a service-based integration layer that is enabled and supported by FI-WARE generic enablers;
- role-based views for the individual participants in the business networks, along with integrated security and privacy management for fine-grained access control to confidential information.

The FIspace project is leveraging and extending domain solutions and stakeholder communities for transport, logistics and agri-food. These were developed in the Phase 1 use case projects FInest and SmartAgriFood (SAF), allowing for cross-domain usage of the service to address multi-domain business challenges. The project will also implement and test the FIspace solution and its underlying technologies, specifically the FI-WARE GEs, using multi-domain trial experiments and will utilise these trials to empirically support the business benefits identified in the Phase 1 projects of each project, and thus ultimately demonstrate the benefits of real life utilisation of FI-enabled technologies.

In total, eight trials will be conducted. They are grouped into three use case scenarios:

(A) *Farming in the Cloud*, which addresses food production issues at the farm level. It contains two use case trials: (1) *Crop Protection Information Sharing* and (2) *Greenhouse Management & Control*.

(B) *Intelligent Perishable Goods Logistics*, which addresses monitoring and environmental management issues of perishable goods as they flow through their supply chains so that waste is minimised and shelf life maximised. It contains three use case trials: (1) *Fish Distribution and (Re-)Planning*, (2) *Fresh Fruit and Vegetables Quality Assurance* and (3) *Flowers and Plants Supply Chain Monitoring*.

(C) *Smart Distribution and Consumption*, which is about helping each stage of the supply chain up to the end consumers to obtain better information on the products they purchase, and producers to better control the flow of their goods to the consumer. It contains three use case trials: (1) *Meat Information Provenance*, (2) *Import and Export of Consumer Goods* and (3) *Tailored Information for Consumers*.

To achieve its goals the project will focus on four primary work areas:

1. Implement FIspace as an open and extensible Software (and Platform)-as-a-Service solution along with an initial set of cross-domain applications for future B2B collaboration, utilizing the Generic Enablers provided by the FI-PPP Core Platform.
2. Establish Experimentation Sites across Europe where pilot applications are tested in early trials from the transport, logistics and agri-food domains.
3. Provide a working Experimentation Environment for conducting early and large-scale trials for Future Internet enabled B2B collaboration in several domains.
4. Prepare for industrial uptake and innovation enablement by pro-active engagement of stakeholders and associations from relevant industry sectors and the ICT industry.

In terms of project organisation, these objectives will be achieved through five work packages (WPs):

- FIspace Development (WP200), which addresses the iterative design, implementation and testing of the software components implementing the FIspace service, while incorporating feedback from users and developers, thereby ultimately enabling the app ecosystem;
- FIspace Hosting & Experimentation (WP300), which is responsible for setting up compute infrastructures, deploying the FIspace software components (developed in WP200) and apps (developed in WP400) including the deployment of the required Core Platform Generic Enablers, as well as for providing experimentation support and enablement to the use case trials (in WP400), also providing requirements on infrastructure needs, to be consolidated by XIFI in M6;
- Use Case Trials (WP400), which defines cross-domain use cases and defines, sets up, and executes use case trials to demonstrate the FIspace capabilities and benefits in the real-world; this WP thus includes the development of apps and the connection of trial-specific, local infrastructure (e.g. in-the-field systems and devices) to the FIspace software components (hosted by WP300). Two types of apps will be developed: (1) general purpose baseline apps (i.e. apps that are required by stakeholders across several domains, T450), (2) domain-specific apps needed for conducting specific use case trial experiments.
- Open collaboration & Exploitation (WP500), which will foster early uptake of results and drive establishing an eco-system around FIspace, including dissemination, exploitation and standardization. This

WP will also coordinate and prepare guidelines and plans for large-scale expansion of platform usage, involving relevant stakeholder groups.

### 1.1.2 WP500 and the T520 Business Model Task

The business model work is situated within WP500 (Open collaboration & Exploitation), which aims at:

(1) mobilizing, engaging and preparing stakeholders across Europe for participation as application and service developers building on and extending the large scale trials;
(2) fostering and demonstrating potential for innovation of FIspace (related to market impact in the food and logistics sector), and
(3) delivering a consistent plan to move into Phase 3.

T520 Business Models is concerned with the construction of the FIspace value network and the outline of a number of business models for (i) the FIspace platform as such, taking into account its open and generic infrastructure and set-up and (ii) for selected, representative trials. This task will provide the following major outcomes:

- The identification of the value network and generic business models for the FIspace service. (Sub-Task - ST521)
- Delineation, analysis and validation of applied business models for selected exemplary trials. (ST522)
- Optimization, configuration, adjustments and validation of the generic FIspace business model and FI-PPP by aggregation and feedback from the trials analysis. (ST523)

## 1.2 Objective

This intention of this deliverable is to build mainly on the activities of ST 523 “Aggregation and feedback to generic FIspace business model and FI-PPP (M9-M24). This task will, while the business model validation of trials (ST522) is on-going, aggregate and analyse results from the different trial evaluations, with the objective to 1) update and validate the generic FIspace value network and business models; 2) to identify the optimal configurations (in terms of value network, functional architecture, cost and revenue structure and value proposed) based on the various small-scale experiments; and 3) to translate these results into concrete recommendations towards (i) the architecture (WP200); (ii) the trials proper (WP400); (iii) the exploitation task within WP500; (iv) the Workgroup on Exploitation and Business Models (organised by the CONCORD project) and FI-WARE; (v) the large-scale trial to be set up in the framework of Phase 3 of the FI-PPP.

It is to be a living document - updated several times during the project lifetime. The deliverable at this point (M6) draws on the insights of D.500.2.1 (FIspace Value network and General Business Model). This first iteration summarises the conclusions of that deliverable.

## 1.3 Approach

The analysis of D520.2.1 was made in number of steps. First, a general business model analysis following the Business Model Canvas approach (see Chapter 2) was made, building on the Business Model work conducted in the FI-PPP Exploitation and Business Model Work Group (EMB WG), and more importantly the business model work performed in the ‘parent projects’ of FIspace – FInest and SmartAgriFood – synthesizing, aggregating and adapting that into a FIspace Business Model Canvas. The FIspace platform is examined in the light of received theory on platforms and multi-sided markets, and positions FIspace vis-à-vis a selection of B2B and B2C platforms.

A Generic Value Network is outlined through the identification of relevant business roles, relationship between these roles as well possible partners that can take up one or several of these roles. This Generic Value Network is tentatively applied to two of the trials.

Based on the preceding steps, a number of business model scenarios for FIspace are presented, along with a list of key business model options. They need to be further validated in interaction with trials and other parts of the project (mainly in T522), the FI-PPP and beyond. These options and blueprint business models constitute the final outcome of the deliverable.

The above analysis is summarised in this deliverable with some preliminary implications for FIspace and the FI-PPP.

## 1.4 Overview of deliverable

This deliverable is structured as follows. This first chapter (Chapter 1) introduced the context, objective and approach used.

Chapter 2 presents a consolidated FIspace Business Model Canvas, which is partly based on the canvasses from FInest and SAF.

Chapter 3 analyses the platform aspects. It summarises the main platform features of FIspace, draws out lessons from literature on platforms and multi-sided markets and reports on the results from a B2B and B2C platform benchmark.

Chapter 4 outlines the Generic Value Network through the identification of relevant business roles, relationship between these roles as well possible partners that can take up one or several of these roles. In that way, it shows the ecosystem of the platforms and the collaborations and interactions that are necessary.

Chapter 5 presents several business model scenarios, grouped in three archetypes, along with a list of key business model options, as input for iterative testing in ST522.

Finally, in Chapter 6, implications and conclusions will be presented.

# 2 FIspace Business Model Canvas

This chapter starts out by placing the deliverable in the context of the overall FI-PPP Business model work (Section 2.1). It then draws on analyses conducted in Phase 1 of the FI-PPP, the FInest and SAF parent projects. The outcome of the chapter is a synthesised and consolidated FIspace Business Model (Section 2.2), framed as a FIspace Business Model Canvas.

## 2.1 FIspace in the context of the FI-PPP Business model work

The business model task of FIspace needs to relate to the overall business model thinking of the FI-PPP, the other FI-PPP projects and guidelines provided by the Exploitation and Business Modell Work Group (EBM WG) of the FI-PPP. The EBM WG has provided some initial business model analysis, so far based mainly on the work conducted in Phase 1. This work is summarised in a first CONCORD deliverable [1].

CONCORD [1] outlines a first framework for how a platform for stimulating a sustainable business and innovation ecosystem can be instigated, based on a more advanced logic than traditional platform-based business ecosystems. It concludes that the sustainability of the FI-PPP ecosystem rests on the one hand on (1) a (statically) viable business model for all stakeholders in the value network, allowing them to realise gains via extended economies of scale and scope provided via generic and specific enablers and infrastructures, and (2) on the other hand igniting a sustainable ecosystem for innovation by stimulating, providing incentives and reducing barriers (i.e. increasing the innovative opportunities) for development of innovative applications and services, notably by SMEs and web entrepreneurs. Innovators must easily combine specific and generic enablers to create innovative applications and services for their customers. Opening of FI specific and generic enablers to SMEs and other third parties will be critical in the successful exploitation of the Future Internet platform envisaged in Phase 2 and 3.

