Deliverable D 600.3

Plan for community building for large scale experimentation

WP 600

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FUTURE INTERNET PPP

SEVENTH FRAMEWORK PROGRAMME

Smart Agri-Food

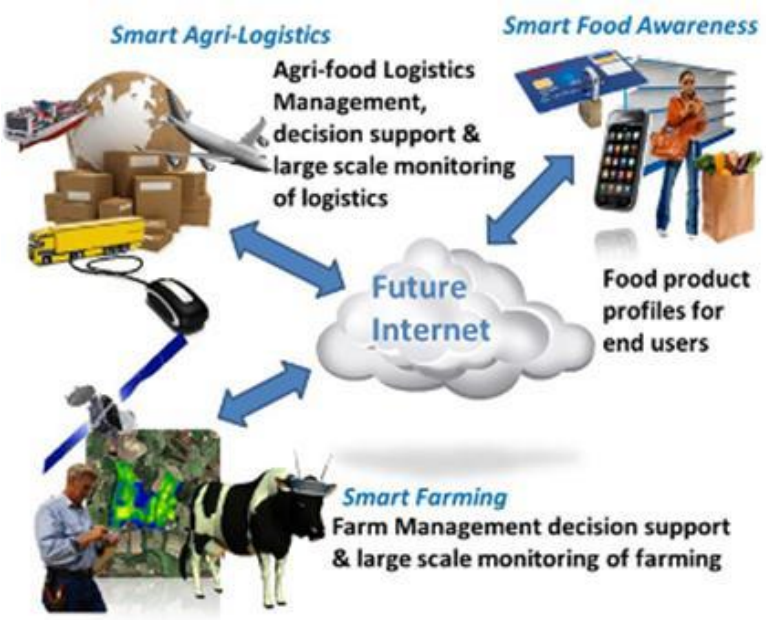
The SmartAgriFood Project

The SmartAgriFood project is funded in the scope of the Future Internet Public Private Partnership Programme (FI-PPP), as part of the 7th Framework Programme of the European Commission. The key objective is to elaborate requirements that shall be fulfilled by a "Future Internet" to drastically improve the production and delivery of safe & healthy food.

Project Summary

SmartAgriFood aims to boost application & use of Future Internet ICTs in agri-food sector by:

- Identifying and describing technical, functional and non-functional Future Internet specifications for experimentation in smart agri-food production as a whole system and in particular for smart farming, smart agri-logistics & smart food awareness,
- Identifying and developing smart agri-food-specific capabilities and conceptual prototypes, demonstrating critical technological solutions including the feasibility to further develop them in large scale experimentation and validation,
- Identifying and describing existing experimentation structures and start user community building, resulting in an implementation plan for the next phase in the framework of the FI PPP programme.



Project Consortium

- LEI Wageningen UR; Netherlands
- ATB Bremen; Germany
- TNO; Netherlands
- CentMa GmbH; Germany
- ATOS ORIGIN; Spain
- ASI S.L.; Spain
- Huawei; Germany
- MTT Agrifood Research; Finland
- KTBL e.V.; Germany
- NKUA; Greece
- UPM; Spain
- Campden BRI Magyarország, Hungary (CBHU)
- Aston University; United Kingdom
- VTT; Finland
- OPEKEPE; Greece
- John Deere; Germany
- Wageningen University; Netherlands
- EHI Retail Institute GmbH; Germany
- GS1 Germany GmbH; Germany
- SGS S.A.; Spain
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PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

