

Deliverable D500.2.3

Towards a Flspace Business Model

Second iteration of the deliverable previously named “Aggregation and Feedback to Generic Business Model and FI-PPP”

WP 500

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The Flspace Project

Leveraging on outcomes of two complementary Phase 1 use case projects (Flnest & SmartAgriFood), aim of Flspace is to pioneer towards fundamental changes on how collaborative business networks will work in future. Flspace will develop a multi-domain Business Collaboration Space (short: Flspace) 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, Flspace 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. Flspace 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

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- KocSistem; Turkey
- Aston University; United Kingdom
- ENoLL; Belgium
- KTBL; Germany
- NKUA; Greece
- Wageningen University; Netherlands
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- FloriCode; Netherlands
- Kverneland; Netherlands
- North Sea Container Line; Norway
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Dissemination Level

PU	Public	X
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RE	Restricted to a group specified by the consortium (including the Commission Services)	
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Document Summary

This deliverable contributes to the objectives of Work package WP500 of the Flspace 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 Flspace (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 Flspace value network and the outline of a number of business models for (i) the Flspace 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. This second iteration of the deliverable (M20) draws on the insights of D500.2.1 (Flspace Value network and General Business Model), it will summarise the conclusions of that deliverable (as was already included in the first iteration) and assess how Flspace technologies could be commercialised in a sustainable manner drawing on and updating the Extra deliverable on Flspace sustainability plan and support to Phase 3 (D500.7.4). In particular, the current sustainability plan is assessed against other 'foundation-based' business models. The deliverable also put forward some implications for the Flspace project.

Abbreviations

App	Software Application	IP	Intellectual Property
B2B	Business-to-Business	IPR	Intellectual Property Rights
B2C	Business-to-Consumer	ICT	Information and Communication Technology
D	Deliverable	KPI	Key Performance Indicator
DoW	Description of Work	LSP	Logistics Service Provider
EBM WG	The Exploitation And Business Model Working Group of the FI PPP	M	Month
EC	European Commission	PF	Plants and Flowers
e.g.	Exempli gratia = for example	RTD	Research and Technological Development
EU	European Union	SAF	SmartAgriFood
FFV	Fresh Fruit and Vegetables (FFV)	SE	Specific Enabler
FIA	Future Internet Assembly	SDK	Software Development Kit
FI-PPP	Future Internet Public Private Partnership	SME	Small and Medium Sized Enterprise
FMS	Farm Management System	ST	Sub-Task
FP7	Framework Programme 7	SW	Software
GA	Grant Agreement	TIC	Tailored Information for Customers (TIC)
GE	Generic Enabler	TIS	Tailored Information System
HW	Hardware	T	Task
ICT	Information and Communication Technology	WP	Work Package
IPR	Intellectual Property Right	W3C	WWW Consortium
i.e.	id est = that is to say	WWW	World Wide Web
IoT	Internet of Things		

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1 Introduction

This deliverable summarises the conclusions of Deliverable D500.2.1 and put forward some implications for the Flspace project. It includes in addition an overview of foundations to provide a benchmark for the Flspace Foundation. This chapter will first put the deliverable into context (Section 1.1). Subsequently, the objective of the deliverable is specified (Section 1.2). A brief overview of the approach and the structure of the deliverables is given (Section 1.3)..

1.1 Business modelling in the context of Flspace

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

1.1.1 Flspace

The Flspace 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. Flspace 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 eco-systems (social networks and app/service markets).

The central features of the Flspace collaboration service will be:

- provisioning of the Flspace service, following the Software-as-a-Service (SaaS) as well as Platform-as-a-Service (PaaS) delivery model, which means that Flspace 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 Flspace 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 Flspace 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 Flnest 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 Flspace 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 Flspace 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):

- Flspace Development (WP200), which addresses the iterative design, implementation and testing of the software components implementing the Flspace service, while incorporating feedback from users and developers, thereby ultimately enabling the app ecosystem;
- Flspace Hosting & Experimentation (WP300), which is responsible for setting up compute infrastructures, deploying the Flspace 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 Flspace 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 Flspace 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 Flspace, 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 Flspace (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 Flspace value network and the outline of a number of business models for (i) the Flspace 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 Flspace 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 Flspace 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 Flspace 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.

This second iteration of the deliverable (M20) draws on the insights of D.500.2.1 (Flspace Value network and General Business Model), it will summarise the conclusions of that deliverable (as was already included in the first iteration). In addition it assesses how Flspace technologies could be commercialised in a sustainable manner drawing on and updating the Sustainability plan D 500.7.4. In particular, the current sustainability is assessed against other ‘foundation-based’ business models. The deliverable also puts forward some implications for the Flspace project.

1.3 Approach and overview of the deliverable

This first chapter (Chapter 1) has introduced the context, objective and approach used.

Chapter 2 presents a consolidated Flspace Business Model Canvas.

Chapter 3 examines the Flspace platform in the light of received theory on platforms and multi-sided markets, and positions Flspace vis-à-vis a selection of B2B and B2C platforms.

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.

Chapter 6 is a new chapter, which describes the governance model chosen by Flspace, namely a foundation. It provides an overview of foundations in the software activity with a focus on the lessons that can be applied to the Flspace Foundation.

Finally, Chapter 7 presents implications and conclusions.

2 Flspace Business Model Canvas

This chapter presents the outcome of an analysis performed in D500.2.1. Based on the FInest and SAF parent projects (Phase 1 of the FI-PPP), it consists in the Flspace Business Model Canvas.

The point of departure for Flspace 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 Flspace BM canvas, as analysed through the lens of the parent projects FInest¹ and SAF is summarised in Table 2–1.

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

Table 2–1: Flspace merged canvas

Key Partners	Key Activities	Value Proposition	Customer Relations.	Customer Segments
Hosting services provider IoT hardware and service providers SW developers, integrators and consultants Machine and material suppliers Financial service providers Industry associations Standards / Certification bodies Governments / authorities Research institutes End-consumers	Platform management Platform operations Service provisioning Marketing Continuous improvement Design and develop Consultancy Maintenance Promotion and networking Key Resources Platform technology App store Apps / services Server infrastructure Cloud GEs IPRs Information Trust	Easier access to larger markets Ease of use Cost reduction Visibility Increased / new revenue, premium prices Control New customers Innovation opportunities New outlet for services Improved product /service quality Wider application of certification and standardization Tracking / tracing / transparency through supply chains Increase of trust Risk reduction	Ease of use, deployment and development SDKs Personal support Online support Automation tools Self-service Information provision / exchange Robust help Community build-up User feedback Channels Support relationship Web presence (incl. social media) Direct sales / Events Existing networks (e.g. internal sales force, direct marketing, business communication, advertising, sector organisations and PR-agents.) App store / Marketplace Advertisements Word of Mouth Government or industry organisations	<u>Business users</u> E.g. shippers, farmers, growers, animal producers, manufacturers, suppliers, logistics service providers, retailers, supermarkets, food processors, traders, crate managers, End consumers Government, standard and certification organisations. Application developers Advertisers (Society)
Cost structure		Revenue streams		
Operational costs (hosting, maintenance, support, etc.) Marketing costs (sales, advertising, acquisition, events, etc.) Development costs (ICT infrastructure (sensors), SDKs, continuous improvement, training, etc.) Costs for other partners in the Flspace ecosystem, e.g. <ul style="list-style-type: none"> - cost reductions induced by Flspace - costs of using Flspace services and apps - cost for app developers 		Membership/Subscription fees (Saas) Advertising fees Transaction fees SDK fees Sales of Information / Analytics Consultancy / service fees Revenue streams for other partners: HW sales, SW licenses, hosting fees, ICT service, consultancy and system integration fees, charging fees for financial transactions		

3 Flspace as a B2B platform

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

The vision that guides the development of the platform (e.g. in WP200) is that Flspace 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. Flspace 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 Flspace 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 Flspace tools. These mashed up solution will address in real-time specific business opportunities and can be discarded when those has been addressed. Figure 3–1 depicts the overall vision for the Flspace service.

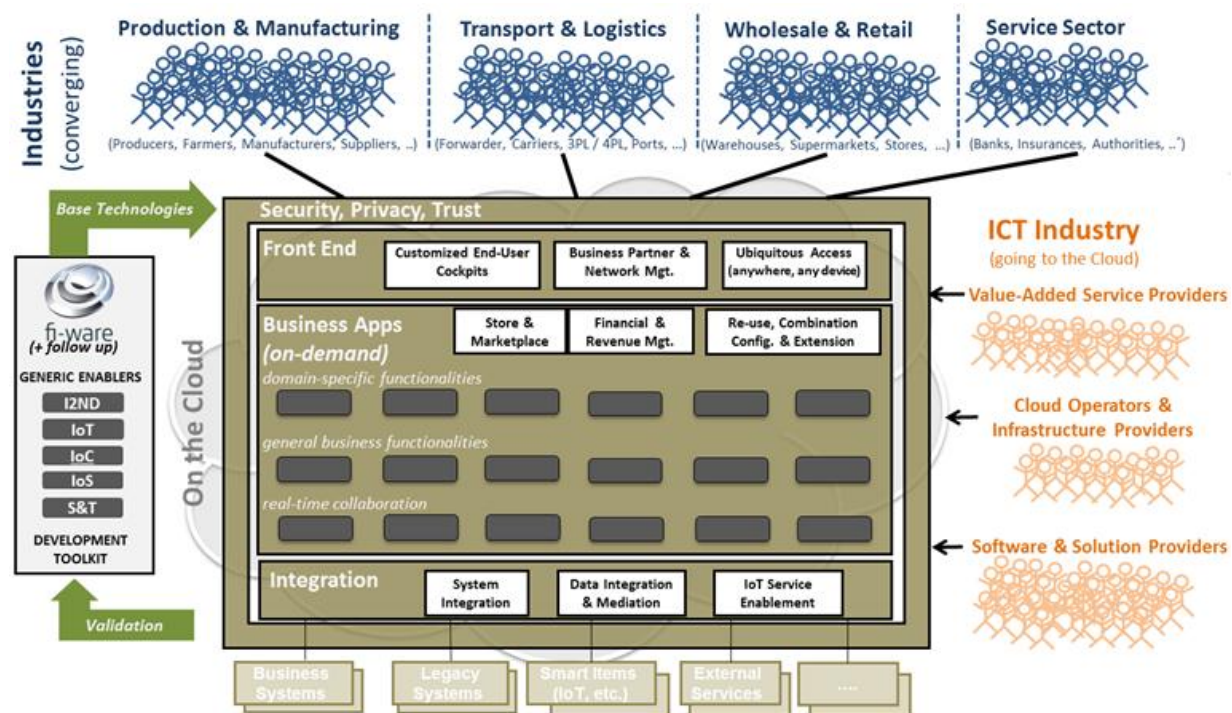


Figure 3–1: Flspace overall vision

Apart from the parties developing and providing (parts of) the Flspace 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 engineers² support the businesses in the configuration of the Flspace 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 Flspace Store that provides the tool-supported infrastructure for providing, finding, and purchasing Flspace 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 inte-

² This role was been renamed 'business architects' as the project progressed. In this iteration of the deliverable we stick to the original terminology.

gration 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 Flspace, 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 Flspace components and apps and the consistent behaviour of the Flspace.

Flspace 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 Flspace 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 Flspace 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 Flspace Store best-sellers should not just be internal apps.
3. Like the holistic solution, Flspace 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. Flspace 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 Flspace 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 Flspace 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 Flspace 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 Flspace, 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 4–1).