In addition, recommendations pertain to: (1) harmonised licensing for sharing and accessing generic and specific enablers is critical for a sustainable FI application ecosystem; (2) clear standardization of technologies must be applied, (3) ownership structure and underlying technology transfer issues when using multiple GEs and SEs must be identified so as to make it easier for third-party application developers to participate and engage in the FI-PPP ecosystem, and (4) precise value proposition towards end-customers must be outlined on the use case project level.

The work in the EBM WG will continue and be further refined through the exploitation and business modeling activities within Phase 2 of the FI-PPP. It also aims to further investigate, test and validate the opportunities and challenges for the FI-PPP as a platform for a sustainable ecosystem for innovation.

Although further work is needed a few key features of the FI-PPP ecosystem pointed out by CONCORD [1] are:

- Low entry barriers for application developers are crucial. Partly these entry barriers relate to costs (e.g. licence fees) but also to other issues such as easy of entry, ease of finding information about platforms and platform components (GE, SE etc.) availability of SDKs.
- FI-PPP needs to accommodate for rapid configuration of end-to-end solutions.
- The platform needs to facilitate for application developers to generate a fair share of the value that is created (revenue models and revenue sharing models) but also to expand the market (establishing markets places – finding customers, e.g. in form of application stores).
- Reducing the uncertainty regarding sustainability of platform/GEs/SEs. There are still many issues relating to the sustainability of the platform and reducing some of these uncertainties would make it more attractive for SMEs and web entrepreneurs to hook up to the FI-PPP.

## 2.2 Towards a FIspace Business Model Canvas

The point of departure for FIspace is the business model work conducted in the FI-PPP Phase 1 project, FInest and SmartAgriFood. FInest is a cloud-based platform for collaboration and integration of entities in the transport and logistic domain. SmartAgriFood elaborated upon six use cases in the areas of (1) Smart farming (including sophisticated and robust broadband sensing and monitoring of animals and plants), (2) Smart agri-logistics (including intelligent transport and real-time logistics of agri-food products) and (3) Smart food awareness (focussing enabling the consumer with information concerning safety, health, environmental impact and animal welfare)

Broadly stated a business model describes how a business (an organisation, business division, new venture, etc.) proposes to create, deliver and capture value [2]. The analysis in this chapter is framed by the widely spread Business Model Canvas (initially proposed by Osterwalder [2] based on his earlier work on the a Business Model Ontology [3]) is a visual chart with elements for describing value proposition, infrastructure, customers, and finances, and is composed of nine building blocks: [2]

1. Customer segments – which customers will the business serve?
2. Value propositions – what bundle of products and services will be delivered to address specific customer needs? The value proposition provides value through various elements such as newness, performance, customization, "getting the job done", design, brand/status, price, cost reduction, risk reduction, accessibility, and convenience/usability.
3. Channels – how will the value propositions be delivered to customers?
4. Customer relationships – what type of relationship will the business have with each customer segment?
5. Revenue streams – how will revenue be generated from each customer segment and its value proposition?
6. Key resources – what “assets” will be required to deliver the value propositions to each customer segment?
7. Key activities – what activities will be critical to the delivery of the customer value propositions?
8. Key partnerships – what activities will be performed in house versus outside the business?
9. Cost structure – what type of cost structure will result from delivering the service?

The FIspace BM canvas, as analysed through the lens of the parent projects FInest[1] and SAF is summarised in Table 1.

[1] The platform aspects of the analysis draws accordingly much on the analysis conducted in FInest project. See [4].

Table 1: FIspace merged canvas

| Key Partners | Key Activities | Value Proposition | Customer Relations. | Customer Segments |
|---|---|---|---|---|
| Hosting services provider<br>IoT hardware and service providers<br>SW developers, integrators and consultants<br>Machine and material suppliers<br>Financial service providers<br>Industry associations<br>Standards / Certification bodies<br>Governments / authorities<br>Research institutes<br>End-consumers | Platform management<br>Platform operations<br>Service provisioning<br>Marketing<br>Continuous improvement<br>Design and develop<br>Consultancy<br>Maintenance<br>Promotion and networking<br>**Key Resources**<br>Platform technology<br>App store<br>Apps / services<br>Server infrastructure<br>Cloud<br>GEs<br>IPRs<br>Information<br>Trust | Easier access to larger markets<br>Ease of use<br>Cost reduction<br>Visibility<br>Increased / new revenue, premium prices<br>Control<br>New customers<br>Innovation opportunities<br>New outlet for services<br>Improved product /service quality<br>Wider application of certification and standardization<br>Tracking / tracing / transparency through supply chains<br>Increase of trust<br>Risk reduction | Ease of use, deployment and development<br>SDKs<br>Personal support<br>Online support<br>Automation tools<br>Self-service<br>Information provision / exchange<br>Robust help<br>Community build-up<br>User feedback<br>**Channels**<br>Support relationship<br>Web presence (incl. social media)<br>Direct sales / Events<br>Existing networks (e.g. internal sales force, direct marketing, business communication, advertising, sector organisations and PR-agents.)<br>App store / Marketplace<br>Advertisements<br>Word of Mouth<br>Government or industry organisations | Business users<br>E.g. shippers, farmers, growers, animal producers, manufacturers, suppliers, logistics service providers, retailers, supermarkets, food processors, traders, crate managers,<br>End consumers<br>Government, standard and certification organisations.<br>Application developers<br>Advertisers<br>(Society) |

| Cost structure | Revenue streams |
|---|---|
| Operational costs (hosting, maintenance, support, etc.)<br>Marketing costs (sales, advertising, acquisition, events, etc.)<br>Development costs (ICT infrastructure (sensors), SDKs, continuous improvement, training, etc.)<br>Costs for other partners in the FIspace ecosystem, e.g.<br>- cost reductions induced by FIspace<br>- costs of using FIspace services and apps<br>- cost for app developers | Membership/Subscription fees (Saas)<br>Advertising fees<br>Transaction fees<br>SDK fees<br>Sales of Information / Analytics<br>Consultancy / service fees<br>Revenue streams for other partners:<br>HW sales, SW licenses, hosting fees, ICT service, consultancy and system integration fees, charging fees for financial transactions |

First and foremost the canvas analysis identifies the characteristics of the service the platform has to offer to meet the needs of its customers, i.e. its **value proposition**. FIspace aims to deliver a number of benefits related to (1) better satisfying customer requirements (enhanced monitoring and tracking of goods as they move along the value chain etc.), (2) increase business efficiency and optimization throughout the value chain by (e.g. significantly reducing manual efforts for planning and re-planning) and (3) facilitating new business opportunities (by providing more efficient and transparent service offer management, optimizing partner contract negotiations, etc.).

It is the vision that the platform will provide multiple benefits to the *business users*. In the long-term, and in general, the implementation of the platform should lead to lowering costs and better collaboration between business partners or users (e.g. a shipper that needs to ship goods, a manufacturer who needs material, a farmer that needs spraying advice). When enough business users have subscribed to the platform, they would, whether sellers or buyers, benefit from a greater variety of partners to do business with. Small service providers will particularly benefit since they are able because of the lower investment and the access to an open platform. In addition, ratings functionality and market places will further increase the efficiency of markets. Easier customization of business processes, the possibility to pay only 'per-use' and automated contracting, service level management and payment services should be estab-

lished, which will lead to lower overheads and lower transaction costs (in the broad economic sense). In many cases this will lead to higher product and service quality, throughout the supply chains, in turn enlarging markets, and provide possibilities to charge more and leading higher long-term profitability.

In transport and logistic chains transparency, event handling, event notification, rapid integration to backend systems, and service level monitoring will allow e.g. business users (e.g. shippers) to optimise their (shipment) processes. Lead-times are likely to be reduced in many cases. In general less waste (perishable goods) and better capacity utilization and fewer transport kilometres will reduce costs and increase efficiency.

Provision of expertise can be outsourced or improved internally by automated processes. More advanced and efficient processes will not only lead to economic gains, but also more environmentally friendly production and service provision. Better visibility and transparency in (e.g. food) supply chains will, among other things, provide opportunities for new revenue streams, but also improve trust (as will higher quality and reliability). Exception reporting will allow taking out products from the chain that are dangerous or of insufficient quality.

Though more objectives are envisioned as well as paths of how to realise these objectives, in its basic form, the value proposition of FIspace would be to support business users through ICT in their various ways to enhance their business. Still this value proposition is quite multi-faceted and in need of showcase examples to concretise and illustrate these benefits. This is one of the aims of T522 business model activity, which will be conduced in close collaboration with the trials.

It is envisioned that *app developers* shall have access to a large number of business users once a certain (critical) mass of such users is reached. That would lead to economies of scale and generate transaction revenues. Lower development costs and the possibility to mash-up with other applications could also be foreseen and for the moment is part of the envisioned value proposition to app developers.