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Abbreviations

AFSCN	Agrifood Supply Chain Network
BPMN	Business Process Modelling Notation
CDI	Connected Device Interfaces
D	Deliverable
DSL	Digital Subscriber line
EDA	Event Driven Agents
EFMIS	Enhanced Farm Management Information System
ELT	Extraction, Transformation and Load
ERP	Enterprise Resource Planning
ESB	Enterprise Service Bus
FDC	Farmer Data Concentrators
FI	Future Internet
FMIS	Farm Management Information System
FI-PPP	Future Internet Public Private Partnership
FTP	File Transfer Protocol
GE	Generic Enabler
GIS	Geographical Information System
IaaS	Infrastructure as a Service
ICT	Information and Communication Technology
IoS	Internet of Service
IoT	Internet of Things
IT	Information Technology
KPI	Key Performance Indicator
LAN	Local Area Network
LSFSS	Local Smart Farming Sub - System
MDDB	Multidimensional Database
MMS	Multimedia Messaging Service
NetIC	Network Information and Control
OFMIS	Over the cloud Farm Management Information System
OPEX	Operational Expense
OLAP	Online Analytical Processing
OWL	Ontology Web Language
PA	Precision Agriculture
PaaS	Platform as a Service
PF	Precision Farming
PIN	Personal Identification Number
PLF	Precision Livestock Farming
QoE	Quality of Experience
QoS	Quality of Service
RDF	Resource Description Framework
RFID	Radio Frequency Identification
S3C	Service, Capability, Connectivity and Control
SaaS	Software as a Service
SAF	Smart AgriFood
SCADA	Supervisory Control And Data Acquisition
SIM	Subscriber Identification Number
SMS	Short Messaging Service
SOA	Service Oriented Architecture
SQL	Structure Query Language
WiFi	Synonymous for WLAN, Wireless LAN
Xaas	X-As A Service. Overall for Iaas, Paas, SaaS
XML	Extensible Mark – Up Language

Summary

This deliverable describes a plan for community building for large scale experimentation to be used in the second phase of the FI-PPP programme. This plan is based on the lessons learned and experiences of the community building in the first phase within the SmartAgriFood project. Partly, this plan is based on an actual proposal for phase 2, called cSpace.

Chapter 2 describes the current user community. This chapter contains the inventory of the involved stakeholders who were achieved in the developed pilots and through the national discussion panel carried out within Task 710 User community involvement.

Chapter 3 presents a short summary of the established and current dissemination activities as the basis on which further community building can be developed. The aim of this chapter is to summarize the lessons learned from the community building activities of the SmartAgriFood project, which can be used for further community building. The successful methods and failures, traps and suggestions for modifications are described here.

Chapter 4 provides the community building elements from the cSpace proposal, which is a merger of the Phase 1 projects FInest and SmartAgriFood. It presents a plan for open collaboration and exploration.

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1 Introduction

1.1 Background

In the SmartAgriFood project, the agri-food use case is considered as an ideal scenario, providing in that it provides both the requirements for a tighter integration with advanced Internet-based network and service capabilities tightly integrate with a specific domain, as well as an innovative application scenario with a great social and economic impacts. It is essential to apply an integrative strategy to bridge the gap between the vertical supply chain dimensions (i.e. especially from farm to fork) as well as from technological point of view between the highly required domain-specific capabilities and the potentials for realising Future Internet Core Platform instances. Hence, the main pillars in phase 1 to accompany the specification of platform requirements and to substantially prepare the large scale experimentation are the Community Involvement and the Core Platform Collaboration.

To address the innovation potentials and wide market impact, the project included three areas that are required for demonstrating the overall feasibility of the approach to be suggested for Phase 2: smart farming, smart agri-logistics and smart food awareness. It was essential to further detail and harmonise a joint approach that has been followed for the requirements specification and Implementation Planning. This included the agreement on mechanisms for coordination and harmonisation of work – addressing both dimensions – the interests of the different stakeholders along the vertical chain dimension (i.e. producers, “processors”, logistic service providers, retailers, consumers) as well as the ways on in which to compile the outcomes for their sound technological exploitation by the key stakeholders (i.e. FI-Ware Core Platform, test infrastructures, standardisation bodies, providers of domain specific sub-systems).

The development of the domain specific capabilities and the conceptual prototypes served has enabled the feasibility assessment. This feasibility assessment is considered as a key prerequisite to the development of the Phase 2 implementation plan and the analysis of the experimentation infrastructure analysis.

1.1.1 Focus of WP600 Community Building Planning

Work package 600 makes a synthesis of the results from all other activities resulting in a coherent plan that forms the basis for large scale experimentation (Phase 2 in the FI-PPP program). This is achieved by executing the following subtasks:

Task 610 Experimentation Infrastructure Analysis and Specification

First a general specification of a required experimentation infrastructure is derived from the sub use cases (WP200-400). For each sub use case, it will be analysed an analysis will be undertaken of the infrastructure is already available and how this could be extended (e.g. experimentation sites and living labs). If necessary, it will be specified what should still be further developments will be specified.

Task 620 Standardisation Planning

For each sub use case the standardization needs will be derived and analysed including standardization organisations that are involved. The results will be matched with feedback that comes from the collaboration with the core platform. From this result, a plan for standardisation is developed.