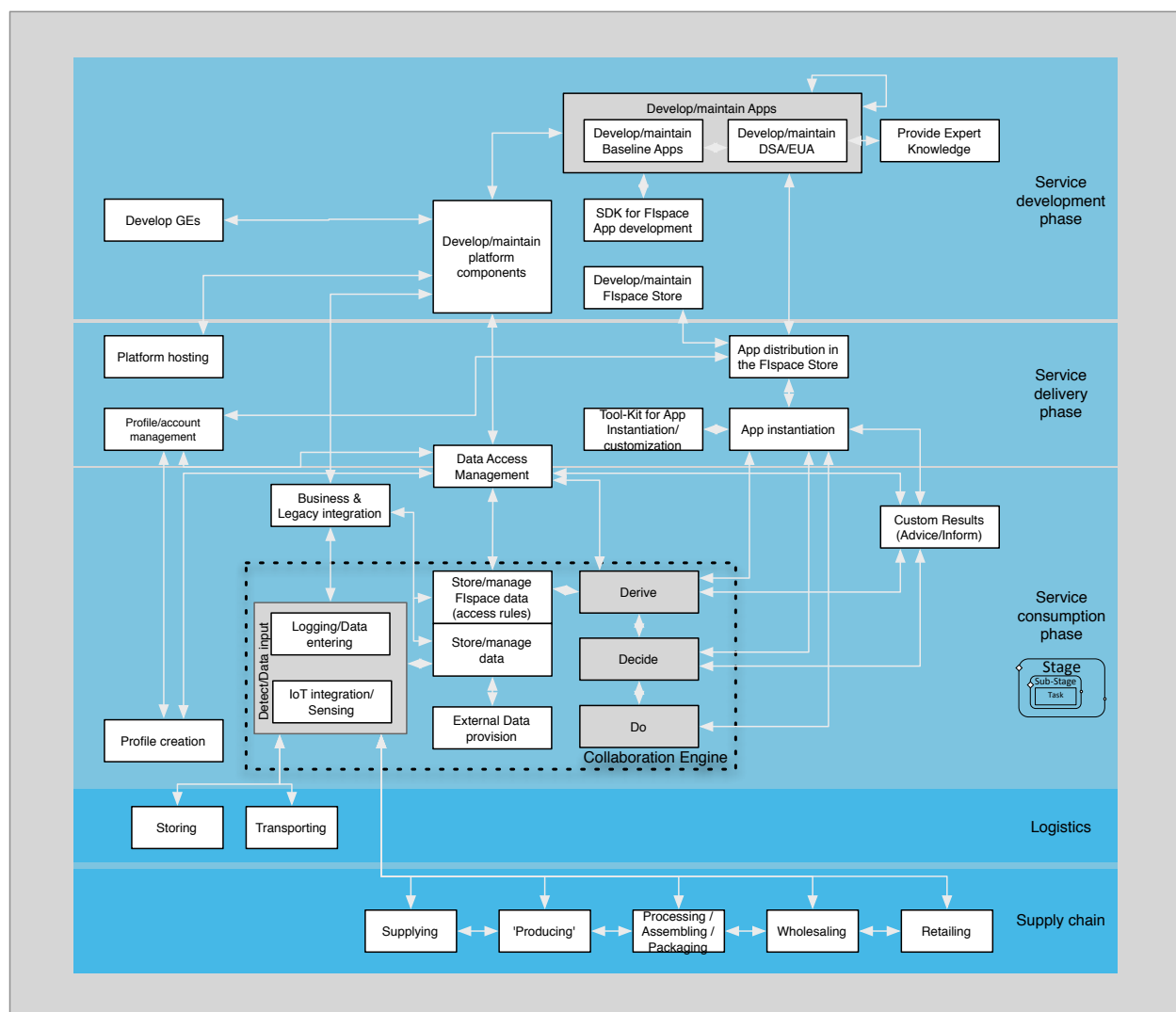


Figure 4–1: Flspace Generic Value Network

These roles and tasks (illustrated as white or grey boxes) are then mapped into the phases as briefly summarised below (Table 4–1).

Table 4–1: 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 Flspace 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 Flspace (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 Flspace 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 Flspace 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 Flspace Store	Develop and maintain the tool-supported infrastructure for providing, finding, and purchasing Flspace apps that provide re-usable ICT-solutions for business collaboration and can be used and combined for the individual needs of end-users, including: <ul style="list-style-type: none"> - the SW infrastructure to support the provisioning, consumptions, purchase, and re-use of Flspace apps for both business and App Developers - financial management (pricing, payment, revenue sharing).
Service delivery phase	Provisioning of services to users
App distribution in the Flspace 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 Flspace 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 Flspace 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 4–2.

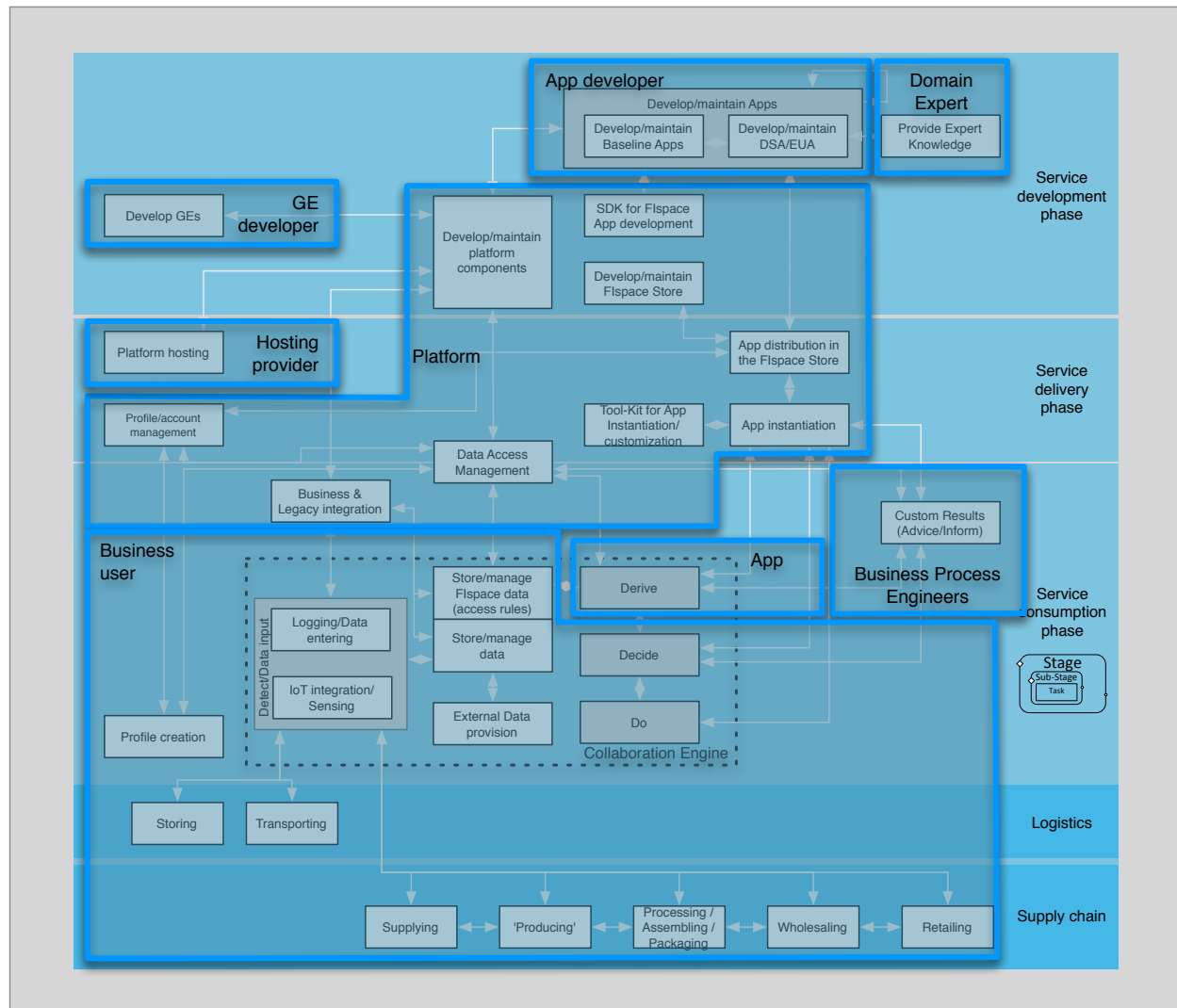


Figure 4–2: Main partners in the value network mapped to their roles

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 Flspace 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 (Flspace 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 Flspace 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 Flspace 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 Flspace 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 Flspace 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 Flspace 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 Flspace platform provider after the end of the Flspace 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, agri-food, assembling) sees the benefit of a centrally provided Flspace 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 Flspace (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 5–1 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 5–1: Comparison of business model scenarios

	Commercial Archetype					Neutral Platform Archetype				Industry-specific Archetype
	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 themselves. 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 players, 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 a 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 a joint venture, a non-profit organisation or a 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 one, 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, an 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. Also a university solution could be less suitable since they typically develop prototypes or beta-versions based on research and often lack resources such a help-desk capacity.

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, or – in the case of an (agricultural) cooperative – with its members. 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 (although in a cooperative that could be 10.000), 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 Flspace 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 the Generic Enablers' status, notably after the end of the FI-PPP.

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 Flspace 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.
- Possibly there could be no registration fee 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

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 include:

- 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)
- Free registration

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 Flspace 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 envisioned value offer. These values come mainly from the feedback of business users leading the trials. Partners named the following expected values of the platform:

- Easiness (easier access to larger markets, ease of use)
- Cost reduction
- Better quality (incl. at product level)
- Visibility
- Increased/New revenue, premium prices
- Trust & Control
- Market expansion (new customers, new outlets for services)
- Innovation opportunities
- Wider application of certification and standardization
- Tracking / tracing / transparency through the chain
- Risk reduction

6 Flspace choices concerning business sustainability³

This chapter first describes the governance model chosen for the continuation of Flspace after the project ends, i.e. a foundation (Section 6.1). It then details nine foundations that provide the basis for our benchmark: W3C, Linux, Apache, OpenStack, Mozilla, Cloud Foundry, AgroSense, Wikimedia and WordPress (Section 6.2). An overview of their main features is then given (Section 6.3). The chapter concludes with potential lessons, and pending questions for Flspace (Section 6.4).

6.1 Choice of sustainability model – a Flspace Foundation

This section summarizes the choices and plans made for the Flspace sustainability model. It draws on Deliverable D500.7.4, and following discussions, presentations and decisions as received up until Nov. 2014.

The Flspace consortium decided in its General Meeting in March 2014 in Haifa to move to commercial exploitation as soon as possible, i.e. after the FI-PPP Phase 2 and the termination of the Flspace project. Main options for this were identified, a timeline with related action items was elaborated and the road for decision-making was agreed between the different project partners. Moreover, as expressed during the review meeting that followed, several end-user partners such as Kuehne + Nagel, Kverneland and NCL have clear (and to some extent common) expectations towards Flspace's commercial exploitation. For example, these organisations would not like to be locked-in or exploited by a monopoly situation in which one commercial company controls all IPRs. Therefore, to summarise these key expectations, Flspace end-user companies have detailed a list of "10 commandments". As these are the key expectations from future users, these could also be considered key success factors for Flspace adoption from an end-user point of view:

1. The platform must be forever neutral (it cannot ever be dominated by any single organisation)
2. Structured and standardised (business makers cannot fully exploit the platform if it is not consistent globally)
3. Must be transparent, trustworthy and secure (no compromise on how the platform operates for the end users)
4. Freedom to create new ecosystems (no restrictions on the business opportunities that can be created from the platform as long as rules are followed)
5. Must be available to all (no exceptions allowed apart from legal obligations. It must be available inside and outside EU)
6. Development patterns must not create restrictions for future exploitation
7. Dispute resolution process (there must be a means by which disputes are resolved)
8. Platform needs to continually grow and evolve (this creates the sustainability)
9. The technical service provision must be affordable and robust (high costs for technical services will negate the benefits to many SME's. This will only happen if there is competition in all development and technical aspects)
10. Ownership and governance (must be 'Light touch' but effective when necessary).

After the review meeting (May 2014), several discussions within the current Flspace consortium took place. Two main types of options were considered: (1) a Flspace-platform company or (2) a Flspace foundation. Since the second option eventually prevailed, we just briefly touch upon the first option where a company would take over the Flspace platform and exploit the platform (see also 5.2.1). This company could for instance be an ICT company from inside the consortium, or a joint venture of companies from inside and/or outside, possibly backed by VC funding, the consortium or an outside organisation that would have to acquire Flspace technology. The platform company could contract with an IT service provider company.

³ This section draws heavily on D500.7.4 unless otherwise stated.

The other option was to move all IPRs in a foundation that would make the Flspace know-how (code, standards) available as open source. This not-for-profit organisation (from now on called Flspace Foundation) should encourage the use of the know-how as open source and allow companies to use the open source standards and codes in commercial products. This solution was inspired by the WWW Consortium (W3C), which secures interoperability on the World Wide Web with commercial browsers like Chrome and Internet Explorer as well as open source ones. Linux (and its link with companies such as Red Hat) was another example of success in establishing de facto standards based on open source. This governance model is graphically presented in Figure 6–1. This commercialisation model is accordingly a combination of the generic business models analysed in Chapter 5.