Some other entities that could (sometimes indirect) profit from the FIspace are defined in addition, e.g. advertisers that profit from views for their advertisement on the platform. Society benefits from environmental impacts and better response to alerts and emergencies. Several suppliers of components (e.g. sensors) will benefit from enlarged markets. FIspace may also allow for wider application of standards for standardization- and of certification schemes for certification bodies. Some applications will provide end-consumers with e.g. higher food awareness, tools for shopping, food alerts, which will possibly increase their willingness to pay and trust.

Finally, whoever develops and operates the platform, for now called the *platform provider or operator*, will be able to capture some of the value provided by the platform. Development and/or management organizations can generate new revenue streams through licensing the platform software or operating the platform. Chapter 5 will outline several scenarios and scenario archetypes, which will puts this core of how to deploy the platform further to evaluation.

FIspace will serve many **customer segments,** including farmers, growers, manufacturers, shippers, crate providers, logistics service providers, retailers, end-consumers, software development companies, infrastructure hosting companies, traders, systems integrators, hardware manufacturers, facilities companies, consultants, etc. and possibly standardisation-, certification and public organisations while providing value to society at large.

The partners can be structured according to the two markets the FIspace platform operates in. These are: (1) the market that mediates between business users and app developers, and (2) the market that mediates between business users as buyers and sellers. The later is also the two-sided market that an app might intermediate. Thus the core customer segments can be broken down to three main categories (based on FInest):

1. Business users - ‘buyers’ that needs a service, product or information, and seeks to establish a business relationship with service or product providers (e.g. shipper that needs to ship goods, a manufacturer who needs material, a farmer that needs spraying advice).
2. Business users - ‘sellers’ that wants to sell a service or product to another business user, e.g. Logistics Service Providers (LSPs) that provide logistics execution services for performing transport operations, or a supplier that provides its product to the next step in the value chain.
3. Application developers/providers: entities that develop apps (or app components) in conformance with the FIspace platform’s app development requirements. Apps are provided via the FIspace Store.

While this distinction draws on the FInest analysis, which made a clear separation between shippers (buyers) and LSP (sellers), we consider this segregation as an example. This distinction is not applied rigorously for FIspace.

Certainly, apart form the core segments other partners should be considered. The platform operator/provider is not a customer but the supplier of the service that FIspace delivers, whose business this analysis seeks to model. In any case, this will be a company or other entity that operates the platform including the FIspace Store and provides the necessary support and toolkits to app developers and possibly support to the business users. The platform operator may also take on the roles of maintaining and developing the platform and its components as well as hosting it, but other companies could also take up these roles. Exactly which roles the platform operator/provider should take up are still under consideration in the business model task, and will be further discussed in Chapter 5.

Additional partners foreseen includes consultants who support the business users in deploying the applications, financial service providers and, possibly in the future, advertisers that would seek to advertise their goods or services on the platform, public services, standard and certification organisations and society at large. These could be considered customers of FIspace as well.

FIspace needs to create **relationships** with these customers. These are of two types of relationships: those with business users and those with application developers. While ease of use, deployment and development is key, FIspace will need to establish close relationships with both. Assistance to the business users (shippers and LSPs) will be needed during the setup process, for e.g. configuring the system for use, connecting to the backend systems, linking IoT devices, setting up security, customising the user interface and accessing apps. Business process engineers will eventually conduct this. Other relationships are required with key partners (see below) that support the business collaboration.

Developers will need support as well, in the form of SDKs as well as personal assistance in learning how to develop and possibly certify FIspace apps and learning about possible app revenue system. Besides personal assistance, this support, can come in many forms including online support, automation tools, self-service and community build-up. Finally, feedback from customers will be key to continuously improve the platform

FIspace delivers its value proposition to its targeted customers through different **channels**. As identified in FInest, these channels needs to be activated for purposes of awareness generation, evaluation, purchase, service delivery and support. Awareness generation is already taking place in the FIspace project, and need to continue as FIspace moves to commercialization. FIspace needs to provide business users with incentives, opportunities and support to evaluate the platform by trying out their services. FIspace also need to provide app developers not only with SDKs but also with training, testing and other support services. Even monetary incentives could be envisioned (cf. Phase 3). When the platform reaches a sufficient number of users and app developers, and the value of the platform has increased, such incentives can be relaxed.

The channels that can be used range from organising events, web presence (incl. social media), the use existing networks (e.g. internal sales force, direct marketing, business communication, advertising, sector organisations and PR-agents), the FIspace Store and marketplace itself, advertisements, word of mouth and activation of other partners such as industry organisations.

FIspace needs to capture some of the value provided to the customer segments. It needs to create **revenue streams** that are sufficient for all players in the ecosystem or other benefits that justify a cost. The main source of revenue is likely, or will have to, to come from the business users of the platform, who in turn have to be willing to pay because of their perceived value of using the platform. Several revenue models can be foreseen including entry fees, subscriptions, and transaction-based fees. Selling segmented information about buyers' habits is another possible revenue source. FIspace may in principle also generate revenues from sales of software development kits (SDKs), consultancy and training services supporting the development of applications and the deployment of these applications for specific business users. At least in initial phases this may discourage the app developer community, however.

The platform operator needs to choose whether or not to charge both sides of the business collaboration market. Plausibly the business user-sellers will be charged, possibly also the buyers.

A range of other revenue streams are also foreseeable, some of which will appear as costs for the platform operator. In some scenarios it is possible that the platform developer is not the same as the platform operator. While the platform developer is the partner that develops the software, the operator (used synonymously for platform provider) is the partner that brands and markets the platform and provides it on the market. In this case the developer could charge the platform operator including also service fees from

the implementation. A platform host would also charge the operator for hosting the platform. Consultants and systems integrators (Business process engineers in the current terminology used in the project) could generate professional service fees for deploying applications at the user side. Financial service providers could generate revenue by charging a fee for clearing payment transactions. Providers of components such a GEs could also generate revenues from the platform.

It could also be noted that the FInest analysis as well as the SAF analyses implies that information and data will be very valuable in many applications, and could be used as a sort of currency in FIspace ecosystem. This topic needs further analysis though.

FIspace needs to identify the **key activities** that will deliver its value proposition. A range of such activities have been identified in the parent projects, including platform management, platform operations, hosting, service provisioning, marketing, continuous improvement, design and develop, consultancy, maintenance, promotion and networking.

**Resources** are necessary to create value for the customer. In parent projects these resources range from the platform technology, servicer, cloud, GEs, IPRs, applications, trust, personnel, etc. FIspace (the platform operators) will also need to provide a set of initial apps for two reasons (1) to stimulate early usage from business users and (2) to showcase how apps can be developed. At the same time, as mentioned, FIspace third-party app developers will have to provided with a number of incentives to develop apps, including SDKs, training, testing services and other support possibly complemented with monetary incentives in the early phase.

The FIspace platform operator should identify **key partners** and establish business relationships and alliances with other partners in the ecosystem in order to be able to deliver its value proposition to its customers. If we in FIspace consider the platform operator at core and business users and app developers as customers, the remaining partners can then be considered as partners important for (the) FIspace (operator) to build a sustainable ecosystem. These roles (overlapping with Key activities above) taken up by these partners can in some case also be taken up by for instance (and eventually temporarily by) the platform operator. This entity then controls some of the key resource. Key partners to include in such an analysis are: hosting services provider, software developers, integrators and consultants (business process engineers), machine and material suppliers that provides business users (e.g. farmers) with equipment, maintenance and repair services and supplies. Certainly key partners cannot strictly be differentiated from customer segments because of their equally valuable roles in some usage scenarios. However, this analysis should not essentially deviate from the thinking in the parent projects where this separation was introduced. Thus, some key partners and their respective roles are:

- financial service providers: allow payments to be made;
- industry associations: can crucially influence the adoption of FIspace, including standardisation and certification bodies;
- governments / authorities: set rules and policies that could support the uptake of FIspace;
- research institutes: can provide scientific knowledge that could improve performance of many applications (flower decay, spraying, to name a few) and end-consumers.

In terms of **cost structure,** FIspace describes the most important monetary consequences while operating under different business models. The cost structure of FIspace could (as analysed in the FInest project) in principle be divided into development, operating and marketing costs. A business model analysis should also consider the cost structure of other partners in the FIspace business ecosystem. In particular there will be costs for business users to hook up to and use the platform, to deploy applications along with possible complementary investments (e.g. sensors) and for app developers to develop applications, put them in the FIspace Store and market them. FIspace needs to seek to minimise these costs. We envision analysing these kinds of cost further for a selection of the trials, in later phases of the project.

This analysis forms an initial stepping stone towards a FIspace business model. In addition to providing a thorough list of factors for each building block in the Business Model Canvas, it provides conclusions for the platform that this deliverable builds on and refines.

Still there are some open questions. FIspace needs a clearer and more marketable statement of its offer. The value proposition as stated on the web site and in project documents, lists too many potential benefits, which makes it difficult for potential users and app developers to grasp. Such benefit needs to be articulated throughout the project, especially drawing on experiences from the trials (this will be elaborated in ST522)

Also, FIspace needs a clear positioning vis-à-vis current offers on the market. Chapter 3 will contribute to that purpose, summarising key features of some exiting platforms on the market and provide recommen-

dations for its setup. There is also need for a clearer and more structured analysis of the implications of being a platform market.