Task 630 Community Building Plan

In interaction with the sub use cases there will be several users involved through the current partners in the consortium and their network. Based on this network, a plan is made how this can be consolidated and extended in the next phase.

Task 640 Overall Implementation Plan

From the results from previous tasks an overall plan is developed with special attention to synergy between the different sub use cases so that there is a consistent approach through the whole agri-food supply chain (from farm to fork). This plan is assessed for its feasibility.

1.2 Objective of this deliverable D600.3

The objective of this deliverable is to describe a community building plan for large scale experimentation in phase 2.

In chapter 2 we first describe the users already involved through the current beneficiaries in the consortium and their networks. Then in chapter 3 we present an overview of the established and current discussion and community building activities and the lessons learned. Based on the experiences of the dissemination, conclusions and further activities are presented. Chapter 4 describes the community building plan which will be applied in the second phase, based on the cSpace proposal that was actually submitted.

2 Description of the current user community

This chapter describes the current user community of the SmartAgriFood project. It contains an inventory of the stakeholders who are already involved in the developed pilots and during the national discussion panels.

2.1 Users involved and their networks

The project deals with the complete agri-food supply chain (‘from farm to fork’) so end users are not only consumers but also retailers, logistic service providers, farmers, input suppliers, etc. Beside the supply chain stakeholders the project also distinguished stakeholders that provide hard- and software and ICT infrastructures.

These other stakeholders are:

- Existing/Established IS providers, such as providers of Farm Management Information System,
- Other (new) service providers. For example a decision support system in farming or a marketing tool for retailers,
- Market place, because the end users buy their information systems and services at the market,
- SAF-FI service infrastructure/proxy. For example EFMIS,
- FI Core platform, which provides the generic enables which – in combination with the domain-specific enablers – must provide the functionalities for the system and service providers that en-able them to enhance their systems for their end users.

In task 610, an inventory of the involved stakeholders per pilot was made. The following table (Table 1) contains the overview of the stakeholders. Detailed information on the stakeholders per pilot can be found in **Appendix A.**

Table 1: Overview of the involved stakeholders.

Organizational features			
Stakeholders	**End users**	**Established ICT service providers**	**Other ICT service providers**
Total number of stakeholders in the category	40	11	17
Total number of countries in which the stakeholders in the category operates	> 8*	>6	>6
Scenarios	**Key sectors**	**Key activities**	**Key themes**
Total number	>6	>10	>6
Total number of countries involved	>8	>8	>6

Source: SAF_D.600.1.

2.1.1 Overview of the involved stakeholders of the pilots

1. Smart Spraying pilot

The aim of the Smart Spraying Pilot was to investigate and demonstrate the requirements for Future Internet technologies from the point of view of Precision Agriculture and beyond. Precision spraying was chosen as an example case since it is an information intensive task, and is sensitive with regard to weather circumstances, timing, correct chemical dosing and environmental aspects. Well controlled precision spraying task with optimal timing and spraying set ups is a complex and demanding task for a farmer. When contracting spraying, the challenge is to serve optimally customer farm's business targets and act correctly in sometimes unfamiliar fields. The challenge is firstly to create and provide farm/customer specific assisting services for fluent task planning and execution, and secondly to provide the assistance in an organized and user friendly way to the farmer or contractor.

In the pilot, the farmer receives an alert of increased plant disease risk in the field based on farming history in the field and weather data during the present growing season. After checking out the actual situation in the field he/she schedules the spraying task and prepares the sprayer with correct chemicals and spraying parameter settings. While executing the spraying task the system logs site-specific spraying process data. The logged data can be used to produce product information for the food chain. The spraying work is remotely monitored by farm manager or other spraying units. In case of machine breakdown, the driver is able to get decision support to solve

the unexpected problem in a most appropriate manner and to re-schedule the task. Within the time frame of growing season, the farmer is able to get assistance in all steps of the task so, that he can perform farming according to his/her farming target and values.

The stakeholders of the pilot are famers, (spraying) contractors, farm advisors and advisory services, weather services or weather sensor providers, sprayer/machine manufacturers, governments for chemical usage regulation, spraying chemicals providers, ICT providers for FMIS, data logging services, remote monitoring and machine repair services, and product information services.

Table 2: Stakeholders directly involved in the pilot prototype development (Smart Spraying).