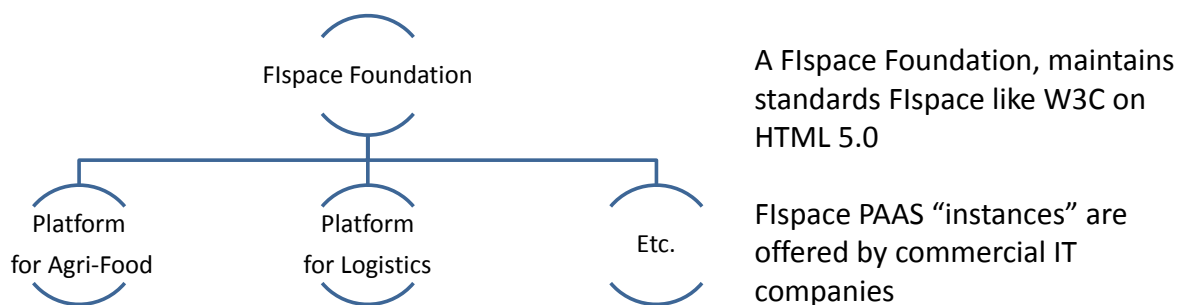


Figure 6–1: Possible governance structure of Flspace in the commercial stage.

Given the comments in the review meeting, taking also into account the developments in the FIWARE FI-PPP programme in general and discussions on the FIWARE Foundation, the Flspace consortium decided to establish a formal open governance model for the Flspace project. Key building blocks in establishing such a model are the Flspace Foundation and an initial instance: the Flspace Lab.

The Flspace Foundation would take over all the Flspace know-how (code, standards) and make it available as open source on its website. The Flspace Foundation would encourage the use of the know-how in open source projects and allows companies to use the open source standards and codes in commercial products and services. The main planned activities of the Flspace Foundation are to:

- manage the components and standards in Flspace communication;
- grant the Flspace trademark/product (Flspace certification). The Flspace foundation will be the one and only institution that provides licenses for Flspace instances.;
- market the principles of Flspace to establish new ecosystems and get new parties on board;
- solve dispute be parties using Flspace standards and components;
- agree on the expansion of the Flspace functionalities and include new standards and components in new releases

A few current Flspace partners have already indicated that they plan to create a Flspace instance for commercial exploitation in one or more domains. The commercial instances could for instance be Agri-Food instances in The Netherlands or Greece or a logistics instance in Scandinavia/Germany. In the longer term, the consortium wants to encourage companies outside the current consortium to offer their own Flspace platform and to ensure instances are interoperable. This model is also attractive for encouraging external funding through e.g. venture capitalists. The timing of the sustainability plan is shown in Figure 6–2.

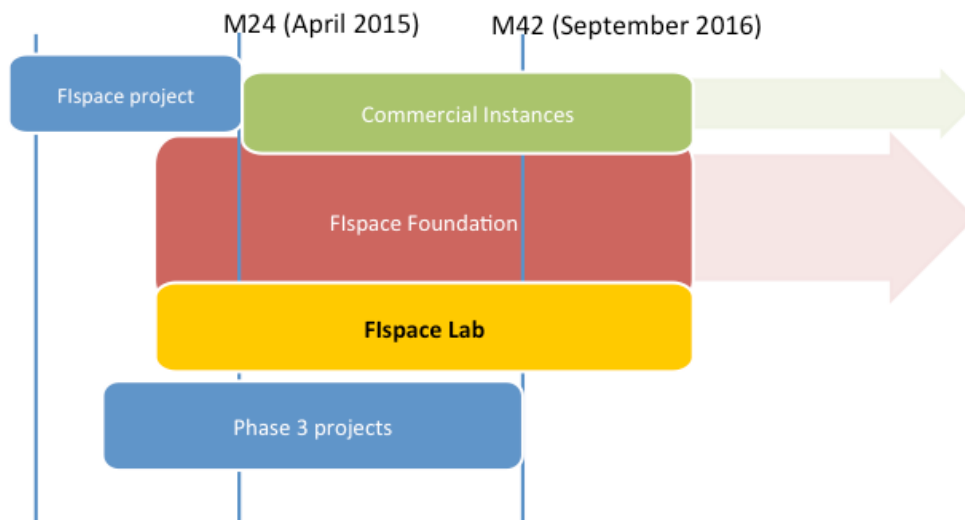


Figure 6-2 Flspace sustainability plan

In order to provide an experimental environment (primarily for FI-PPP Phase 3), there will also be a pre-commercial stage during which an open specifications instance (the Flspace Lab) of the platform will be established. The Flspace Lab will be a continuation of the current cloud instance hosted by KOÇSistem and maintained by the main Flspace partners currently in charge of the platform development. In addition the Apps that are currently being developed will also be put in that lab and maintained by their current developers. The Flspace Lab is especially meant for support to the FIWARE Accelerators and their applicants in Phase 3 of the FI-PPP. It will be maintained until the end of the programme. The relationships between the Flspace Foundation, the Flspace Lab and the commercial instances are shown in Figure 6-3.

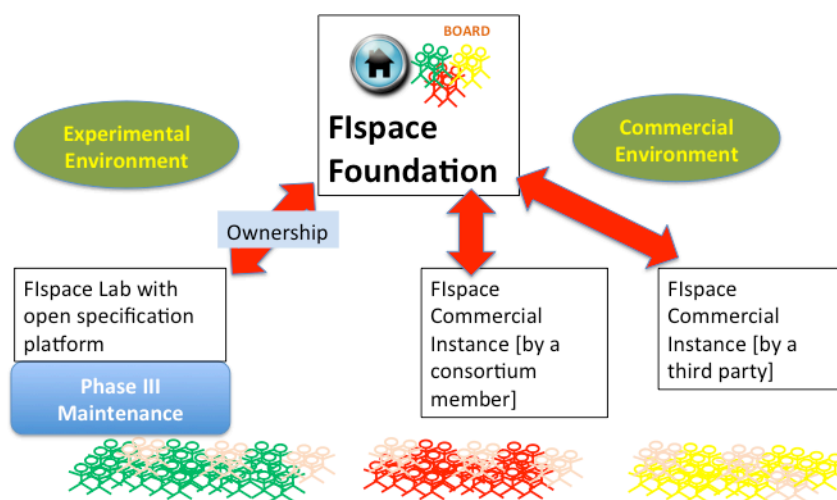


Figure 6-3 Flspace sustainability governance structure

If app developers from the accelerators will use Flspace, they will start in the Flspace Lab but when commercial instances are available they can decide to make their App/Service also available there. For that purpose they would make commercial agreements with the company or the consortium that owns such an instance. Several commercial instances can also compete with each other by maintaining different business models. This is in line with the 'ten commandments' that were previously defined in the project.

To conclude, while developing the sustainability plan, Flspace has decided to move towards a Foundation. The core goal is to safeguard the platform. While we may expect rather low costs for fulfilling that goal, for which the foundation should be able finance via modest membership fees, there might be other

activities that the Flspace Foundation should engage in order to support the sustainable commercial exploitation of the platform. For such, more ambitious purposes, some governance and revenue options might be better suited than others. In order to contribute to that discussion, a benchmark of foundation based business models was conducted. This benchmark is reported in the next section.

6.2 Benchmark of foundations and relevant organisations

This section gives an overview of a selection of foundations, and relevant organisations, active in software activity.⁴ This is done in order to extract best practices that could apply to the Flspace Foundation. Each organisation is described in general terms, along with a description of its governance and organisation as well as the types of revenues and costs the foundation has. The list of foundations to be reviewed consists of the W3C Consortium (Section 6.2.1), the Linux Foundation and RedHat (Section 6.2.2), the Apache Software Foundation (Section 6.2.3), The OpenStack Foundation (Section 6.2.4), the Mozilla Foundation (section 6.2.5), Cloud Foundry (Section 6.2.6), AgroSense (section 6.2.7), the Wikimedia Foundation (section 6.2.8), and the Wordpress Foundation (Section 6.2.9). The review draws mainly on publicly available information.

Key features of the foundations are summarized in Section 6.3 and implications for the Flspace foundation discussed in Section 6.4. The time-pressed reader is encouraged to skip directly to Section 6.3.

6.2.1 WWW Consortium (W3C)⁵

The World Wide Web Consortium (W3C) is the main international standards organization for the World Wide Web (WWW or W3).⁶ Founded and currently led by Sir Tim Berners-Lee, the consortium is made up of member organizations, which maintain full-time staff for the purpose of working together in the development of standards for the World Wide Web. As of 22 October 2014, the World Wide Web Consortium (W3C) had 402 members. W3C also engages in education and outreach, develops software and serves as an open forum for discussion about the Web.

W3C tries to enforce compatibility and agreement among industry members in the adoption of its standards. One of the objectives is to avoid incompatible versions of HTML offered by different vendors and causing inconsistency in how web pages are displayed. The consortium tries to get all those vendors to implement a set of core principles and components, which are chosen by the consortium.

W3C was founded by Tim Berners-Lee (after he left CERN) in 1994 at the MIT Laboratory for Computer Science with support from the EC and the DARPA, with hosts established in Europe (INRIA) in 1995 and Japan (Keio University) in 1996. From 1997, W3C started to create regional offices around the world⁷

6.2.1.1 Governance, organisation and main activities

W3C does not have a typical organizational structure, nor is it incorporated. However, in administrative terms W3C is governed via a joint agreement among its "Host Institutions": MIT (in Cambridge, MA, USA), ERCIM (in Sophia-Antipolis, France), Keio University (near Tokyo, Japan) and Beihang University (in Beijing, China). The W3C staff (many of whom work physically at one of these institutions) is led by a Director and CEO. A small management team is responsible for resource allocation and strategic planning. Regional offices play an important role in W3C being an international organization.⁸

The W3C Process Document⁹, Member Agreement¹⁰, Patent Policy¹¹, and some others documents establish the roles and responsibilities of the parties involved in the making of W3C standards. Some key components of the organization are¹²:

⁴ Note that only a selection of the multitude acronyms of this section can be found in the list of abbreviations.

⁵ This section draws mainly and heavily on information from the W3C webpage. <http://www.w3.org/Consortium/facts.html> and also http://en.wikipedia.org/wiki/World_Wide_Web_Consortium#Administration unless otherwise quoted

⁶ http://en.wikipedia.org/wiki/World_Wide_Web_Consortium#Administration

⁷ http://en.wikipedia.org/wiki/World_Wide_Web_Consortium#Administration

⁸ <http://www.w3.org/Consortium/facts.html>

⁹ <http://www.w3.org/2014/Process-20140801/>

¹⁰ <http://www.w3.org/2009/12/Member-Agreement>

¹¹ <http://www.w3.org/Consortium/Patent-Policy-20040205/>

¹² <http://www.w3.org/Consortium/facts.html>

- Advisory Committee: includes one representative from each W3C Member. It has a number of review roles in the W3C Process, and elects the Advisory Board and Technical Architecture Group (TAG).
- Advisory Board: an advisory body elected by the Advisory Committee. Provides guidance on issues of strategy, management, legal matters, process, and conflict resolution.
- Technical Architecture Group (TAG). Primarily seeks to document Web Architecture principles.
- The W3C Director and CEO. Assesses consensus for W3C-wide decisions.
- The chartered groups: populated by Member representatives and invited experts. Produces most of W3C's deliverables according to the steps of the W3C Process.

W3C does not have a single physical headquarter. There are four institutions, however, that "host" W3C: MIT, ERCIM, Keio University, and Beihang University. W3C has a relatively small staff team, around 50–60 worldwide recently. The staff is distributed around the world, including Cambridge, Massachusetts (USA), Sophia-Antipolis (France), and Tokyo (Japan). In addition, W3C is represented in 17 other regions of the world via representatives. W3C calls these regional points of contact "W3C Offices". The W3C Offices work with their regional Web communities to promote W3C technologies in local languages, broaden W3C's geographical base, and encourage international participation in W3C Activities.