A clearer analysis of key roles and partners is also needed. A first approach is taken in Chapter 4, depicting the value network of the platform.

# 3 FIspace as a B2B platform

Since FIspace aims to be a business collaboration and integration service platform, this chapter briefly analyses the FIspace platform in the light of received theory on platforms and multi-sided markets, and positions FIspace vis-à-vis a selection of B2B and B2C platforms. It draws out implications for FIspace.

The vision that guides the development of the platform (e.g. in WP200) is that FIspace will be a business collaboration space designed as a cloud-based platform enabling partners operating in collaborative business networks (e.g. businesses, authorities, public & private service providers) in various application domains to find out about one another, determine what services others can provide, and to collaborate on developing and executing solutions to business needs that they might have in a seamless and easy manner. FIspace enables Business users to select, assemble (mash up), and execute apps from its cloud-based application store. New apps can be developed by re-using features of existing apps or through the development of completely new apps using the FIspace App Development Environment. Apps can be selected based on features, pricing and as well as rating and past performance, and can then be mashed up (combined) to low cost and easily at using FIspace tools. These mashed up solution will address in real-time specific business opportunities and can be discarded when those has been addressed. Figure 1 depicts the overall vision for the FIspace service.

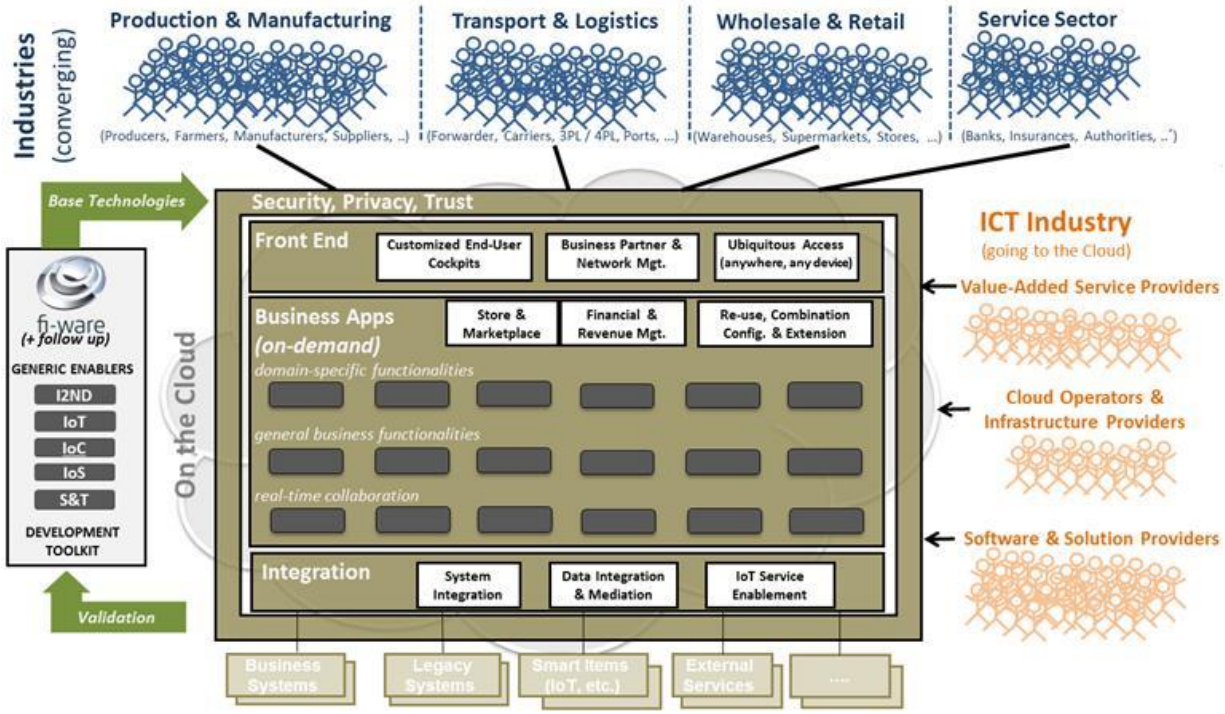


Figure 1: FIspace overall vision

Apart from the parties developing and providing (parts of) the FIspace platform itself, three main groups of users are foreseen (in the design of the platform – WP200). (1) End-users (business users) use the platform and its apps in their business activities. (2) Business process engineers support the businesses in the configuration of the FIspace and its applications for their individual needs, particularly for the definition of customised business processes by using the apps and the platform's customization support services. (3) App developers develop solutions to the end-users in the form of apps.

These users interact with the functionalities of the platform, which in turn consist of the following components: (1) The Front-End that serves as the main point of access for end-users; (2) The FIspace Store that provides the tool-supported infrastructure for providing, finding, and purchasing FIspace apps; (3) Business Collaboration Core Modules ensuring that all information and status updates are provided to each involved stakeholder in real-time; (4) A System and Data Integration Layer that allows for the integration and continued usage of existing legacy and business systems as well as the integration of external systems and services, (5) A Development Toolkit providing tool-support for the development and instantiation of FIspace, both for app development and for app customization to individual business needs. In addition a (6) Security, Privacy, and Trust framework ensures the secure, reliable, and trustworthy

handling of business data and an (7) operating environment ensures the technical interoperability of FIspace components and apps and the consistent behaviour of the FIspace.

FIspace will be positioned as a platform intermediating (or supporting apps to intermediate) multiple two-sided markets. The first two-sided market consists of business users as buyers and sellers. For the current project, these business users are situated in the transport, logistics and agri-food sector. The second two-sided market consists of the business users and the app developers. The market is characterised by (mainly inter-group) network externalities where the rate of adoption of the platform on one side of the market defines the attractiveness for the other side to join.

Based on brief benchmarks of B2B platforms (Salesforce AppExchange, Fraunhofer Logistics Mall, Descartes, SAP store, Ariba, GT Nexus and the Alibaba Group) and B2C platforms (Apple iTunes App Store and Google Play Store), we can derive several implications for the FIspace platform and its business model. These implications can take the form of strategic choices as well as considerations to be taken into account at a later stage. They are as follows:

1. The FIspace platform will provide a holistic solution that will be fairly unique, since many of the existing platforms focus on only a part of the process. When possible, this unique advantage should be fostered and utilised.
2. Stimulating the platform and app developers by offering a set of internally developed apps ('seed apps') seems like a good strategy, but enough space need to be left for external developers. The FIspace Store best-sellers should not just be internal apps.
3. Like the holistic solution, FIspace has another selling point in aiming to be an open platform that connects business users and their systems without restricting it to users of only certain services or technologies. This advantage should be fostered and utilised. It should be taken into account when considering the possible platform provider(s) beyond the end of the project and the FI-PPP.
4. Many of benchmarked B2B and B2C platforms are non-European. If Europe wants to play a leading role in business, logistics and trade, this could be stimulated by a European platform. This should be taken into account when considering the possible platform provider(s) after FI-PPP.
5. Revenue models are unclear for the B2B platforms. FIspace revenue models, like B2C ones, should be transparent and simply, especially towards app developers. (Apple and Google clearly state their policy that they charge a commission for every sold app, but in return give suggestions and support to app developers for monetizing strategies of their apps.)
6. Data needs to be available to the FIspace platform to get the development process started. Data enables the creation of apps. Issues need to be handled of additional (external) databases from entities outside the project (e.g. street maps in the transport and logistics domain, weather data in the agri-food domain).

# 4 Generic Value Network

This chapter analyses the FIspace value network through the identification of relevant business roles, relationship between these roles as well possible partners that can take up one or several of these. The Generic Value Network forms the building block for the outlining of various business model scenarios and for the further testing of those in iterations with the trials, and other parts of the FIspace project and external stakeholders. It may therefore be subject to adjustments and refinements to be presented in the later iterations of this living document.

The value network is disentangled in three phases. (1) The *service development phase* describes the tasks necessary for product and service creation (here mainly: the development of the platform and apps). (2) The *service delivery phase* represents the product provision to the users. In the case of FIspace, the main part of the platform is situated in this phase. (3) This results in the *service consumption phase*, where the product or services are used in a certain way to fulfil tasks or conduct roles. This service consumption phase is separated into three refined layers (depicted in blue) including the logistics and production supply chain (Figure 2).