Stakeholder	**Role**
Farmers (1	3 farmers involved in the concept design process and 3 farmers as evaluators of the prototype
Farmers providing contracting(1	1 spraying contractor/farmer involved in the concept design process and 2 as evaluators of the prototype
Retailer(1	1 as evaluator of the prototype
IT developer(1	1 as evaluator of the prototype
Researcher(1	3 as evaluator of the prototype
Advisor(1	1 as evaluator of the prototype
Journalist/Farming magazines(1	2 as evaluator of the prototype
John Deere Ltd(2	Machine (PA sprayer and tractor) manufacturer, remote repair service provider; machine breakdown service
MTT(2	Research Institute providing PA expertise and platform for the pilot prototyping
VTT(2	Research Institute providing human factors methodology for the pilot development
A-Lab Ltd(3	Weather sensor and sensor network service provider; data and service interfaces for the pilot
Suonentieto Ltd(3	FMIS and Task Controller (for machinery commanding and data logging) provider; farm data and interfaces for the pilot
Nylands Svenska Lantbrukssällskap(3	Disease alarm developer; disease prognosis model

(1 Private person (2 SAF partner (3 Collaborating stakeholder/non-SAF partner

The Smart Spraying prototype development took mainly place in Finland, and therefore Finnish stakeholders played important role in this early trial. Two farmers and a farm contractor were involved in the concept development in an early stage. They expressed their needs and commented suggested technical solutions. VTT had an important role here in communicating the possibilities of FI enabling technologies to the farmers and in interpreting and the farmer needs and comments to structured information for the pilot developers. Several farmers and contractors

gave their evaluation for the final prototype during interview sessions in a national machine fair (KoneAgria) in Finland. John Deere provided the concept for the machine breakdown service. Nylands Svenska Lantbrukssällskap (regional farm advisory service in Finland) provided a disease model for the pilot use. A-Lab Ltd provided interface descriptions data for the weather service part of the pilot. Suonentieto Ltd provided FMIS interface for the piloting.

Table 3 contains the stakeholders, who are not directly involved in the development of the pilot, but during the organised workshops and national discussion panels the pilot was introduced to them and they could provide opinions about the pilot.

Table 3: Stakeholders indirectly involved in the pilot prototype development by commenting in dissemination workshops (including SAF national panels) – Smart Spraying.

Stakeholder	**Role**
MTK	Farmer's Union
HK Ltd	Food industry
PETLA	Potato Research Institute governed by potato industry chain
GS1 Finland	Standards provider
Valtra AGCO Finland, Junkkari Ltd	Machine manufacturers
Finnish Crop Protection Association (KASTE)	Group of experts from different sectors, e.g. government, safety, food, chemicals to develop plant protection regulation and communication in Finland
MLOY Ltd	FMIS provider
ProAgria	Farm advisory service provider, disease alarm provider
IBM Finland	ICT provider
inno-w Ltd	ICT provider forcollaborative and networked business solutions
TiViT Ltd	Excellence Cluster for ICT in Finland
Kauppahalli 24	Internet store and online shopping

2. Greenhouse management pilot

The target group of the Greenhouse Pilot in Greece are mainly farmers from greenhouse production, agriculturists, traders in fruit and vegetable supply network, service providers organising transports or packaging solutions as well as ICT experts. The setup of the Greenhouse Pilot is based on the development of a communication network to support business interaction between these different stakeholders. The architecture of the FMS has been designed in a way to allow the simple integration and collaboration of services developed for independent providers. This pro-

vides a new market place like AppStore or the android market and enables a certified provider to release its application and gain revenue.

Furthermore, the architecture of the FMS has been designed in order to allow the creation and support of a market place. A service provider can upload his services while the users can search for and register to new services. Also, the system is designed to support the exchange of information between stakeholders (e.g., farmers, agriculturists, service providers, manufacturers etc.) and allow sharing their opinions and experiences. A farmer who is willing to experience the proposed concept of the Greenhouse Pilot could have at least the opportunity to:

- Avoid possible crop damages
- Produce more qualitative products
- Calculate the best amount for cultivating his products
- Cultivate the right product even without previous experience
- Organize resource management more efficiently
- Decrease the cost of investment
- Advertise his products effortlessly
- Be provided with technical support immediately
- Link easily with other stakeholders
- Better link with government and certification authorities

The farmers are the most important stakeholder of Greenhouse Pilot. During all the phases of the implementation of the Greenhouse Pilot we were in touch with farmers from all over Greece (around 100 farmers) for the collection of the requirements, for the evaluation of the concept, the Greenhouse Pilot mock-up and the real implementation of the Greenhouse Pilot. These farmers are from different ages, educational level, some are familiar with the internet, with small and big farm area and all of them are eager to install new systems in their cultivations to create new and qualitative products and make their work more efficient.