Most W3C work revolves around the standardization of Web technologies. As of 2010, the majority of standardization is done by external experts in W3C's various working groups. To accomplish this work, W3C follows processes that promote the development of standards based on community consensus. Standards include the following areas:¹³

- *Web Design and Applications* involve the standards for building and Rendering Web pages, including HTML, CSS, SVG, Ajax, and other technologies for Web Applications ("WebApps").
- *Web Architecture* focuses on the foundation technologies and principles that sustain the Web, including URLs and HTTP.
- *Semantic Web*, is helping to build a technology stack to support a "Web of data," (in addition to web of documents), with the goals to enable computers to do more useful work and to develop systems that can support trusted interactions over the network. The term "Semantic Web" refers to W3C's vision of the Web of linked data. Semantic Web technologies enable people to create data stores on the Web, build vocabularies, and write rules for handling data.
- *XML Technology*
- *Web of Services* refers to message-based design frequently found on the Web and in enterprise software.
- *Web of Devices* enables Web access anywhere, anytime, using any device. This includes Web access from mobile phones and other mobile devices as well as use of Web technology in consumer electronics, printers, interactive television, and automobiles.
- *Browsers and Authoring Tools*

In addition to developing and maintaining those standards, W3C's activities include:¹⁴

- Liaisons with national, regional and international organizations around the globe. These contacts help W3C maintain a culture of global participation in the development of the World Wide Web. W3C coordinates particularly closely with other organizations that are developing standards for the Web or Internet in order to enable clear progress.
- The Offices Program, which promotes adoption of W3C recommendations among developers, application builders, and standards setters, and encourage inclusions of stakeholder organizations in the creation of future standards by joining W3C.
- Translations of Web standards and other materials from dedicated volunteers in the W3C community. W3C also has a policy for authorized translations of W3C materials. Authorized W3C Translations can be used for official purposes in languages other than English.
- Talks around the world in a variety of languages on Web standards by people closely involved in the creation of the standards.

W3C's Internationalization Activity helps ensure that the Web is available to people.

¹³ <http://www.w3.org/Consortium/facts.html>, <http://www.w3.org/standards/about.html>, <http://www.w3.org/standards/>

¹⁴ <http://www.w3.org/Consortium/facts.html>

6.2.1.2 Revenues

W3C receives funding from three sources (1) W3C Membership fees; (2) research grants and other sources of private and public funding, and (3) individual donations of money and equipment. W3C **membership fees** vary depending on the annual revenues, type, and location of headquarters of an organization. For instance, as of 1 September 2014, a small company in India would pay 1,905 USD annually, a non-profit organisation in the United States would pay 7,900 USD, and a large company in France would pay 59,500 EUR. Members include businesses, non-profit organizations, universities, governmental entities and individuals.¹⁵

In **addition, grants, external contracts, and other funding** support a variety of work at W3C, including Member-approved Activities (including Working Groups), W3C public communications, and W3C internal operations. They also help connect W3C to important communities and developments in emerging technologies and research.¹⁶ W3C also receives support through W3C Fellows Program and contributions through the W3C Supporters Program. W3C fellows program means that, in addition to W3C staff, some members pay directly the salaries for staff working for the W3C. The supporters program means that Members and non-Members make contributions, financial as well as in kind (e.g. software, hardware), to help support W3C's operations. Research grants include EC funded projects.¹⁷

Finally W3C offers individuals and organisations various ways to **sponsor** W3C activities, including general organisation sponsorship deal (from USD 150,000 and down), to event sponsors, web for all sponsors and developer sponsors.

6.2.2 The Linux Foundation

The Linux Foundation is a non-profit technology consortium chartered to foster the growth of Linux. Founded in 2007 by the merger of the Open Source Development Labs (OSDL) and the Free Standards Group (FSG). It is supported by leading Linux and open source companies, including technology corporations such as Fujitsu, HP, IBM, Intel, NEC, Oracle, Qualcomm and Samsung, and developers from around the world.¹⁸ The Linux Foundation promotes, protects, and standardizes Linux by providing a set of services to compete effectively with closed platforms.

Linux is a Unix-like computer operating system assembled under the model of free and open-source software development and distribution. The key component of Linux is the Linux kernel, an operating system kernel first released in 1991 by Linus Torvalds. It runs on a number of computer hardware platforms and is a leading operating system for servers, mainframe computers and supercomputers. Linux also runs on embedded systems, e.g. mobile phones, tablet computers, network routers, facility automation controls, televisions and video game consoles. Also Android is built on top of the Linux kernel.¹⁹

The Linux kernel and other components are free and **open-source software**. The underlying source code may be used, modified, and distributed (commercially or non-commercially) by anyone under licenses such as the GNU General Public License, which is used for the kernel and is a type of copy-left licence where any work derived from a copyleft piece of software must also be copyleft itself. Typically, Linux is packaged in a format known as a Linux distribution (either for desktop or server use). A Linux distribution – often called distro for short – is an operating system made as a collection of software based around the Linux kernel and often around a package management system. Linux distributions include the Linux kernel, supporting utilities and libraries and usually a large amount of application software needed to fulfil the distribution's intended use. Some popular mainstream Linux distributions include Debian, Ubuntu, Linux Mint, Fedora, openSUSE, Arch Linux, and the commercial Red Hat Enterprise Linux and SUSE Linux Enterprise Server.²⁰

The development of a distribution is largely driven by developer and user **communities**. Some vendors develop and fund their distributions on a volunteer basis (e.g. Debian). Others maintain a community version of their commercial distributions (e.g. Red Hat with Fedora and SUSE with openSUSE). In many cities and regions, local Linux User Groups (LUGs) promote their preferred distribution and by extension free software. This is done through meetings, the provision of free demonstrations, training, technical

¹⁵ http://en.wikipedia.org/wiki/World_Wide_Web_Consortium#Administration

¹⁶ <http://www.w3.org/Consortium/nmfunds#current-details>

¹⁷ <http://www.w3.org/Consortium/nmfunds#current-details>

¹⁸ http://en.wikipedia.org/wiki/Linux_Foundation

¹⁹ <http://en.wikipedia.org/wiki/Linux>

²⁰ <http://en.wikipedia.org/wiki/Linux>

support, and operating system installation to new users, support to Linux users and developers chatrooms or newsgroups, online forums (e.g. LinuxQuestion.org) and distribution specific support and community forums (e.g. for Ubuntu, Fedora, and Gentoo).²¹

Linux distributions are typically available for free, but still several large corporations sell, support, and/or contribute to the development of the components of the system and of free software including Dell, IBM, HP, Oracle, Sun Microsystems (now part of Oracle), SUSE, and Nokia. A number of other corporations, notably Red Hat, Canonical, and SUSE, have built a significant business around Linux distributions.²² Therefore, the relationship between a Linux distribution as a whole and individual vendors may be seen as symbiotic. One common business model of commercial suppliers is charging for support, especially for business users. A number of companies also offer a specialized business version of their distribution, which adds proprietary support packages and tools to administer higher numbers of installations or to simplify administrative tasks. Another business model is to give away the software in order to sell hardware.²³

6.2.2.1 Governance, organisation and main activities

The Linux Foundation is a non-profit consortium dedicated to fostering the growth of Linux. Founded in 2007, it also sponsors the work of Linux creator Linus Torvalds. The Linux Foundation promotes, protects and advances Linux by providing unified resources and services needed for open source to successfully compete with closed platforms.²⁴

The Linux foundation is governed by its bylaws (see <http://www.linuxfoundation.org/about/bylaws>). The organisation is lead by an executive director, and a management team.²⁵ The Linux Foundation serves as a neutral spokesperson for Linux and generates original content that advances the understanding of the Linux platform. It also hosts collaboration events among the Linux technical community, application developers, industry, and end users to solve pressing issues facing Linux. Through the Linux Foundation's community programs, end users, developers, and industry members collaborate on technical, legal, and promotional issues.²⁶

In order for Linux creator Linus Torvalds and other key kernel developers to remain independent, the Linux Foundation sponsors them so they can work full-time on improving Linux. It also manages the Linux trademark, offers developers legal intellectual property protection, and coordinates industry and community legal collaboration and education.²⁷

The Linux Foundation offers application developers standardization services, which include the Linux Standard Base (LSB) and the Linux Developer Network. It supports the Linux community by offering technical information and education through its annual events, such as the Linux Collaboration Summit, the Linux Kernel Developers Summit, and the general LinuxCon event.²⁸

The Linux Foundation also provides services to key areas of the Linux community, including an open source developer travel fund and other administrative assistance. Through its workgroups, members and developers can collaborate on key technical areas. There is also a training program that is vendor-neutral, technically advanced, and created with the actual leaders of the Linux development community.²⁹

The Linux Foundation eventually hosts a number of other collaborative projects, in which it shares its expertise and networks, and to which it provides a number of services.³⁰

6.2.2.2 Revenues

The Linux Foundation's funding comes primarily from its Platinum Members: Fujitsu, HP, IBM, Intel, NEC, Oracle, Qualcomm, and Samsung and for many years Hitachi. These nine, each having a representative

²¹ <http://en.wikipedia.org/wiki/Linux>

²² <http://en.wikipedia.org/wiki/Linux>

²³ <http://en.wikipedia.org/wiki/Linux>

²⁴ <http://www.linuxfoundation.org/about/faq>

²⁵ <http://www.linuxfoundation.org/about/faq>

²⁶ http://en.wikipedia.org/wiki/Linux_Foundation

²⁷ http://en.wikipedia.org/wiki/Linux_Foundation

²⁸ http://en.wikipedia.org/wiki/Linux_Foundation

²⁹ http://en.wikipedia.org/wiki/Linux_Foundation

³⁰ http://collabprojects.linuxfoundation.org/sites/collabprojects/files/lf_collaborative_projects_brochure.pdf

on the Board of Directors, hold a majority on the 16-person board. As of April 2014, the foundation collects annual fees worth at least 6,245,000 USD.³¹

6.2.2.3 Red Hat Enterprise Linux

Red Hat, Inc. is an American multinational software company providing open-source software products to the enterprise community. Founded in 1993, Red Hat has become associated to a large extent with its enterprise operating system Red Hat Enterprise Linux and with the acquisition of open-source enterprise middleware vendor JBoss. Red Hat provides operating system platforms, middleware, applications, management products, and support, training, and consulting services.³²

Red Hat creates, maintains, and contributes to many free software projects and has also acquired several proprietary software packages and released their source code mostly under the GNU GPL while holding copyright under a single commercial entity and selling user subscriptions. As of June 2013, Red Hat is the largest corporate contributor to Linux's Kernel (see Figure 6–4).³³

Business model³⁴

Red Hat started by developing and providing their own Linux distribution – Red Hat Linux. Initially most revenues came from telephone support.³⁵ Eventually the company stopped giving away their OS for free, and created the Red Hat Enterprise Linux (RHEL) which was sold through a subscription that included also updates, patches and bug fixes. It also created Fedora, a Red Hat-sponsored community project, which was first released in 2003 and initially based on Red Hat Linux code. Fedora and RHEL have a mutually beneficial relationship, with Fedora code serving as something of a testing ground for the enterprise features delivered to Red Hat's paying customers.³⁶ RHEL source code is freely available under GPL for those who want to compile it themselves, but the actual finished product costs money. Red Hat charges a premium for RHEL because it is (theoretically) guaranteed to work – Red Hat and third-party software vendors make sure that applications running on RHEL are not broken when the operating system is updated. For major customers, Red Hat creates a long-term support edition every two years. It commits to support this for a full decade, to the point of taking critical fixes from the Linux community and back-porting them to the older versions.³⁷ It could be noted patent troubles is a major cost for Red Hat³⁸

The business model of Red Hat could be summarized in a Business model Canvas, as in Table 6–1.

Table 6–1 Red Hat business model (Linux business)

Key Partners	Key Activities	Value Proposition	Customer Relations.	Customer Segments
Linux Open Source development community Other open source communities and enterprise businesses.	'Build' a distribution of Linux, including SW development, release, versioning and testing SW support services including updates, support and training	Continuously upgraded, serviced and guaranteed SW + Free open source SW	Self-service and direct access to engineers, mailing lists, forums	Enterprise client that pay for the subscription package (RHEL) or self-service users that use freely available versions (Fedora and CentOS)
	Key Resources		Channels	

³¹ http://en.wikipedia.org/wiki/Linux_Foundation:

³² http://en.wikipedia.org/wiki/Red_Hat

³³ http://en.wikipedia.org/wiki/Red_Hat

³⁴ <http://arstechnica.com/business/2012/02/how-red-hat-killed-its-core-productand-became-a-billion-dollar-business/> See also http://www.redhat.com/f/pdf/RH_ValueSubscription_3680017_0810_cw_web.pdf and http://www.redhat.com/f/pdf/rhel/RHEL6_Advantage_WP.pdf

³⁵ "Red Hat Linux was much like today's Fedora, releasing new versions quickly to get the bleeding-edge technology out to users. But new versions and patches could break old applications, and there was no ecosystem of software and hardware vendors supporting applications running on Red Hat. With RHEL, Red Hat gives the enterprise what it wants: a stable lifecycle and roadmap, and a more careful system for inserting patches without breaking application compatibility. That model has certainly proven its worth." <http://arstechnica.com/business/2012/02/how-red-hat-killed-its-core-productand-became-a-billion-dollar-business/>

³⁶ <http://arstechnica.com/business/2012/02/how-red-hat-killed-its-core-productand-became-a-billion-dollar-business/>

³⁷ <http://arstechnica.com/business/2012/02/how-red-hat-killed-its-core-productand-became-a-billion-dollar-business/>

³⁸ <http://arstechnica.com/business/2012/02/how-red-hat-killed-its-core-productand-became-a-billion-dollar-business/>

	Communities to maintain and improve Linux (and JBoss)		Redhat.com	
	Red Hat SW		Red Hat Global Branches	
	HQ support functions		Independent third parties	
	IP guarantee			
	Professional advisers			
Cost structure		Revenue streams		
Contains elements of a service company and a subscription model		Professional subscription.		