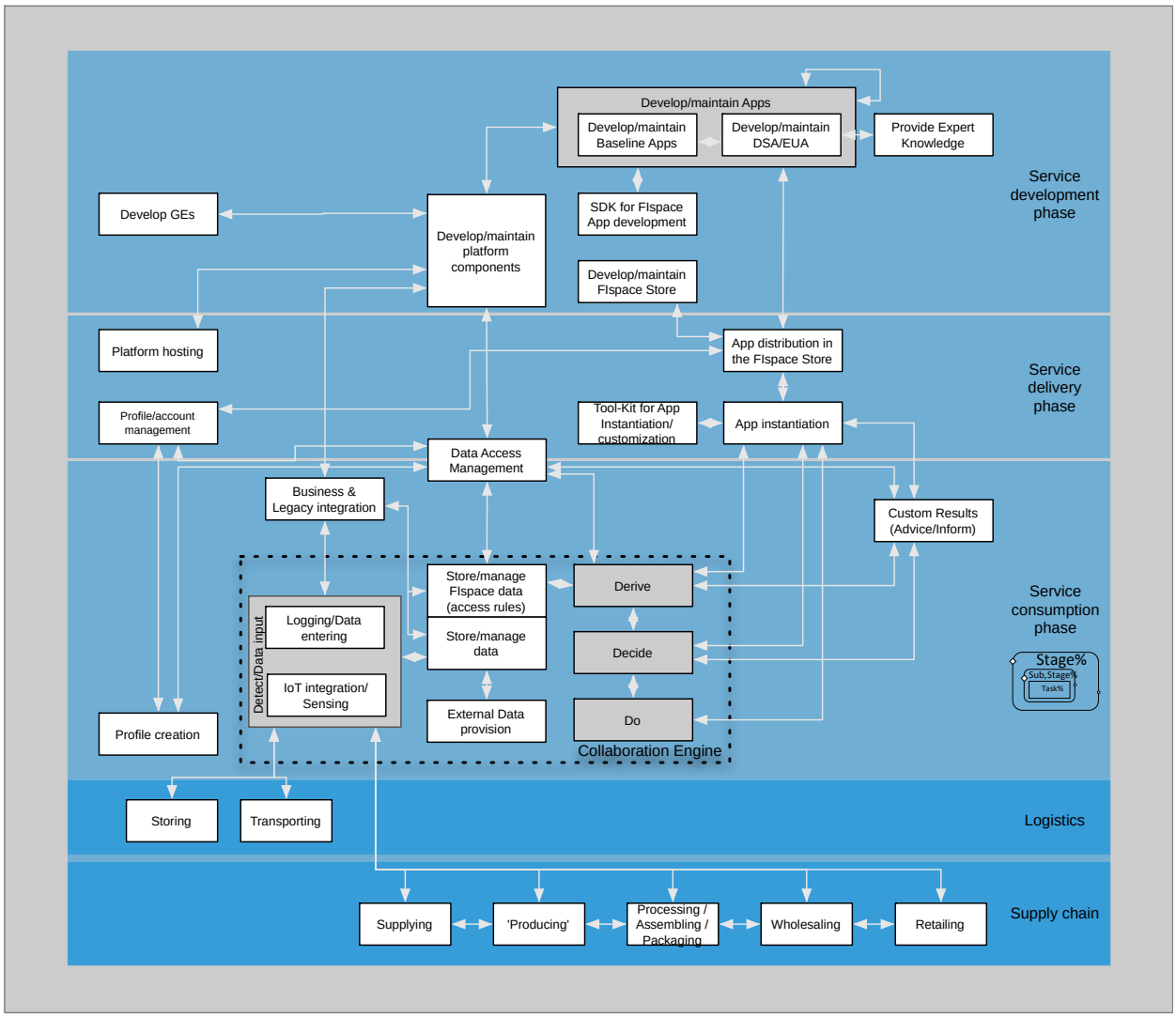


Figure 2: FIspace Generic Value Network

These roles and tasks (illustrated as white or grey boxes) are then mapped into the phases as briefly summarised below (Table 2).

Table 2: Description of roles of the value network

| Phase / role | Explanation |
|---|---|
| **Service development phase** | **Development of the end-product or service (i.e. the platform and apps and other services)** |
| Develop/maintain platform components: | Development and maintenance/operation of the core platform, including the Front-end development, the Real-time B2B Collaboration, the System and Data integration, the Operating Environment, the Security, Privacy and Trust framework the FIspace Store and the Development Environment (the latter two listed separately below and in the figure). This role can be split into development and maintenance. |
| Develop GEs | The development and provision of generic reusable functionality (Generic Enablers) used by FIspace (and app developers). This role extends to service delivery as well. |
| Develop/maintain apps | Development and maintenance of domain-specific apps as well as more generic apps (labelled 'Base-line' apps, currently in the FIspace project). The latter will be of particular importance, because (more than specific apps) they can be reuse and combined for creating new apps and functionalities, and this drive rapid app development and early usage by business users. |
| SDK for FIspace app development. | Development toolkit that supports the development and provisioning of apps. |
| Provide expert knowledge | Often sector dependent knowledge that that can be used in the development and provisioning of apps. |
| Develop/maintain FIspace Store | Develop and maintain the tool-supported infrastructure for providing, finding, and purchasing FIspace apps that provide re-usable ICT-solutions for business collaboration and can be used and combined for the individual needs of end-users, including:<br>- the SW infrastructure to support the provisioning, consumptions, purchase, and re-use of FIspace apps for both business and App Developers<br>- financial management (pricing, payment, revenue sharing). |
| **Service delivery phase** | **Provisioning of services to users** |
| App distribution in the FIspace Store | Allows business users to find and purchase apps and for app providers to upload and sell apps. Several business model options should be planned for (registration fees, subscriptions, revenue sharing, etc.). |
| App instantiation | Configuration of the app for the business user, particularly for customised business processes, by using the apps and the platform's customization support services. Business process engineers can take up that role. |
| Toolkit for App instantiation | Supports the App instantiation, i.e. customise and extend FIspace and its apps to the needs of end-users at an individual or organizational level. |
| Data access management. | Management of access to data: databases, legacy systems, IoT, etc. |
| Profile / account management | Management of user profiles and accounts. Currently developed as a baseline app. Should perhaps be considered as part of the platform. |
| Platform hosting. | Providing the infrastructure (server, storage) for hosting the platform as a cloud-based service. |
| **Service consumption phase** | **Final usage or consumption of a product or service, data processing, execution of the B2B collaboration** |
| Supply chain | Generic roles taken up in supply chain (e.g. farm to fork). Further specification of these roles foreseen for each usage situation, during the course of the project – trial – additional roles may be foreseen. |
| Logistics | Generic roles in the logistics chain. Further specification and additional roles should be foreseen for each usage situation - trial. |
| **Service Consumption and Collaboration Engine** | **Generic roles below** |
| Detecting / Data input | Capturing data via logging or other forms of (manual) data entering, sensing or integration of the Internet of Things (IoT). |
| Business & legacy integration | Definition and implementation of communication channels between the FIspace and external business and legacy systems (e.g. in-house logistics solutions, ERP systems, FMS). |
| Store / manage data (data access rules) | Capture and store data in own databases. |
| External data provision | Provision of data external to the business users. |

| Phase / role | Explanation |
|---|---|
| Derive/decide/do | Generic representation of outputs (e.g. concrete spraying advice on the app). |
| Profile creation | Initial creation and updating of business profile account, setting the rules for what data is visible to whom. A business process engineer can take up this role (together with App instantiation). |
| Custom results (Advise/Inform) | Optional role dependent on the usage context. |

In a next stage different configurations of partners can be mapped to the roles. One possible generic scenario is outlined in Figure 3.