The agriculturist is another stakeholder that has been involved to the Greenhouse Pilot so far. His experience to the era has been extremely useful for the implementation but also for the evaluation of the concept and the pilot. About 8 agriculturists participated to all the phases of the implementation, some of them were employees of the OPEKEPE which is one of the project beneficiaries and some others were external stakeholders with important involvement in the agri-food chain. Most of the agriculturists have provided their knowledge about agricultural issues, methods and techniques. Furthermore, they have enriched the provided recommendations that will be

produced by the system according to the production of greenhouse tomato and cucumber. Some of them have evaluated the concept and the pilot. All of them were willing to advertise themselves and their expertise through this agricultural platform.

Two traders in fruit and vegetable supply network and service providers organising transports or packaging solutions were also involved in the Greenhouse Pilot as they aim more organized coupling between the primary sector and the secondary one, focus on simplifying their daily tasks and earn more profits.

Finally, ICT experts were provided through the NKUA, which is also a project beneficiary. We focused at informing the participants about the key functions of the pilot and how the functions of the Future Internet could be applied to the agricultural life. Previous research of the existing solutions have revealed some shortcomings. Until now the proposed systems (SCADA and FMISs) remain monolithic, providing to the end users limited functionalities. The Future Internet providea set of generic principles for that.Apart from the Generic Enablers (GEs) that have already been considered, the SmartAgriFood projects expects from the ICT experts to recognize what is still missing from the applied solutions but mostly how we could upgrade or even deploy systems that do improve the daily life of every stakeholder along the food chain. ICT experts support the cloud hosting, enabling SMEs to deploy their applications with limited cost investments and the Greenhouse pilot has a lot of possibilities to succeed.

We also organized group meetings or individual meetings, presenting the concept and the implementation until then. A group of stakeholders (around 20 persons) have participated in the National Panels that have been organized so far. Some of the stakeholders have answered to a questionnaire either electronically in the following link:

http://obsurvey.com/S2.aspx?id=3694E4C9-BFDF-4020-B79D-14A940E08AE8 or manuscripts to the questionnaire that can be found in the Appendix A of D200.2 which was shared to stakeholders who have participated in a presentation of the GUI without access to the electronic questionnaire (in total around 76 persons).

3. Fruit and Vegetable Pilot

The target group of the fruit and vegetable pilot are agri-food companies of all stages (farmer, trader, and retailer) in the fruit and vegetable supply network as well as service providers organising transports or packaging solutions. Additionally laboratory groups such as SGS (Partner in SAF) are also in focus. The setup of the FFV Pilot is based on the development of a communica-

tion network to support business interaction between these different stakeholders. The development of the product quality information service is of relevance for all agri-food companies to enable their potential to differentiate using product quality information to proof their capability to provide highly qualitative products. The product quality information includes production and handling information from agri-food companies as well as analytical results from laboratories sampling product batches. Service providers, especially returnable packaging pool management companies such as EuroPoolSystem play a crucial role in the sector, because their crates are part of traceability management schemes of the individual companies and traceability of products is one key success factor and the most important pre-requisite for developing the pilot. In addition of the agri-food companies, the pilot also targets selected ICT service providers with relevance to the aforementioned agri-food companies to discuss the integration of SAF FFV pilot solutions into the currently existing business IT infrastructures.

The overall strategy of the FFV Pilot community building plan in Phase 1 was to involve selected key actors from every stage of the supply network as well as selected service providers with relevance to the pilot scope and bring them together with direct project partners. The selection of stakeholders was based on their capability to multiply interests in the project and the pilot as well as the size of their supplier / customer base. The current involved major stakeholders are presented in the following table.

Table 4: Stakeholders in the SmartAgriFood FFV Pilot.