Source: [2] and <http://www.ict-prose.eu/wp-content/uploads/2014/01/PROSE-D3.3.pdf>

The following figure illustrates that Red Hat is the largest contributor to the Linux Kernel.

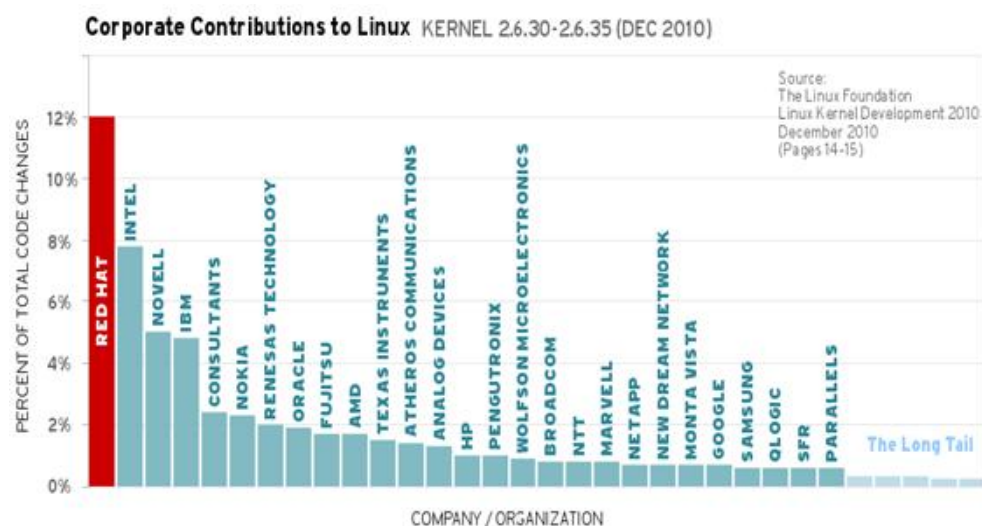


Figure 6–4 Corporate contributions to the Linux Kernel

Source: <http://www.redhat.com/en/about/blog/leading-in-enterprise-linux-by-the-numbers>, see also file:///Users/svenlindmark/Downloads/lf_pub_who_writes_linux_2013.pdf

6.2.3 Apache Software Foundation

The Apache Software Foundation (ASF) is linked to the Apache HTTP Server, development beginning in February 1995. A group of eight developers started working on enhancing the so-called NCSA HTTPd daemon. They came to be known as the Apache Group. In 1999, the Apache Software Foundation was formed and incorporated in Delaware. The name 'Apache' was chosen from respect for the Native American Apache Nation.³⁹ It is an American non-profit corporation to support Apache software projects, including the Apache HTTP Server. It is a decentralized community of developers. The software they produce is distributed under the terms of the Apache License and is therefore free and open source. The Apache projects are characterized by collaborative and consensus-based development processes. Each project is managed by a self-selected team of technical experts who are active contributors to the project. The ASF is a meritocracy, implying that membership of the foundation is granted only to volunteers who have actively contributed to Apache projects. The ASF is considered a second generation open-source organization, in that commercial support is provided without the risk of platform **lock-in**.⁴⁰ ASF also provides legal protection to volunteers working on Apache projects; to **prevent the Apache brand name from being**

³⁹ http://en.wikipedia.org/wiki/Apache_Software_Foundation

⁴⁰ http://en.wikipedia.org/wiki/Apache_Software_Foundation

used by other organizations without permission⁴¹ and it holds several ApacheCon conferences each year, highlighting Apache projects, related technology, and encouraging Apache developers to gather together.⁴²

6.2.3.1 Governance, organisation and main activities

The objective of ASF is to provide support for the Apache community of open-source software projects, to provide software products for the public good.⁴³ The Foundation was formed primarily to⁴⁴:

- provide a foundation for open, collaborative software development projects by supplying hardware, communication, and business infrastructure;
- create an independent legal entity to which companies and individuals can donate resources and be assured that those resources will be used for the public benefit;
- provide a means for individual volunteers to be sheltered from legal suits directed at the Foundation's projects; and,
- protect the 'Apache' brand, as applied to its software products, from being abused by other organizations. The Apache projects are defined by collaborative consensus based processes, an open, pragmatic software license and a desire to create high quality software that leads the way in its field.⁴⁵

The Foundation is overseen by a board of directors, who are elected on an annual basis, according to the corporation's bylaws. The board appoints a set of officers to manage the day-to-day operations of the Foundation and oversee the ASF projects. Each project is managed by a self-selected team of technical experts who are active contributors to the project, according to whatever guidelines for collaborative development are best suited to that project.⁴⁶

The ASF board of directors has responsibility for overseeing the ASF's activities and acting as a central point of contact and communication for its projects. The board assigns corporate issues, assigning resources to projects, and manages corporate services, including funds and legal issues. It does not make technical decisions about individual projects; these are made by the individual Project Management Committees.⁴⁷ Unlike some other organizations that host FOSS projects, before a project is hosted at Apache it has to be licensed to the ASF with a grant or contributor agreement. In this way, the ASF gains the necessary intellectual property rights for the development and distribution of all its projects.⁴⁸

6.2.3.2 Revenues and costs

In the 2010–11 fiscal year, the Foundation received income of \$539,410, almost entirely from grants and contributions with \$12,349 from two ApacheCons. With 500 members,⁴⁹ no employees and 2,663 volunteers, it spent \$270,846 on infrastructure (hosting source code, download, email lists, bug tracking system, etc.) \$92,364 on public relations (supporting and providing visibility for projects sponsored by foundations), and \$17,891 on two ApacheCons.⁵⁰

6.2.4 OpenStack

OpenStack is a free and open-source cloud computing software platform. Users primarily deploy it as an infrastructure as a service (IaaS) solution. The technology consists of a series of interrelated projects that control pools of processing, storage, and networking resources throughout a data center – which users manage through web-based dashboards, command-line tools, or RESTful APIs. OpenStack release it under the terms of the Apache License. OpenStack began in 2010 as a joint project of Rackspace Hosting and NASA. Currently, it is managed by the OpenStack Foundation, a non-profit corporate entity established in September 2012 to promote OpenStack software and its community. More than 200 companies have joined the project, including Arista Networks, AT&T, AMD, Avaya, Canonical, Cisco, Dell, EMC,

⁴¹ http://en.wikipedia.org/wiki/Apache_Software_Foundation

⁴² http://en.wikipedia.org/wiki/Apache_Software_Foundation

⁴³ <http://www.apache.org/>

⁴⁴ <http://www.apache.org/foundation/faq.html#what>

⁴⁵ <http://www.apache.org/>

⁴⁶ <http://www.apache.org/foundation/faq.html#what>

⁴⁷ http://en.wikipedia.org/wiki/Apache_Software_Foundation

⁴⁸ http://en.wikipedia.org/wiki/Apache_Software_Foundation. Lists of Apache Software Foundation projects can be found at http://en.wikipedia.org/wiki/List_of_Apache_Software_Foundation_projects and <http://www.apache.org/foundation/>

⁴⁹ <http://www.apache.org/foundation/members.html>

⁵⁰ http://en.wikipedia.org/wiki/Apache_Software_Foundation and <http://www.apache.org/foundation/records/990-2010.pdf>

Ericsson, Go Daddy, Hewlett-Packard, IBM, Intel, Mellanox, Mirantis, NEC, NetApp, Nexenta, Oracle, Red Hat, SUSE Linux, VMware and Yahoo!.⁵¹ The OpenStack community collaborates around a six-month release cycle with development milestones. During the planning phase of each release, the community gathers for the OpenStack Design Summit to facilitate developer working-sessions and to assemble plans.⁵²

OpenStack has a modular architecture with various code names for its components, including for instance Compute (Nova): a cloud fabric controller; Object Storage (Swift): a scalable redundant storage system.⁵³ OpenStack APIs are compatible with Amazon EC2 and Amazon S3 and thus client applications written for Amazon Web Services can be used with OpenStack with minimal porting effort.⁵⁴

6.2.4.1 Governance, organisation and main activities

OpenStack is governed by a non-profit foundation and its board of directors, a technical committee and a user committee.⁵⁵ The OpenStack Foundation is a non-profit non-stock corporation. Its objective is to develop, support, protect and promote the the OpenStack Project.⁵⁶ It provides shared resources for the purpose of protecting, empowering, and promoting OpenStack software and the community around it, including users, developers and the entire ecosystem.⁵⁷ The board of directors is made up of eight members from each of the eight platinum sponsors, eight members from the 24 defined maximum allowed Gold sponsors, and eight members elected by the Foundation individual members.⁵⁸

The main activities of the foundation are to:⁵⁹

- Coordinate platforms for testing and continuous integration
- Provide processes and tools to enable developers to contribute code easily and taking care of legal matters
- Manage events including the twice annual Summit & Conference and regional user groups
- Manage legal affairs to take care of the necessary steps such as the CLA process and use of the trademark
- Provide educational resources to help new developers, sys admins, users, CIOs, etc. to evaluate and implement OpenStack
- Promote the OpenStack brand, including supporting webinars, case studies, TCO studies, user interviews, and press outreach for member companies to leverage when promoting their OpenStack-powered products
- Promote the ecosystem of companies who are building successful businesses with or around OpenStack
- Analyse, and draft reports on, topics such as the OpenStack Jobs outlook, economic impact of OpenStack, etc.

6.2.4.2 Revenues and costs

By 2014 the Foundation has attracted more than 9,500 individual members from 100 countries and 850 different organizations.⁶⁰ The target of OpenStack has been an annual budget of circa \$4-5 million per year (the actual number probably being a bit higher). Platinum Members will fund \$500,000 per year with a three-year commitment. Platinum Members are allowed to withdraw from Board and funding obligation if the Foundation changes its mission. Gold Members will fund an amount equal to total company revenue times .025, with a minimum of \$50k and a maximum of \$200k. In addition to the funding commitment, Platinum Members will provide operational resources to the Foundation such as staffing or development environment infrastructure. Corporate and start-ups sponsors can support with respectively USD 25k and USD 10k per year.⁶¹ At this writing OpenStack reports 8 platinum members, 17 gold members and 92 sponsors.⁶²

⁵¹ <http://en.wikipedia.org/wiki/OpenStack>

⁵² <http://en.wikipedia.org/wiki/OpenStack>

⁵³ See further <http://en.wikipedia.org/wiki/OpenStack>

⁵⁴ <http://en.wikipedia.org/wiki/OpenStack>

⁵⁵ <http://en.wikipedia.org/wiki/OpenStack>

⁵⁶ <http://www.openstack.org/legal/bylaws-of-the-openstack-foundation/>

⁵⁷ <http://en.wikipedia.org/wiki/OpenStack>

⁵⁸ <http://en.wikipedia.org/wiki/OpenStack>

⁵⁹ <https://wiki.openstack.org/wiki/Governance/Foundation/Funding>

⁶⁰ <http://www.openstack.org/foundation/>

⁶¹ <https://wiki.openstack.org/wiki/Governance/Foundation/Funding>

⁶² <http://www.openstack.org/foundation/companies>

6.2.5 Mozilla Foundation

In 1998, Netscape created the Mozilla Organization to co-ordinate the development of the Mozilla Application Suite. The Mozilla Foundation was launched on July 15, 2003 **to ensure Mozilla could survive without Netscape**. In addition the Mozilla Corporation was formed, to which the Mozilla Foundation delegated all development and business-related activities. The Mozilla Foundation now focuses solely on governance and policy issues, though it also continues to oversee the projects that have not been "productized", such as Camino and SeaMonkey. The Mozilla Foundation owns the Mozilla trademarks and other intellectual property, which it licenses to the Mozilla Corporation. It also controls the Mozilla source code repository and decides who is allowed to check code in.⁶³