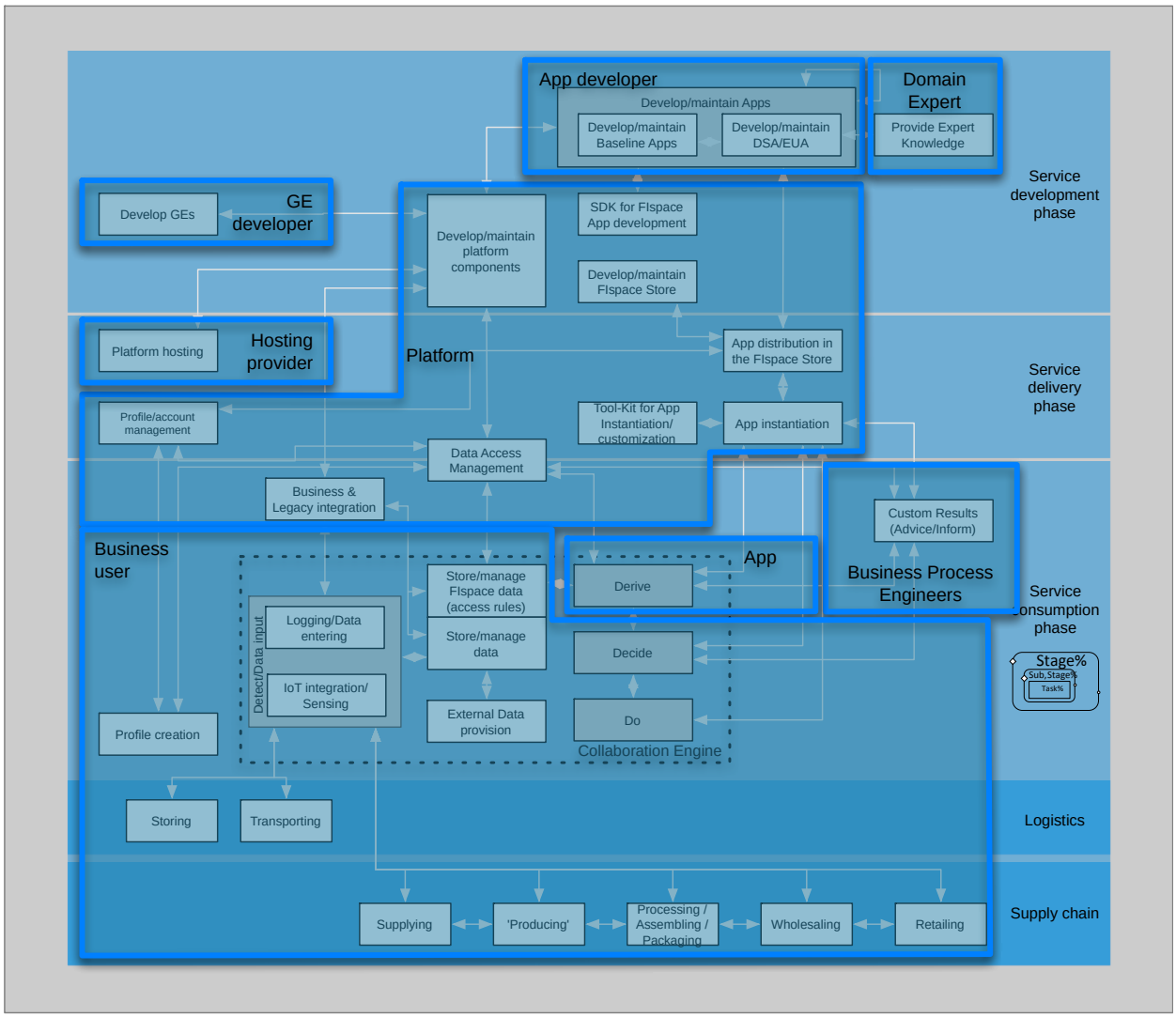


Figure 3: Main partners in the value network mapped to their roles

The role '**platform'** is deliberately kept broad here, not denoting it as platform provider/operator/manager/developer. This is because multiple scenarios can be foreseen. In principle it is possible that an integrated provider takes on the roles of developing, maintaining and operating (and even hosting) the platform, while these roles can also be separated. Multiple instances of the platform could also be foreseen (see the next chapter). One or several of the project partners could take up the further development of the platform or players from outside the FIspace consortium could take this role up These are key decisions, which will in turn influence the viability of different value network and business model set-ups, and will depend on decisions about IPRs and their terms and conditions that are set by the current partners. Some probable scenarios for the platform's future deployment and business model can be outlined. They are listed and assessed in Chapter 5.

In addition key partners (or suppliers) to the platform provider will be the **hosting provider** and the **provider of Generic Enablers**. In principle the platform provider can integrate also the hosting role.

**App developers/providers** develop apps for the end-users (having the possibility to use other apps for this). They will be using the platform not only for developing apps but also publishing them, find other relevant apps for mash-ups and integration, provide (and possibly trade) software patterns for interacting with the platform and will have the possibility to capture monetary returns from the processes. The attractiveness will depend on many factors such as: the availability and ease to integrate with other apps and support for app development in general, size of the market of business users, the possibility to capture value from business users' usage of apps (revenue), cost of being on the platform (FIspace Store) of SDKs, to mention a few. Clearly the availability of initial (baseline) 'seed' apps will be key both for value proposition to app developers and to the value proposition to the business users. Terms and conditions for providing and for the reusing apps need to be settled.

**Domain experts** help the app developer with an understanding of the market and deliver content for the apps. The exchange of knowledge should be compensated somehow (e.g. revenue sharing) once an app creates revenue. Domain Experts can either be independent parties or the user of the apps themselves (e.g. a farmer that has particular knowledge of his/her farm and data in the FMS and cooperates with an individual app developer).

The **business users** are those who use the platform (and an app) for their specific needs in their business operations. They are asked for their data input e.g. in the form of business and legacy integration. Their specific case demands and how they make use of the platform and the apps can be pre-defined as currently done in the trial set-up and objective.

The **business process engineers** customise and extend FIspace and its apps to the needs of end-users at an individual or organizational level. Depending on the usage situation these may be part of business users organisation, specialised consultancy, or even part of the service that the platform provides.

In conclusion, the value network of the FIspace platform indicates that the current design provides a meaningful division of roles. The current version of the platform can roughly be placed in the service delivery phase as the intermediate of the two-sided market: app developers (in the service development phase) and the users (in the service consumption phase). Due to its wide functionality and possibility of usage, the platform's roles are not limited to service delivery but includes the other layers as well. Having said that it is one single partner that can take up the all roles currently being taken by the platform. Platform development could be separated from the operations of the platform for instance. Such value network design choices are in turn dependent on who will take up these roles.

The app developer's roles are stable and straightforward in the value network. In the basics, developers use parts of the platform to develop applications and distribute them via the FIspace Store. Additional roles are optional and appear only in some scenarios. Due to the neutral character of the platform on one hand, and the very specific business requirements of diverse sectors on the other, app developers might need support from domain experts to build useful and marketable applications. App developers are dependent on the data that is generated by the business users. App developers can be independent or collaborate with a company or business user for whom they develop customised apps. Hence, they might be subsidised directly by the business users. Apart from that, the platform can help stimulating the app development by building the basic infrastructure, support the access to data, provide support (SDKs) or other incentives for the app developers, such as minimizing entry barriers for developers.

It is mainly at the lower layers of the value network where the implementation of the roles by the partners varies per usage situation. This stems naturally from the different options that the platform envisions to support. The value of the platform for the business users can and will be measured by the means of different parameters. This task will be one of the main focuses of the future work.

Though the value network depicts the current status, roles—and the partners that conduct the roles—as well as their terms and conditions might change according to the exploitation of the platform after the FI-PPP Phase 2 period. Multiple scenarios can be envisioned that result in different business model scenarios for the generic platform, as will be described in the subsequent chapter.

# 5 Generic Business Model Scenarios

The previous chapters have shown that the FIspace platform has the potential to provide a value proposition to different partners in the value network. The anticipated neutral character of the platform allows it to not be restricted to a certain domain or sector. Initially, however it will be put into use, tested and validated in the agri-food, transport and logistics domains. It inherits the legacy of the parent projects, the use cases of which will provide trial situations to test the software functionality, feed back and improve the platform development process. Moreover, the development of applications within the trials shall make it possible to understand and reproduce the procedure of app development and support the commercial implementation as well provide settings to test the opportunities and challenges faced by the business users. This open and generic (neutral) strategy is then reflected in wide range of multifaceted business model options. Multiple scenarios are presented, not only for the commercialization but also as different configurations in FI-PPP Phase 3 projects.

These scenarios should help as a first step to reducing these interdependent uncertainties. A number of generic business model scenarios are outlined in the following section. Some of the currently envisioned functionalities of the platform might be secondary in a number of scenarios and might not be further pursued by the entity that takes up the platform. There, this first business model attempt needs to be further analysed, validated, optimised and improved, mainly through testing in a close to real-world setting of the trials. In the next step of T520, the objective is thus to iteratively optimise, configure, adjust and validate the generic FIspace business model by aggregation and feedback from the trials. Further testing and validation also needs to be conducted with other parts of the project. Finally, it should be pointed out that exploitation decisions of the partners (including terms and conditions for making the developed software available) strongly affect the likelihood of some of the scenarios to unfold.

## 5.1 Initial business model scenarios

Eight scenarios for the platform's business model appear to be feasible at the current status of the project. Since they are still dependent on the development of the platform, configurations of parameters are partly based on assumptions and interpretations. In short, these scenarios are:

1. The first scenario is that an **ICT or software company from within the project** takes up the role as the platform provider.
2. Similar is the scenario that an **ICT or software company from outside the project** steps into the position of the platform provider.
3. There is a possibility of a **new start-up**, an organization that has no other businesses then to provide the platform.
4. As another solution, it could be possible that no internal or external party applies to become a FIspace platform provider after the end of the FIspace project. In that case, the project partners could opt for the scenario in which they create a **consortium of project partners** to keep the platform operational for the time being, and possibly develop its functionality further).
5. It is possible that a group of important business players in relevant industries (e.g. logistics, argi-food, assembling) sees the benefit of a centrally provided FIspace platform, but none of these players is willing to become a platform provider themselves, e.g. because they lack the finances, or it would be too far away from their core businesses. In that case they could collaborate and together found a **joint venture of industry players** to be a platform provider.
6. Another scenario is that of a **non-profit organization or university** interested in taking up the role of platform provider.
7. The platform's functionality can be taken up by a **public authority**, i.e. a European, national, federal or regional governmental organization. An example is the project partner OPEKEPE, the Greek National Organisation of Agricultural Development and Funding, Control, Orientation and Guarantees for Community Aids.
8. Another possibility is that the platform is taken up by **one company in a specific sector or domain** to serve just this sector or domain.

It is also a possibility that **multiple instances** of FIspace (eventually developing simultaneously, eventually drifting apart) will run in the future. These multiple instances will mix would then mix features of the above (and is therefore not listed as separate scenario in the table below).