Stakeholder	**Role**
EDEKA	Largest German retail group with over 12.000 supermarkets in Germany and over 200 suppliers for fresh fruits and vegetables.
Landgard	Largest German fruit and vegetables trading group with over 8000 members (=farmers) all over Europe.
Eurofins	Largest Laboratory group with many customers in the fruit and vegetables sector.
Global G.A.P.	Worldwide leading certification provider for Good Agricultural Practice (GAP).
Euro Pool System	Largest European Returnable Packaging Pool Management company with offices in 12 EU-countries.
Van Wylick	Large scale fruit and vegetable trading company as well as logistic service provider for fresh fruits and vegetables.
Vendel	Large transport service provider and leading in IT services for their customers in the FFV sector.
Campus Klein-Altendorf	Farm research facility and supplier of fresh fruits and vegetables
SAP	ICT company providing business solutions for EDEKA
Lunar	EDEKA ICT service company
Realdolmen	ICT company and IT service provider of Euro Pool System

Landgard, EDEKA and Euro Pool System are the key actors on business side for building the community around the FFV Pilot. All companies are situated at the Centralmarkt Bornheim, an industrial area specialised on fresh fruit and vegetable trade. In this area a concentrated experimentation is possible with low efforts due to the presence of all stakeholders representing a complete supply chain from farm to retail. This opens the chance to create an open and collaborative experimentation environment with a tremendous perspective for dissemination.

Landgard is a marketing organisation for fruits and vegetables as well as flowers. In the European market Landgard is the second largest marketer of flowers and one of the largest marketer of fruits and vegetables. Landgard coordinates 3000 SME farmers and growers that provide fresh produce every day to the Landgard central warehouses in 11 European countries (Germany, Denmark, France, England, Italy, Austria, Switzerland, Slovakia, Spain, Czech Republic and Hungary). The subsidiary in Bornheim (Germany) is the centre for quality management and a major central warehouse for fresh products.

Euro Pool System is the leading pool management company for returnable packaging in Europe. The company developed out of a number of German, Dutch and Belgian fruit and vegetable growers with the idea to build up, maintain and administrate a pool of reusable packaging for their products. Euro Pool System is the market leader of reusable packaging in the top six fruit and vegetable producing countries, with a market share of 41%. The principal activities of Euro Pool System include:

- the pooling of returnable packaging to the European retail market,
- the optimisation of return logistics of their packaging, as well as
- the integration of Return & Service Centres at strategic places all over Europe.

Euro Pool System organises over 650 million crate cycles, integrating enterprises from farm to retail per year. The headquarter of Euro Pool System in situated in the Netherlands, whereas seven different offices are operated all over Europe. The German headquarter is situated in Bornheim (Germany).

EDEKA is the largest German retail group and is organised in seven regional centres, which coordinate between 400 and 800 independent SME merchants owing 12.000 supermarkets all over Germany. A potential model region (North Rhine-Westphalia and Rhineland-Palatinate) offers great perspective for the large scale experimentation (Phase 2) and represents an entry point for large scale implementation in Phase 3 where the focus of this group can be extended to their European supplier base. EDEKA Fruchtkontor is one out of four central procurement offices for fresh fruits and vegetables of the EDEKA group. From the Fruchtkontor the fresh products are

delivered to the EDEKA distribution centres which distribute the products to the EDEKA supermarkets.

Additionally, the following project partners supported the project and the pilot in dissemination and community building activities with their dissemination platform in order to create awareness for the project and the pilot.

Table 5: Project Partners involved in the community building in the FFV Pilot.

Stakeholder	Role
ATB Bremen	Dissemination towards ICT community
ATOS	Dissemination towards ICT community
Huawei	Dissemination towards ICT community
GS1	Dissemination Platform towards Food Industry & Retail with a large member base and different highly noted events with relevance to logistics and food;
KTBL	Dissemination Platform towards Agriculture.
Cambden BRI	Dissemination Platform Food4 Life; Support for Discussion Panels
DLO	Dissemination towards Science
CentMa	Dissemination towards Science

In Phase 1 we made use of all three dissemination platforms and Euro Pool System to create awareness for the project and the pilot as well as to contact potential candidates for Phase 2 and large scale experimentation. These potential partners (see especially table 4) were involved in all community building activities, because they are acting in a wider supply network with many companies interested in innovation for their daily business. This led amongst others to the involvement of EDEKA, whose commitment to the pilot and the project has been a great achievement.

4. Plants and Flower pilot

The main stakeholders of the Plants and Flowers (PF) pilot are user organisations, standardisation organisations and solution providers.