The Mozilla Foundation is a non-profit organization that supports and leads the open source Mozilla project. Its products includes Firefox, the Firefox OS, Thunderbird, the Seamonkey Internet suit, and a range of other client apps, development tools, APIs, etc. It sets the policies that govern development, operates key infrastructure and controls Mozilla trademarks and copyrights. As mentioned above, it owns a taxable subsidiary: the Mozilla Corporation, which employs many Mozilla developers and coordinates releases of the Mozilla Firefox web browser and Mozilla Thunderbird email client. The subsidiary is 100% owned by the parent, and follows the same non-profit principles.⁶⁴

6.2.5.1 Governance, organisation and main activities

The mission of the Mozilla Foundation is to promote openness, innovation & opportunity on the Web (<https://www.mozilla.org/en-US/mission/>). The Mozilla Manifesto sets out the values and principles that guide the pursuit of the mission. Similar to Flspace it is **guided by 10 principles**.⁶⁵

- (1) The Internet is an integral part of modern life – a key component in education, communication, collaboration, business, entertainment and society as a whole.
- (2) The Internet is a global public resource that must remain open and accessible.
- (3) The Internet must enrich the lives of individual human beings.
- (4) Individuals' security and privacy on the Internet are fundamental and must not be treated as optional.
- (5) Individuals must have the ability to shape the Internet and their own experiences on the Internet.
- (6) The effectiveness of the Internet as a public resource depends upon interoperability (protocols, data formats, content), innovation and decentralized participation worldwide.
- (7) Free and open source software promotes the development of the Internet as a public resource.
- (8) Transparent community-based processes promote participation, accountability and trust.
- (9) Commercial involvement in the development of the Internet brings many benefits; a balance between commercial profit and public benefit is critical.
- (10) Magnifying the public benefit aspects of the Internet is an important goal, worthy of time, attention and commitment.

The Mozilla Foundation pledges to support the Mozilla Manifesto in its activities. Specifically, it shall:⁶⁶

- build and enable open-source technologies and communities that support the Manifesto's principles;
- build and deliver great consumer products that support the Manifesto's principles;
- use the Mozilla assets (intellectual property such as copyrights and trademarks, infrastructure, funds, and reputation) to keep the Internet an open platform;
- promote models for creating economic value for the public benefit; and
- promote the Mozilla Manifesto principles in public discourse and within the Internet industry.

Some Foundation activities – currently the creation, delivery and promotion of consumer products – are conducted primarily through the Mozilla Foundation's wholly owned subsidiary, the Mozilla Corporation⁶⁷.

Mozilla considers itself a hybrid organization, combining non-profit and market strategies to ensure the Internet remains a shared public resource. The relevant entities are⁶⁸:

⁶³ http://en.wikipedia.org/wiki/Mozilla_Foundation

⁶⁴ http://en.wikipedia.org/wiki/Mozilla_Foundation

⁶⁵ <https://www.mozilla.org/en-US/about/manifesto/details/>

⁶⁶ <https://www.mozilla.org/en-US/about/manifesto/details/>

⁶⁷ <https://www.mozilla.org/en-US/about/manifesto/details/>

⁶⁸ <https://www.mozilla.org/en-US/about/governance/organizations/>

- The Mozilla Foundation is a California non-profit corporation exempt from Federal income taxation under IRC 501(c)(3). The Foundation supports the existing Mozilla community and oversees Mozilla's governance structure. It also actively seeks out new ways for people around the world to recognize and steward the Internet as a critical public resource.
- Mozilla Japan is a separate non-profit organization that promotes Mozilla's products and mission in Japan and is affiliated with the Mozilla Foundation.
- The Mozilla Corporation, a wholly owned subsidiary of the Mozilla Foundation, works with the community to develop software that advances Mozilla's principles (e.g. the Firefox browser).
- Mozilla Online is a separate organization that operates in China and is a wholly owned subsidiary of the Mozilla Corporation.

In addition, there are other formal and informal organizations that are maintained by people actively involved in the community that do not have an official relationship with the Mozilla Foundation.

There is a virtual management team made up of experts from various parts of the community. The community is structured as a virtual organization where authority is distributed to both volunteer and employed community members as they show their abilities through contributions to the project.⁶⁹ Similar to the Apache Software Foundation, Mozilla is governed as a meritocracy. Leadership roles are granted based on how active an individual is within the community as well as the quality and nature of his or her contributions.⁷⁰

There are various policies used to run the Mozilla community. These concerns governance, hacking, licensing, privacy, security, trademarks and websites. See further <https://www.mozilla.org/en-US/about/governance/policies/>.

6.2.5.2 Revenues and costs

In publicly available information, the revenues of the Mozilla foundation are often mixed up with and includes those of its subsidiaries, the Mozilla Corporation in particular. Anyway, the revenues of Mozilla come mainly from search and commerce functionality included in the Firefox product – through Google and other search partners including, Bing, Yahoo, Yandex, Amazon and eBay. Mozilla's revenues also include important individual and corporate donations and grants, which are growing significantly, as well as other forms of income from their investable assets. Mozilla's consolidated reported revenue (Mozilla Foundation and all subsidiaries) for 2012 was \$311M.⁷¹

A majority of costs relates to technology and development, and increasingly, the marketing of new product lines, in particular the market launch of Firefox OS and significant upgrades to the Firefox for Android browser.⁷²

6.2.6 Cloud Foundry

Cloud Foundry is an open source cloud-computing platform as a service (PaaS) developed by VMware.⁷³ It provides a choice of clouds, developer frameworks and application services. Cloud Foundry claims to make it faster and easier to build, test, deploy and scale applications, and in contrast to many other PaaS offering, does not have developers locked into a solution. It is available through a variety of private cloud distributions and public cloud instances.⁷⁴

The Cloud Foundry foundation could be viewed as a spin-off from Pivotal Software Inc. (Pivotal), a software company based in San Francisco, California, which provides software and services for the development of custom applications for data and analytics based on cloud computing technology. Pivotal Software is in turn a spin-out and joint venture of EMC Corporation and VMware that combined software products, employees, and lines of businesses from the two parent companies.⁷⁵ In early 2014, Pivotal announced that it would establish a formal open governance model for its Cloud Foundry project. The governance model was expected to be in place in the summer. Partners in this initiative were EMC, HP, IBM, Rackspace, SAP and VMware, that would work together to structure the foundation, with bylaws

⁶⁹ <https://www.mozilla.org/en-US/about/governance/>

⁷⁰ <https://www.mozilla.org/en-US/about/governance/roles/>.

⁷¹ <https://www.mozilla.org/en-US/foundation/annualreport/2012/faq/>

⁷² http://en.wikipedia.org/wiki/Mozilla_Foundation

⁷³ http://en.wikipedia.org/wiki/Cloud_Foundry

⁷⁴ <http://docs.cloudfoundry.org/concepts/overview.html>

⁷⁵ http://en.wikipedia.org/wiki/Pivotal_Software

that would accelerate the adoption of Cloud foundry.⁷⁶ These companies would also join the foundation as Platinum sponsors. A large number of additional sponsors have entered the foundation by May 2014, amounting to 33.⁷⁷

The mission of the Cloud Foundry Foundation is to “establish and sustain Cloud Foundry as the global industry standard open source PaaS technology with a thriving ecosystem; to deliver continuous quality, value and innovation to users, operators and providers of Cloud Foundry technology; and to provide a vibrant agile experience for the community's contributors that delivers the highest quality cloud-native applications and software, at high velocity with global scale.”⁷⁸

Cloud founder has just recently established and published its governance documents⁷⁹. Its guiding principles are:

- Governance By Contribution - Influence within the Foundation is based on contributions.
- IP Hygiene - IP cleanliness must be preserved at all times.
- Equal Opportunity To Participate - Everyone has an equal opportunity to participate in projects.
- No Surprises - Planning processes and project status are open to all.

Currently the foundation lists 35 members, including some major ICT companies. In addition 50 companies are listed as contributors.⁸⁰ There is also a Community Advisory Board (CAB), which has the mission to foster a healthy, vibrant, collaborative and innovative community and ecosystem around the Cloud Foundry platform and open source project.⁸¹

6.2.7 Agrosense

AgroSense is an open-source project for agriculture related software and services⁸² The AgroSense foundation is the guardian of the architecture and the source code. It provides a legal entity as copyright holder for the AgroSense source code and a neutral institute to guard the best interest of AgroSense as open source project. AgroSense was originally developed by Ordina – a Dutch IT outsourcing company. Since it did not fit with Ordina's business model, the AgroSense Foundation was formed in 2012 to protect AgroSense as an open source product. The foundation is based in the Netherlands and registered with the Dutch chamber of commerce, but the use of AgroSense is however not limited to the Netherlands. Currently, AgroSense is available in English, Dutch and Czech, with more translations in progress.

The foundation is governed according to Dutch regulation, by a board including a chair, secretary and two members, and with recorded meetings.

AgroSense is commercialised by LimeTri B.V. – a company specialized in precision agriculture and headquartered in the Netherlands. It uses AgroSense as a brand for its precision agriculture related services and products as well as its farm management tool AgroSense. LimeTri also maintains the open source code of Agrosense. For these reasons the foundation does not need additional revenues.

6.2.8 Wikimedia Foundation

The Wikimedia Foundation (WMF) is an American non-profit and charitable organization headquartered in San Francisco, California that operates several wiki projects. It is most known for hosting Wikipedia, but also Wiktionary, Wikiquote, Wikibooks, Wikisource, Wikimedia Commons, Wikispecies, Wikinews, Wikiversity, Wikidata, Wikivoyage, Wikimedia Incubator, and Meta-Wiki. It was founded in 2003 by Jimmy Wales, co-founder of Wikipedia, as a way to fund Wikipedia and its sister projects through non-profit means.⁸³

⁷⁶ <http://www.pivotal.io/platform-as-a-service/cloud-foundry-foundation>

⁷⁷ http://www.theregister.co.uk/2014/05/29/cloud_foundry_foundation_expansion/

⁷⁸ <http://www.cloudfoundry.org/about/index.html>

⁷⁹ <http://www.cloudfoundry.org/about/index.html>

⁸⁰ <http://www.cloudfoundry.org/about/index.html>

⁸¹ <http://www.cloudfoundry.org/about/index.html>

⁸² This section draws on personal correspondence with Timon Veenstra (5 December, 2014), <http://agrosense.eu/foundation.php>, and <http://agrosense.eu/contact.php>

⁸³ http://en.wikipedia.org/wiki/Wikimedia_Foundation

6.2.8.1 Governance, organisation and main activities

The Wikimedia Foundation's goal is to develop and maintain open content, wiki-based projects and to provide the full contents of those projects to the public free of charge.⁸⁴ It provides technological, legal, fundraising and administrative support for Wikipedia and its sister projects.⁸⁵ It is governed by:

- its bylaws,⁸⁶
- a Board of Trustees to oversee the foundation and its work, as its ultimate corporate authority⁸⁷,
- a number of policies⁸⁸

In addition, it includes an advisory board. As of 2013, the foundation employed more than 208 people.⁸⁹

6.2.8.2 Revenues and Costs

The WikiMedia Foundation relies on public contributions and grants to fund its mission. It is dependent mostly on donations but also grants, sponsorship, services and brand merchandising and an historically also an update feed service targeted primarily at search engines.⁹⁰ As of 2013, the foundation had revenues of US\$48.6 mln and cash equivalents of \$22.2 mln.⁹¹

Cost mainly relate to staff, internet hosting, etc. It can be divided into product and engineering (circa \$20 mln), grantmaking and programs (9mln), community and communications (1.5 mln), management and governance (1mln), general and administrative (10mln) and fundraising (4mln).⁹²

6.2.9 WordPress Foundation

WordPress is a free and open source blogging tool and a content management system (CMS) based on PHP and MySQL. Features include a plug-in architecture and a template system. As of August 2013, WordPress was used by more than 22% of the top 10 million websites, being the most popular blogging system in use on the Web, on more than 60 million websites. It was first released on May 27, 2003, by its founders Matt Mullenweg and Mike Little. The license under which WordPress software is released is the GPLv2 (or later) from the Free Software Foundation.⁹³ Though largely developed by the community surrounding it, WordPress is closely associated with Automattic, the company founded by Matt Mullenweg.