These scenarios can materialise at the moment of commercialization of the platform. It implies the materialization of some factors that positions the platform in the market. Table 3 depicts an overview of the most relevant factors upon which the business model scenarios (potentially) differentiate. Additionally to these, several business model parameters were identified in Section 5.3 that the platform provider needs to decide upon, independent of which scenario will be realised. These parameters influence the choice *for* a particular business model and strategy of the platform. Conversely, parameters are influenced *by* the choice of the platform business model and strategy. In the following section, these scenarios can be grouped into three archetypes: the commercial archetype, the neutral platform archetype and the industry-specific archetype.

Table 3: Comparison of business model scenarios

| | 1. ICT or software company from within the project | 2. ICT or software company from outside the project | 3. New start-up | 4. Consortium of project partners | 5. Joint venture of industry players | 6. Non-profit organization or university | 7. Public authority | 8. Company in a specific sector or domain |
|---|---|---|---|---|---|---|---|---|
| Open or proprietary | TBD | TBD | TBD | Open | Likely open | Open | Open | TBD |
| European owner | Yes | TBD | TBD | Yes | TBD | TBD | Likely yes | TBD |
| Hosting | Likely self | Likely self | Likely self | Self | Third party | Likely third party | Likely third party | Likely third party |
| Goal of platform | Profit or cross-subsidisation | Profit or cross-subsidisation | Profit | Trajectory towards one of the other scenarios | Functionality | Functionality | Functionality | Profit or cross-subsidisation |
| Domain-specialization | No | No | No | No | Yes | Likely No | Yes | Yes |
| Possibility to bundle products | Yes | Yes | No | No | Unlikely | No | Unlikely | Maybe Yes |
| Apps published by the platform provider | Yes | Likely | Likely | Yes | Possible | Possible | Possible | Likely |
| Attractiveness for developers | High | High | Medium (rises when start-up shows potential) | Low | High | Medium | Medium | Low |
| Attractiveness for business users | High | High | Medium (rises when start-up shows potential) | Low | High | Medium | High | Medium (depending on authority) |
| Platform as intermediate of Two-sided markets | Yes | Yes | Yes | Yes | No | Yes | No | Likely No |
| Adoption decisions | Optional | Optional | Optional | Optional | Collective | Optional | Authority | Authority |

## 5.2 Archetype scenarios

For many parameters certain scenarios show similarities. For these reasons, the scenarios are grouped into three archetypes, which will be discussed below. They are the commercial archetype, the neutral platform archetype, and the industry-specific archetype. We stress that these are archetypes, so variations might exist, types might be mixed, and multiple archetypes or variations of it might coexist.

### 5.2.1 Commercial archetype

The scenarios that follow the commercial archetype comprise the probability of an **ICT or software company** taking up the role as the platform provider. it encompasses four scenarios with the following platform providers:

1. an ICT or software company from within the project
2. an ICT or software company from outside the project
3. a new start-up company
4. a consortium of project partners

The archetype is analysed along a list of parameters that assumingly result in the same configurations for all four scenarios. In most of the scenarios, it is likely that the developed platform will be proprietary. If the fourth scenario materialises, the platform will be open until another solution is set up. If the new platform provider is an ICT or software company from within the project, it will be a European organisation that is in charge.

Since these are all ICT-related companies, platform hosting, server infrastructure and web space might change to the company's own infrastructure.

The main goal of these commercial partners would be to make profit from the platform (eventually via cross-subsidisation of other products). Hence, the purchase or licensing of the platform is crucial and needs to be well assessed. Via a buyout, the equity of the other companies can be acquired or a license agreement is set up. Some advantages of the ICT or software company within the project is that self-developed parts and components (including apps) do not need to be purchased or licensed but pass into the net assets of the ICT or software company. Other advantages for an existing ICT or software companies are that they already provide products that can be bundled to the newly acquired platform and cross-subsidise products. They moreover profit from an existing customer base that are familiar with the company's offer.

Depending on the structure of the company, the platform can find its way and expertise in one or multiple different lines of businesses where their customers are active. In other words, the platform remains domain-neutral, but it might be utilised in multiple domains.

As specified, the availability of apps adds value to the platform. But developers will only be attracted once a significant amount of business users are on the platform. It is thus assumed that the first apps will be developed by the platform itself (or taken over from the current FI-PPP project). Some key apps (cf. baseline apps) might need constant maintenance and ensured availability, thus the platform provider might have to provide and maintain these apps themself. This scenario seems attractive for developers and business users assuming that the ICT or software company can attract a critical mass. If the last scenario, the consortium of project partners, materialises, it could be more difficult to build this critical mass due to the uncertainties that this situation implies.

If the platform operator is an ICT or software company, it naturally intermediates a multi-sided market and is supposed to balance the requirements and demands of all sides. The platform is in the position to capture value between these sides. It will however not itself present a buyer or seller and thus decreases the value of the platform if the businesses on either side do not adopt the innovation. More complex, the platform intermediates multiple two-sided markets: one of the business users that represent buyers versus sellers as well as the one of industry partners and app developers. Whereas it is a matter of strategic acting to define which business user to address (and incentivise) first, the platform will only get app developers on board as soon as business users are on board. That means that multiple roles need to be conducted in-house firstly (e.g. developing of apps) that might be handed over increasingly to third parties soon as the size of those markets grows. Since it is most likely that the business users are existing customers of the ICT or software company and the platform might be bundled with other offers, registration fees for business users may not apply in this scenario. However, there may also be a danger in too much bundling. This would make the platform more closed and risk repel customers afraid of lock-in.

It should also be noted, that the ICT and software companies compete with others on the market with similar solutions from their competitors. Decisions of adopting this innovation (here: the platform) are optional for business users and might depend on a broad range of factors that exceed the list provided here. The way of how the platform addresses the issues of the businesses and can transform it into reality will decide upon its rate of adoption.

### 5.2.2 Neutral platform archetype

The second scenario archetype consists of those scenarios that have the neutral standpoint of the platform operator in common. It commons the three scenarios with the following platform providers:

1. Joint venture of industry players (or existing industry organisations)
2. Non-profit organisation or university
3. Public authority

As mentioned, the common denominator is that all these scenarios are based on neutral platform operators that most likely will aim to keep the platform open rather than restrict it with proprietary standards. The joint venture of industry player, or an existing industry player for that matter, might do so to allow as many of its members to join. The other platform providers will do so because they have no commercial interest and from their position should support open standards. Compared to the previous group, the partners in this group do not necessarily operate the platform in order to make a profit, but rather because they have certain goals and see the platform as an added value to achieve these goals. As such, the platform goal will emphasise functionality rather than monetisation, although let it be noted that probably all of these partners would prefer a break-even rather than a negative investment.

Since none of these potential platform operators is an ICT company, it is most likely that the actual platform development, hosting and maintenance will be outsourced to a third party. One example might be the university, which might have an elaborate server architecture as well as the know-how to operate it. At the same time, none of these partners have apparent products to bundle the platform with. An exception might be when the industry organisation or the public authority has some kind of information or administration system that they want bundled.

In the case of the joint venture, the non-profit organisation or the university, it is likely that they will be developing their own apps as well, although the amount might be limited. In all cases except the university, the most likely candidate is an app to communicate with the platform provider concerning its other activities. For instance, a public authority could arrange a permit system or tax declarations via a platform app. Additionally, the industry organisation could develop an app for matchmaking between its members. All of these apps are strategic and reflect the nature of the platform operator, and thus will be limited in number. As said, the exception will be the university. They will perhaps not have direct business collaborations with the (industrial) business users, but develop apps either to fill the store and/or for their academic merit.

A platform operated by an industry organization will be very attractive to developers since they can access a large client base, due to the collective adoption decisions. This might also make it attractive to business users since many of their industry associates will be on the platform. When a public authority would operate the platform, this might bring an authoritative adoption decision, which would force business users and stimulate app developers. At the same time, developers might be less eager since public budgets might be lower than commercial ones, and the platform might be less facilitated for monetisation. The same applies for the non-profit and university scenario, and because of the optional adoption decisions the platform in this case might struggle to gather a significant pool of business users.

When a university or non-profit organisation becomes the platform provider, they will be the intermediate in a two-sided market. The public authority and the joint venture of industry partners will have stakes in a certain market side.

### 5.2.3 Industry-specific archetype

The industry-specific archetype consists of the only remaining scenario: a company or other sector-specific player sets up a platform for a specific sector or domain. This is a particular scenario, since this one will make it very likely that multiple instances of the platform exist next to each other, serving different industries or domains. Most likely, this company has the financial resources to operate a platform, or have it operated, and has a power over its suppliers and clients so that they can enforce the adoption of the platform. If not, it is unlikely that the platform will succeed. In any case, a sector-specific player with a

strong enough industry position will have the possibility to stimulate both the business users' market and the app market, and may be able to reach critical mass through the generation of intra-industry network effects. In this scenario, it can become an issue that apps and other functionalities are not interoperable with other instantiations of the platform.

A motivation for operating the platform will likely be the efficiency it would create for the company's internal processes. In that way, the company saves money, which in part will pay the operation of the platform. The platform in this form will only serve a limited set of business users, which means that the smaller scale will reduce operational costs compared to the large-scale platform in the other scenarios.

In this case, it is also very likely that the company will provide its own apps, although probably developed under commission. As a downside, given its small scale, the attractiveness towards external developers will be very limited.