The user organisations are the main participants of floricultural supply chains:

- *Traders*, in particular wholesalers, exporters, and importers; these organisations are closely connected to retail and have a crucial role in logistics orchestration.
- *Growers*: the supply chain starts at the producers;
- *Auctions / producer organisations*: the largest flower and plant auction in Europe is located in The Netherlands (FloraHolland), where the auctioning system originally started.

- *Logistic Service Providers*, in particular transportation companies and storage/transhipment firms;
- *Suppliers of Logistic Assets* (containers, crates, etc.): the most often used containers are the CC containers (supplier Container Centralen and the Auction Trolleys of Flora Holland;
- *Retailers*: the main retail channels are florists, supermarkets, garden and Do-It-Yourself (DIY) centres, and street market. The shares differ a lot between European countries. Furthermore, web shops are becoming increasingly popular.

The most relevant organisations for information standardisation in the plants and flower industry are Florecom (part of TuinbouwDigitaal) and GS1.

The most relevant solution providers are standardisation organisations and ICT-companies that offer products and services for:

- RFID and sensor integration
- On-line quality monitoring
- Supply chain planning & scheduling
- ERP for flower logistics
- Service integration and cloud computing
- Decision support and business intelligence

The current involved major stakeholders are presented in the following table.

Table 6: Stakeholders in the PF Pilot

Stakeholder	**Role**
Baas Plantenservice	Trader in garden and indoor plants
Van der Salm	Grower, producer of lavender plants
Speksnijder	Transporter, specialised in cooled logistics
Flora Holland	Biggest flower/plants auction in the world, growers cooperative with about 6,000 members, especially in the Netherlands, but also beyond
Mieloo& Alexander	Auto ID integrator.
Greenport Digital Community (Dutch: TuinbouwDigitaal)	Collaboration of three eBusiness sector organisations horticulture.
Florecom	Industry association for chain information in the Dutch plants and flowers sector (member of Greenport Digital Community).
Union Fleurs	International Flower Trade Association.

Baas Plantenservice is an innovative Dutch trader that implemented a large-scale tracking system based on the RFID tags that attached to the 3.84 million plant trolleys put into circulation across Europe in 2011. To the best of our knowledge, Baas Plantenservice was the only company who was actively taking advantage of this unique RFID infrastructure. The tracking and tracing system of Baas Plantenservice has served as an important basis of the pilot. As a consequence, the trader also served as a pivot in the pilot community building. The solution provider of the tracking and tracing system has supported the prototype development: Mieloo& Alexander.

For the pilot, a supplier and a logistic service provider were selected that have an proactive role in its current RFID-based tracking and tracing system. Van der Salm is an important supplier of Baas Plantenservice, who produces lavender plants mainly in greenhouses. Speksnijder Transporter, specialised in cooled logistics. Also the auction FloraHolland has been involved because of its important role in the floricultural sector.

For involving the other user organisation of the Flowers & Plants we have chosen to involve several industry associations, i.e. Greenport Digital Community (Dutch: TuinbouwDigitaal), Florecom and Union Fleurs.

Greenport Digital Community (Dutch: TuinbouwDigitaal) is a collaboration of the sector eBusiness organisations Florecom (flowers and plants), Frug I Com (fruit and vegetables) and EDIbulb (flower bulbs) together with the Dutch Ministry of Economic Affairs, the Wageningen UR and the Product Board of Horticulture. The member organisations of the Greenport Digital Community cover nearly all companies active in the Dutch horticulture, including producer organisations and auctions, traders, logistics service providers and information technology vendors.

Florecom is an active industry association for chain information in the Dutch plants and flowers sector (member of Greenport Digital Community). The direct business members of Florecom are:

- FloraHolland (see above);
- Association of Wholesale Trade in Horticultural Products (VGB): about 350 flowers and plants traders are member;
- HBAG: Trades Council agricultural wholesale trade;
- Others partners include the Commodity Board for Horticulture, Plantform (producers association) and GS1 The Netherlands.

Union Fleurs is the International Flower Trade Association. Its full member countries are: Austria, Belgium, Colombia, Denmark, Germany, Israel, Italy, Kenya, Morocco, The Netherlands

(VGB, see Florecom), Norway, Spain, Sweden, Switzerland, Turkey. Additional associate member countries: Japan, USA.