6.2.9.1 Governance, organisation and main activities

The WordPress Foundation is a charitable organization founded by Matt Mullenweg to further the mission of the WordPress open source project, i.e. to democratize publishing through Open Source, GPL software. The objective of the foundation is to ensure free access, to the software projects it supports, ensuring that the source code for the projects will survive beyond the current contributor base. As part of this mission, the Foundation will be responsible for protecting the WordPress, WordCamp, and related trademarks. It shall also educate the public about WordPress and related open source software.⁹⁴

On September 9, 2010, Automattic handed the WordPress trademark to the newly created WordPress Foundation,⁹⁵ which was inspired by other organizations and non-profits, notably the Free Software Foundation, and the Open Source Applications Foundation.⁹⁶

The foundation's main projects include⁹⁷:

⁸⁴ http://en.wikipedia.org/wiki/Wikimedia_Foundation

⁸⁵ https://upload.wikimedia.org/wikipedia/commons/c/ce/Wmf_AR12_v11_SHIP_2pp_hyper_14jan14.pdf

⁸⁶ <https://wikimediafoundation.org/wiki/Bylaws>

⁸⁷ https://wikimediafoundation.org/wiki/Board_of_Trustees

⁸⁸ <https://wikimediafoundation.org/wiki/Policies>

⁸⁹ http://en.wikipedia.org/wiki/Wikimedia_Foundation#Officers_and_staff

⁹⁰ http://en.wikipedia.org/wiki/Wikimedia_Foundation

⁹¹ http://en.wikipedia.org/wiki/Wikimedia_Foundation

⁹² See further https://upload.wikimedia.org/wikipedia/foundation/3/36/Audit_FAQ_2014_Final.pdf

https://upload.wikimedia.org/wikipedia/foundation/e/e3/FINAL_13_14From_KPMG.pdf,

https://upload.wikimedia.org/wikipedia/commons/c/ce/Wmf_AR12_v11_SHIP_2pp_hyper_14jan14.pdf, and

https://meta.wikimedia.org/wiki/Wikimedia_Highlights_July_2014

⁹³ <http://en.wikipedia.org/wiki/WordPress>

⁹⁴ <http://wordpressfoundation.org/>

⁹⁵ http://en.wikipedia.org/wiki/WordPress#Development_and_support

⁹⁶ <http://wordpressfoundation.org/>

⁹⁷ <http://wordpressfoundation.org/projects/>

- WordPress itself: freely available GPL blogging software with about 143,000 lines of code representing about 33 man.years of development. WordPress is available in 23 languages and has been downloaded about 18,000,000 times in 2009.
- WordPress Plugins, a repository of over 24,000 freely available plugins representing about as many volunteers. These plugins have received over 434 million downloads we know about.
- WordPress Themes, over 1,700 free GPL-licensed design and themes for WordPress that have received over 67 million downloads.
- bbPress, an open source forum software built on the same backbone as WordPress.
- BuddyPress, which allows to create a social network on purely Free Software.

WordPress key developers include a number of individuals, including the founders. WordPress is also developed by its community, including WP testers, a group of volunteers who test each release. They have early access to nightly builds, beta versions and release candidates. Errors are documented in a special mailing list, or the project's Trac tool.⁹⁸

"WordCamp" is the name given to all WordPress-related gatherings and conferences WordCamp San Francisco, an annual event, is the official annual conference of WordPress developers and users.⁹⁹

WordPress's primary support website is WordPress.org. This support website hosts both WordPress Codex, the online manual for WordPress and a living repository for WordPress information and documentation, and WordPress Forums, an active online community of WordPress users.¹⁰⁰

Hundreds of people all over the world contribute to developing WordPress – they work on code, provide support, do translations, organize events, write documentation, review plugins and themes, and are involved in other projects. Contributors are grouped into teams, and each team has a site on make.wordpress.org to communicate with others and share updates about what they're working on.¹⁰¹

6.2.9.2 Revenues and Costs

While much of the revenues generated in the WordPress ecosystem goes to Automattic (see below), the foundation itself also have some revenues and costs, in the the range of \$0.5 mln, the majority related to the WordCamps.¹⁰²

6.2.9.3 Automattic

It is difficult to discuss WordPress without mentioning the company linked to it – Automattic. Automattic, Inc. is a web development corporation founded in August 2005. While we have no information on the size of the company in terms of revenues, it has 269 employees¹⁰³ and has generated more than \$300 mln in funding from 13 investors in five rounds of investment.¹⁰⁴ While giving away the software for free, the company generates income in the following ways¹⁰⁵:

- Web hosting
- Google AdSense - Free blogs hosted on WordPress.com may sometimes carry Google AdSense ads.
- WordPress themes – The WordPress themes directory offers premium themes that cost between \$50 and \$100. These GPL compatible themes are developed by third-party WordPress developers. Automattic gets a commission per sale.
- Premium Accounts – While anyone can host a blog on WordPress.com for free, one gets charged a fixed fee for additional storage space and the use of a custom web domain instead of the default wordpress.com sub-domain.
- Web Host Referrals – WordPress.org suggests a list of third-party web hosting companies where one may self-host their WordPress blog(s) for a fee. All these are referral links so Automattic gets a commission per sale.

⁹⁸ http://en.wikipedia.org/wiki/WordPress#Development_and_support

⁹⁹ http://en.wikipedia.org/wiki/WordPress#Development_and_support

¹⁰⁰ http://en.wikipedia.org/wiki/WordPress#Development_and_support

¹⁰¹ <http://wordpressfoundation.org/2013/make-wordpress/>

¹⁰² <http://wordpressfoundation.org/2013/2012-tax-review/>

¹⁰³ <http://en.wikipedia.org/wiki/Automattic>

¹⁰⁴ <http://www.crunchbase.com/organization/automattic>

¹⁰⁵ <http://www.labnol.org/internet/blogging/how-wordpress-makes-money/7576/>. On the variety of business models based on WordPress, see <http://mashable.com/2011/06/01/wordpress-business-models/>

- WordPress Support – Additional to the free support forums, primarily aimed at Enterprise users who paying \$2.5-5k per year.
- Poll Daddy – Automattic also provides a paid version of Poll Daddy where one can have unlimited number of questions per survey and without Poll Daddy branding in their polls or surveys.
- Guided Transfers – transfers blogs from WordPress.com to WordPress.org. They charge a one-time \$119 fee for the transfer.
- VaultPress – Back-up service starting at \$15 per month, that also notifies of potential security issues.
- VideoPress – The VideoPress plugin for WordPress allows for hosting videos and audio files on one's own website. Starts at \$60 per year.
- Automattic Kismet – Filters spam. This is free for non-commercial personal blogs but if one maintains a corporate blog or runs a network of blogs, one has to buy a commercial license that starts at around \$50 per month. Professional bloggers, or anyone who makes more than \$500 per month in advertising revenue from a WordPress blog, is required to pay \$5 per month for this license.

6.3 Overview

Table 6–2 enumerates the foundations and other relevant organisations from the benchmark as well as their key points.

Table 6–2: Foundation benchmark key points

	W3C	Linux and Red Hat	Apache	OpenStack	Mozilla	Cloud Foundry	AgroSense	Wikimedia	WordPress
Domain	Internet/WWW	SW (OS)	SW/server	SW (cloud)	SW (Internet)	Cloud PaaS	AgriFood SW	SW / Content	Blogging SW
Objective	Develop (and promote) compatible standards Ensure long-term growth of the Web.	Foster growth of Linux Promote, protect and advance Linux by providing unified resources and services	Support Apache community of software projects	Develop, support, protect, and promote OpenStack	Support and lead the Mozilla project	Establish and sustain Cloud Foundry as the global industry standard open source PaaS technology with a thriving ecosystem	Provide legal entity as copy-right holder for the source code Guard the best interest of AgroSense as an open source project	Develop and maintain open content, wiki-based projects Provide contents to the public (free)	Ensure free access to the software projects it supports, ensuring survival of source code beyond the current contributor base
Created	1994	2007 (current)	1999	2012	2003	2014	2012 (?)	2003	2010 (?)
Country	Not registered	US	US	US	US	US	Netherlands	US	US
Type of organisation	Joint agreement among its host institutions	Non-profit mutual benefit corporation (RH is a commercial entity)	Foundation / non-profit corporation	Non-Profit non-stock corporation	Foundation / non-profit corporation	Foundation / non-profit trade association	Foundation	Foundation / non-profit and charitable organization	Foundation / non-profit organization
Size (# of members)	400+	8 Platinum / 13 Gold / 189 Silver (RH has 6,500 employees)	500 members	27 platinum and gold members 9,500 individual members	n.a.	35 members, 50 contributors	1 secretary, 2 members of board, plus chair (vacant)	200+ employees	n.a.
Type of members	Various entities (commercial, educational, governmental, etc.) and individuals	Main members are (large) ICT companies. Other members include community groups, universities, and individuals.	Individuals by invitation. Main sponsors include Matt Mul-lenweg and large Internet firms like Google and Facebook.	Individual, platinum or gold Companies and others in the ICT sector	n.a. (no members?)	Various ICT organisations	SW oriented.	No members	n.a.

	W3C	Linux and Red Hat	Apache	OpenStack	Mozilla	Cloud Foundry	AgroSense	Wikimedia	WordPress
Member roles	Provide staff for development of standards	Sponsor (?)	n.a.	Technical contributions or community building efforts,	n.a.	n.a.	LimeTri maintains AgroSense code	not relevant	n.a.
Governance	Joint agreement of "host Institutions" Small management team Advisory committee, advisory board, TAG, W3C directors and CEO, plus chartered groups	Governed by its bylaws Led by Executive director and mgmt. team Funds key kernel developers in order for them to be independent.	Overseen by board of directors, elected by ASF members Appointed officers manage day-to-day operations and ASF projects. Projects managed by self-selected teams. Any project hosted at Apache must be licensed to ASF with a grant or contributor agreement	Bylaws Board of directors, technical committee and user committee	Governed by mission and Manifesto Meritocracy Four organisations Virtual management team of experts, and employed and not	See newly established bylaws and other governance docs available at http://www.cloudfoundry.org/about/index.html	In accordance with Dutch regulation: a board with a chair, secretary and at least one member. Recorded meetings.	Bylaws, board of trustees, advisory board and organisation of employees.	n.a.
Main activities	Standardisation Promotion, translation, internationalisation of standards.	Maintain trademark, Operate Linux.com Host the workgroups that advance and standardise Linux Produce the Linux conferences	Support the SW development - provide HW, communication, and business infrastructure - a legal entity to which resources can be donated - means for individual to be sheltered from legal suits - protect the 'Apache' brand	Coordinate platforms for testing and integration Provide processes and tools for code contribution Event management Manage legal affairs, CLA and trademark Educational activities. Analysis and reports	Focused on governance and policies, non-productised projects, owning IPRs, and controlling the source. The remit of the Mozilla corp is bigger.	Ditto	See objective	Technological, legal, fundraising and administrative support for projects	Ensure free access, to Word-Press Protect trademarks Educate the public

	W3C	Linux and Red Hat	Apache	OpenStack	Mozilla	Cloud Foundry	AgroSense	Wikimedia	WordPress
Revenues	Member fees Research grants and other sources Individual donations	Primarily from its Platinum Members: In 2014, > \$ 6mn <i>For RH: primarily subscriptions</i> <i>USD 1.4 Bn in 2014</i> <i>Some training and services</i>	Circa USD 500k mainly from grants and contributions	Membership and sponsor fees Staff contribution (free resources) Ca. \$4-5 mln / y	Consolidated group: > \$311 mn (2012) mainly from search engines + donations and grants	Presumably membership fees and sponsorships.	Close to zero. LimeTri offers services based on AgroSense, but does not commercialise AgroSense as product	Mainly donations and grants, Circa \$50mln	Mainly World-Camps <i>Automatic generates revenue from range of complementary products and services</i>
Type of Costs	See main activities	n.a. <i>For RH: Subscriptions</i> <i>Training & services</i> <i>Sales and marketing</i> <i>R&D</i> <i>Administrative and general</i>	Infrastructure (hosting source code, download, email lists, bug tracking system, etc.) PR ApacheCons.	See main activities	Technology and development, marketing.	n.a.	Close to zero (since LimeTri maintains the code)	Product development and engineering Awards and grants Internet hosting Community building and communication Legal advice	Mainly Word-Camp

6.4 Conclusions

This section discusses the lessons learned for Flspace from the overview of foundations given in the previous sections. Note that these lessons serve the purpose of providing input for strategic decisions on the further commercialisation of Flspace, but do not specify any operational actions.