If the platform operator is a business user of the platform as well, it will not be an intermediate in all two-sided markets.

## 5.3 List of options to be defined

Based on the analysis in the previous chapter, we have identified a list of parameters that any platform provider needs to take into consideration when designing the platform business model. These apply for all scenarios, independent of who is going to be platform provider of FIspace after FI-PPP Phase 2 (or eventually in a different configuration in FI-PPP Phase 3).

The parameters influence the choice for a particular business model and strategy of the platform. Conversely, parameters are influenced by the choice of the platform business model and strategy. In the following sections, the business model scenarios are analysed along these parameters. They can be separated into: (i) platform, (ii) platform and business user interplay, (iii) platform and app developer interplay, (iv) app developers.

Note that this list is not exhaustive, and further options could be identified in interaction with the trials.

### 5.3.1 Platform

The most direct options for the platform developers to monetise the platform are

- Selling
- Licensing

They are however dependent on an important factor, namely the Generic Enablers developed by FI-WARE. At the moment (presumably until the end of the FI-PPP Phase 3 projects), they can be used without costs. These decisions from the developers of the GE needs to be taken into consideration:

- GEs used in FIspace continue to be free to use for the platforms; maintenance might not happen in this option.
- Each developer sets charges/licence fees for individual GEs.
- Charges/licences apply for all GEs that are used in FIspace.
- FI-WARE sets flat-rate subscription fees to the GE catalogue.

### 5.3.2 Platform and business user interplay

The question of how to attract business users can manifest in several options:

- Monetary incentives (e.g. 'follow-the-free' where the first users don't have to pay, or the first users even *get* paid).
- Free instantiation of the FIspace service (SaaS, PaaS) including customised support and consultancy.
- PR and publicity of these companies via the platform's communication channels.
- If the platform operator has a dominant position, it can instruct or enforce the usage of the platform for business users.

In the decision how to attract business partners and which are the crucial partners, some distinctions could be made between the types of business users that are contacted:

- Incentivise according to different parameters (e.g. size of the company)

- Incentivise according to adaption time (e.g. follow the free)
- No differentiation between companies

The question of whether registration fees for business users shall be implemented:

- Yes
- No

Last, it needs to be insured that inactive/fake or impostor accounts are prevented:

- Registration fees
- Approving enrolling business user

### 5.3.3 Platform and app developer interplay

Incentives for developers to join might be:

- Monetary incentives
- Free and easy support
- Free SDK
- Access to data
- Clearly defined customers in a business context that might be more willing to pay
- Challenges, developer battles and prizes
- Publicity
- Special conditions for in-house developers of companies (company registration fee, monthly charges)

Charges for the SDK shall be implemented:

- Yes
- No

Whether registration fees for app developers shall be implemented:

- Yes
- No

Spam, malware and apps of low quality can be prevented via gatekeeping and certification. We distinguish the following options:

- Approval/certification process of apps from the platform (including even probable charges)
- Community-review and certification
- Self-certification for apps
- No approval process for apps

Two further points shall be highlighted: To stimulate the open app development, the platform provider shall consider ways for incentivizing the usage of open licence agreements.

In terms of testing the apps, the platform operator should enable test beds and beta-testing with business users.

The need for third-party data might apply in some of the use cases. It is thus up to the platform provider to decide upon the handling of these matters and whether or not to buy (a licence for) these datasets (examples are weather data or maps).

### 5.3.4 App developers

Within the current development of the FIspace platform in FI-PPP Phase 2, app developers create apps in the trials. It is yet open what happens to these apps. Options include:

- Selling/Licencing the app to the platform provider
- Selling/Licencing the app to another app developer
- Maintaining the app (e.g. charge business users)

## 5.4 List of values to be provided

The decisions that the platform provider needs to take upon these issues are closely connected to the on the envisioned value offer. These values come mainly from the feedback of business users leading the trials (currently situated in the agri-food and transport and logistics domain as specified in SAF and FInest). An initial list of values to be proposed is provided below. Partners named the following expected values of the platform:

- Easier access to larger markets
- Ease of use
- Cost reduction
- Better quality
- Visibility
- Increased/New revenue, premium prices
- Control
- New customers
- Innovation opportunities
- New outlet for services
- Increased product quality
- Wider application of certification and standardization
- Tracking / tracing / transparency through the chain
- Increase of trust
- Risk reduction

Note that an extended list of value can be proposed depending on type of user situation.

# 6 Implications

This deliverable has outlined the main conclusions of the business model analysis conducted so far (D520.1.1). It is clear that FIspace has the potential to address the problems of limited use of ICT in business collaboration networks in general and for SMEs particular. The platform, if widely used, can help unleashing so far unrealised efficiency gains. It is well positioned towards existing offers through its openness, the possibility to construct business collaboration on the platform and its possibility to mash-up and reuse applications and application components.

While the potential benefits are significant, there are a number of challenges to overcome. First, FIspace is envisioned to operate as a multi-level multi-sided platform. The platform will mediate business users (currently from the transport, logistics and agri-food sector) and app developers that create and provide apps via the FIspace Store. Second, the platform will mediate between business users as buyers and sellers of goods and services. Third, apps eventually mediate the same two sides of the market (with possible expansions to even more sides, such as advertisers). Inter-group network effects are foreseen. That means that the attractiveness of the platform to one type of customer is dependent on the number and importance of the customers on the other side. The project should stimulate these market sides, and even then it will take time before the platform reaches a (critical) mass of such customers.

The sustainability of the FIspace ecosystem model rests on the one hand on providing a viable business model for all stakeholders in the value network, allowing them to realise gains via the platform, and on the other hand on igniting a sustainable ecosystem for innovation, through stimulating, providing incentives and reducing barriers (i.e. increasing the innovative opportunities) for development of innovative apps (notably by, but not restricted to, SMEs and web entrepreneurs). They form a crucial part of the business model. It is worth emphasising that parts of the ecosystem need to be built early on. Other tasks in the FIspace project are dealing with these issues of ecosystem incubation during the project lifetime (T510).

Not only the number (quantity) of participants but also the ‘quality’ of those participants will matter for the attractiveness for the two-sided market. For applications, this means for instance releasing the FIspace Store with an initial set of apps, possibly beyond the existing set of baseline apps. This will stimulate early usage and demonstrate third-party developers how apps are developed. The more generic these apps are, the more innovative opportunities will arise for other apps to combine (‘mash up’) in order to create new functionalities (apps). Therefore, any potential exploiter of the platform should consider developing more of such ‘seed apps’. At the same time, enough space needs to be left for external developers. Equally important will be to attract ‘referral’ business users, in order to attract other business users to join the platform. We foresee those influential business users to be important in order for small business users (SMEs) to join.

FIspace will also need to provide business users with opportunities to evaluate the potential benefits of the platform. This will already happen during the project lifetime, and to be extended into the FI-PPP Phase 3, which provides an opportunity for scaling up these evaluation processes, but can also substantially increase the number of potential apps for FIspace, and thus further increase the value of the platform to the multiple market sides. In the process of attracting Phase 3 proposals (and eventually app developers in open calls) to build on the FIspace, it also makes sense to reduce a number of uncertainties. Apart from showcasing how the platform works, a clear path for how the platform will be provided after the FIspace project could be relevant and would increase its attractiveness for the different market sides and to provide potential app developers with business cases that goes beyond the short-term monetary incentives provided through the Phase 3 open call. Equally important, terms and conditions for app developers must be clearly spelled out and be transparent. From the FIspace ecosystem building perspective, it makes sense to make the platform available at no cost and to provide the platform components as open source. Such decisions can only be taken at project management level and by the beneficiaries. These decisions can be further supported by work in T550, Exploitation and IPR.

This deliverable outlined a number of scenarios for exploitation of the platform, which could provide first stepping-stone reducing business uncertainties. These scenarios (and possibly others that are not yet foreseen) need to be further iteratively assessed.

The previous chapter also presented a number business model parameters open for further refinement. They include a range of options for revenue models. Since these depend on further testing, the initial FIspace platform should ideally cater for many options, including e.g. membership fees, subscription fees, transactions fees.

Not least for marketing and stakeholder communication, we recommend that FIspace provides a clear and marketable statement of its offer. Though the platform should head towards meeting all value propositions, a single unique selling proposition should be found and communicated that is easy to comprehend for potential users and app developers. This clear benefit needs to be articulated throughout the project. It can draw on experiences from the trials. Further testing and evaluation is envisioned in the trials.

In a next step, it will be important to showcase how these benefits are actually realised; and equally important—if they are not realised—to analyse what the barriers are. For this purpose, T520 will engage with a selection WP400 trials, not only to assess the impact of FIspace on business operations, but also to iterate and elaborate different business model options. This will be done in several ways, including stakeholder workshops, questionnaires, and logging of business parameters. The logging variables need to be both desirable from a business perspective (i.e. be good determinants for the success of the platform or a trial) as well as measureable within a realistic testing set-up. The eight trails vary in their goals and applications, but in order to structure the testing, a general framework for logging these business model parameters was sketched out in D520.2.1, identifying parameters in the layers (phases) of the value network.

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