6.4.1 Objectives

A first set of issues concerns what should be the objective(s) of the Flspace Foundation and its main activities. This is a strategic choice **that depends on (1) the overall ‘goals’ and activities of the Flspace ecosystem, (2) how that ecosystem is organised** (who takes on which roles). Questions such as how much the development and promotion of the platform is taken on by a commercial partner and how can the foundation stimulate this to happen.

Our foundation overview identifies the following (sometimes overlapping) objectives:

- Develop the platform (or software, architecture, source code, standards or content)
- Ensure compatibility
- Promote the platform
- Support (the development of) the platform
- Protect (or guard) the platform and brand
- Ensure free access to the platform
- Ensure sustainability of the platform
- Stimulate an ecosystem beyond the (initial) members of the foundation

We consider **all these objectives are relevant to the Flspace Foundation**. Some of the objectives (e.g. promotion, development, ecosystem building) should be contributed to also by other stakeholders than the foundation itself. We consider it not sustainable to confining to only one objective since there are usually positive interactions between these objectives. It is also key that objectives are contributing to a common good of the foundation members, be they ICT companies, app developers, research organisations, business users or consultants.¹⁰⁶

6.4.2 Activities

Which are the activities that the Flspace foundation needs to engage in, in order to contribute to these objectives? Our foundation overview identifies the following (sometimes overlapping with the objectives) activities:

- Maintenance and development
- Development on non-productised projects (e.g. new platform components)
- Support development by e.g. providing: equipment, communication and business infrastructure not the least to enable developers to contribute code easily and by providing platforms for testing and integration
- Maintain trademark
- Operate web site
- Host work groups
- Translation of documents and standards
- Providing a legal entity to which resources can donated
- Legal support
- Means for individuals to sheltered from legal suits
- Promotional activities
- Event management, including conferences.
- Maintain and protect trademarks and brands
- Governance, “policymaking” and administrative support
- Owning IPRs
- Controlling source code
- Fundraising

¹⁰⁶ It is also worth keeping in mind the general benefits of keeping a separation between the open source platform and the commercial activities of the companies that will provide instances of the platform, e.g. reduced risks of lock-in.

- Granting
- Communication and community advocacy
- Provision of free access
- Provide educational resources including webinars, case studies, TCO studies and user interviews
- Analysis and reporting

Clearly there is a multitude of activities that the Flspace Foundation could have, which have yet not been defined in detail. In this respect, the foundation needs to strike balance of starting out at a scale that is small enough to be financed by the foundation revenues while at same time providing enough momentum for Flspace further commercial exploitation and ecosystem building. **At the minimum we consider the Flspace Foundation needs to**

1. Become a legal entity to which revenues can be transferred, etc.
2. Support the maintenance and further development of the platform (including providing the necessary infrastructure for that)
3. Own and manage IPRs
4. Operate a web site
5. Provide administrative and legal support
6. Promote the platform (and its standards)

More activities can be added. Those activities need in any case elaborated and adapted in the foundation statutes.

A key issue for the sustainability of Flspace will be to ensure **platform technologies are maintained and improved** (cf. the Linux Red Hat model where Red Hat is the biggest contributor to the Linux Kernel). Similar contributions needs to be ensured by Flspace's major exploiting partners, unless the foundation generously receives voluntary contributions or it ensures paid-for development via significant revenues.

Finally, an issue concerns the **branding of Flspace**. Should it come to the foreground, or should the commercial instances take the spotlight? Compare for instance with Wikimedia. Many people have never heard of them, yet they operate one of the most used websites in the world: Wikipedia. On the other hand, Flspace addresses B2B collaboration, and therefore it does not require Flspace to be notorious among general audience.

6.4.3 Type of legal entity

Most of the investigated organisations have the legal status of being US foundations, i.e. non-profit corporations, associations, or organizations (the foundations describe their legal status in slightly different ways). The exception is W3C consortium which is a joint agreement among its host institutions. We have not investigated the (dis)advantages of a foundation as compared to of forming other type of entity. However, it should be taken into consideration that European Member States laws differ from US ones, a fact which may limit or expand the remit of the Flspace Foundation.

6.4.4 Governance and internal organisation

Most foundations are formally governed by the foundation bylaws or, as in the case W3C, via joint agreements. These bylaws are often complemented with specific documents that regulate development processes, IPRs, and established other roles and responsibilities, depending on how the development process is organised. Sometimes (as in the case of Mozilla) there is a manifesto or mission statement. The foundations often employs a management team which is responsible for e.g. strategic and resource planning. The main activities of the foundations are organised in different ways, depending on how they rely on voluntary external contributions. Advisory committees are also common.

In the case of the Flspace Foundation it is important to define its mission, the scope of its activities and how it is going to be managed. Beyond its status, it is important to elaborate all specific documents required by its specific features. The main example is the Flspace Lab, the characteristics of which are dependent on the kind and level of support to be provided to Phase 3 Accelerators.

6.4.5 Memberships (types and roles)

The overview shows that **foundations have very different membership set-ups** ranging from not having any members at all (Wikimedia) to having 1000s of members. Members can be companies as well as

individuals – although the Dutch law is probably more restrictive in this matter. **Members typically pay a membership fees** (often differentiated, e.g. platinum, gold and silver) **and/or provide in-kind contribution** (human resources, hardware, etc.). For instance, the platinum members of OpenStack each contribute \$500k per year to the foundation and also provide the equivalent of two full time employees contributing to OpenStack.

For Flspace it would be important to include members from inside and outside of the current Flspace consortium and from different stakeholder groups including ICT companies, research organisations as well end-users, maybe some 10-20 organisations to start with. If members were not allowed national legislation, then the foundation would need to consider other means for engaging those stakeholders, since their contribution to the further development of the platform and its brand is key to the sustainability of Flspace. These would provide varying degrees of membership fees, and in-kind support to cover the main activities foreseen for the Flspace foundation (if legally allowed)

6.4.6 Revenues

The investigated foundations generate **revenues from a variety of sources**. The main source of income is often **membership fees**. In-kind contributions of members often contribute to the activities of the foundations as well. Some of the foundations also rely partly (or fully as in the case of Wikimedia) on **donations and grants**. **Conferences** can generate incomes in some cases. Mozilla is the only foundation that actually generates revenue from its commercial activities (search engine related – however the incomes of the foundation and of the Mozilla corporation are consolidated and therefore impossible to distinguish).

The total revenue ranges from a couple of \$100k to more than \$300m in the case of Mozilla. As a source of reference, it could be mentioned that OpenStack estimates a budget revenues of between \$4 and 5 mln to be raised from membership fees and sponsors. As a general rule, **most foundations have chosen not to generate any revenues from commercial activities**, probably because they prefer to see for-profit entities using their e.g. standards to develop their commercial products. This way several competing entities can emerge, rather than one derived from the foundation.

The preferred option for the Flspace foundation could therefore be to rely on membership fees and in-kind contributions of members. However, there may be legal restrictions to this option. If so, the Foundation needs to consider, either alternative legal setups (e.g. association) or alternative forms of revenues, such as sponsorship. Other sources of revenue envisioned including services revenues (help-desk, consultancy, hosting, conferences) or commercially oriented fees based on the usage of Flspace (per transaction, per download of app, yearly fee for using brand etc.). But, again, such solutions seem to be not so common among the benchmarked foundations.

Given the size and scope of the other foundations, we may envision that at least €100,000 need to be provided. This obviously depends on the exact scope of activities (and related costs). Of course, the aim is for the Flspace ecosystem and hence the exploiting companies (Platform providers, hosts, app developers, end-users and business configurators), to generate revenues at several levels of magnitude higher than that.

6.4.7 Commercial exploitation

A major objective for the investigated foundations (with the exception of the Wikimedia foundation) is to **facilitate for commercial activities of other actors in the ecosystem**. In some case there is one company closely linked to the foundation (e.g. Automattic with WordPress, or arguably with Mozilla) that generates substantial revenues from add-on and complementary products and services.

The Linux – Red Hat model constitutes one of the most well-known examples of a symbiotic relationship between on the one hand a non-profit foundation that provides software (in particular the Linux Kernel) open-source and for free and on the other hand a company whose profitable business model consists in exploiting that open-source software. Maybe even more importantly, this commercial exploitation benefits to the foundation's mission: Red Hat is the main contributor to the Linux Kernel.

Another key element in commercial exploitation is marketing, in which the foundation as well as its main commercial partners need to be involved. Instrumental, as a first step, would be to provide actual business cases. In this respect, the experiences (business impact of applications, benefits from using Flspace, etc.) from trials (from WP 400 and the upcoming D 500.2.2) could be used to showcase the potential of Flspace.

While it would be possible to create a unique commercial company tightly linked to the Flspace Foundation, this would go against the ten commandments of Flspace (see **Error! Reference source not found.**). Therefore **it is most plausible to foresee a more Linux-style ecosystem, where various companies and consortia can provide their own instances** of the platform. In this respect OpenStack is also an interesting model, being a cloud computing software platform, thus sharing characteristics with both Flspace and FIWARE. The OpenStack Foundation is based on **memberships of normally competing organisations working together towards a common goal**.

Finally, this model requires some careful thinking regarding **the incentives for the commercial companies to contribute to the Foundation**. Beyond (important) revenue issues, this also concerns the overall growth of knowledge upon which the Foundation relies, e.g. which mechanisms could favour a development of the Flspace's platform components.

7 Implications

This deliverable has outlined the main conclusions of the business model analysis conducted so far (D520.1.1). In addition it has assessed how Flspace technologies could be commercialised in a sustainable manner. In particular, an overview of Foundations currently active in the software activity was performed, in order to draw lessons for Flspace's current sustainability plan.

It is clear that Flspace 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, Flspace is envisioned to operate as a multi-level, multi-sided platform. The platform will mediate business users (currently from the logistics and agri-food sectors) and app developers that create and provide apps via the Flspace 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, i.e. 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 may take time before the platform reaches a (critical) mass of such customers.

The sustainability of the Flspace ecosystem model rests on the one hand on allowing viable business models 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). It is worth emphasising that parts of the ecosystem need to be built early on. Other tasks in the Flspace 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 Flspace 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). 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 convince 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.

Flspace will also need to provide business users with opportunities to evaluate the potential benefits of the platform. A crucial step here is the FI-PPP Phase 3, which can also substantially increase the number of potential apps for Flspace, 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 Flspace, it also makes sense to reduce a number of uncertainties regarding:

- The actual functioning of the platform
- How the platform will be provided once the Flspace project ends
- Terms and conditions for app developers (clearly spelled out and transparent)

From the Flspace 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. It has been decided to follow the neutral platform archetype scenario, with all knowledge created during the project to be transferred to the Flspace Foundation.

The deliverable also presented a number business model parameters open for further refinement. The overview of foundations allows gathering some hints regarding the options the Flspace Foundation could follow regarding these parameters.

First, the FIspace Foundation's objectives must be defined with a close attention to the FIspace ecosystem, namely how it is organised and what are the objective of its members. The Foundation's activities derive from such objective, but at the minimum we consider the FIspace Foundation should

1. Become a legal entity to which revenues can be transferred, etc.
2. Support the maintenance and further development of the platform (including providing the necessary infrastructure for that),
3. Own and manage IPRs,
4. Operate a web site,
5. Provide administrative and legal support,
6. Promote the platform (and its standards),

A crucial question is whether the FIspace Foundation should have commercial activities. The overview shows that most foundations have chosen not to generate any revenues from commercial activities. On the contrary, a major objective is to facilitate for commercial activities of *other* actors in the ecosystem. Therefore it is plausible, and recommended, to foresee a more Linux-style ecosystem, where various companies and consortia can provide their own instances of the platform. This model however requires some careful thinking regarding the incentives for the commercial companies to contribute to the Foundation and the further development of the FIspace platform.

Such activities need to be funded. Foundations' revenues usually come from a variety of sources. Membership fees or in-kind contributions from members often provide the main resources. Some foundations also rely on donations and grants, on the organisation of events. There may be price discrimination among members (e.g. platinum, gold and silver), also between individuals and companies, etc.

The type of membership should not prevent the FIspace Foundation to remain neutral. Here, the Open-Stack Foundation provides an interesting example with its members being normally competing organisations working together towards a common goal.

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