Table 7: Project Partners involved in the community building in the PF Pilot.

Project Partners	Role
DLO	Community building and dissemination towards user organisations, dissemination towards science, dissemination towards ICT community
TNO	Dissemination towards science, dissemination towards ICT community
GS1	Dissemination towards user organisations
Huawei	Dissemination towards ICT community

The main roles of these partners in the pilot are as follows. DLO is coordinator of the pilot and is leading the system analysis and design activities. Furthermore it develops the user interface of the prototype software. TNO supports the system analysis and design, including standardisation issues. GS1 support the standardisation activities and provides the expertise on EPC/RFID. Huawei develops the expert component of the pilot prototype.

5. Tailored Information for Consumers (TIC) pilot

The goal of this pilot is to test and demonstrate how the potential of Future Internet can be used to improve food awareness among consumers. Agrifood products contain a lot of information, some of which is shown in the labelling of the product; other information, by means of a logo provided by a certification body declaring that the product accomplishes several criteria (environmental, quality or health criteria). In despite of this, there is other product information that nowadays is very hard to know, especially if this information is fed from several points of the supply chain or changes with every batch. For this sub-system experimentation, a pilot system is developed that helps the consumer to be more aware of the food they buy in the supermarket and that they eat, including pre-shopping and post-shopping activities.

The technical organization of this pilot is accompanied with the business organization, which encompasses the analysis of the members of the supply chain involved, the companies that are involved in the pilot and in the possible escalation of the pilot for large scale experimentation.

Regarding the members of the supply chain involved we mean logistic service providers, in particular transportation companies who transport food products. Suppliers of logistic assets such as containers, crates, etc., are also taken into account, as the identification of products must be started in earlier stages of the product supply chain. Finally, the focus of the TIC pilot is in the

Retailers and Consumers as the goal of the pilot is to extend and improve their relation in the pre-shopping, shopping and post-shopping stages.

Therefore, the stakeholders involved in the TIC pilot are:

- Bonpreu, a food company with over 150 stores in Catalonia, Spain, employing more than 4000 workers in supermarkets and hypermarkets.
- An end-user representation from Bonpreu's customer community used for validation of the tools developed in the pilot.

The end user representation is involved in the pilot through the creation of three user workshops that involved more than 50 people. These people were asked to use the developed application and communicate their experiences and comments for improvement through satisfaction surveys. These conclusions are being analyzed and will be used to improve the TIC pilot.

The selection of stakeholders was based on their capability to multiply interests in the project and the pilot as well as the size of their supplier / customer base. The current involved project partners are presented in the following table.

Table 8: Project Partners involved in the community building in the TIC Pilot

Project Partners	**Role**
ATOS	Dissemination towards ICT community
UPM	Dissemination towards Science
BonPreu	Community building around retail sector and marketing disemination
ATB Bremen	Dissemination towards ICT community
ASI S.L	Dissemination towards ICT community

The pilot implementation is validated through the creation of consumers workshops, which test a mobile application for the identification and information provision of products and evaluates the performance, response and usefulness of the pilot. The opinions of users are strongly taken into account for preparing a future large scale experimentation of the provided infrastructure.

6. Tracking and Tracing for Awareness in Meat Chain pilot

Within the TTAM pilot several stakeholders from food industry have been engaged. For building up know-how of current labelling and communication conventions related to beef the following companies have been involved.

Table 9: Description of the stakeholders in TTAM pilot

Stakeholder	Role
Westfleisch	Westfleisch is a meat marketer in Germany and Europe. The international company, based in Muenster, Germany, slaughters, cuts, processes and refines meat.
Tils GmbH	Tils is a small veal deboning and processing company.
Kaufland Fleischwaren	Large meat processor
Orgainvent	ORGAINVENT is the largest German labelling organisation in the beef sector.
QS (Qualität und Sicherheit GmbH)	QS is a quality assurance scheme for fresh foodstuffs that involves all participants in the food industry – from farm to shop.
Consumers	Customers of the Spanish retail chain Bon Preu

Level of involvement:

- Face to face meetings (Westfleisch, Tils, Orgainvent, QS)
- Interviews and questionnaires (Westfleisch, Orgainvent, KauflandFleischwaren)
- Interactive training sessions (participants of WP 700 training sessions)

2.1.2 Overview of the participants of the national discussion panels carried out in WP700

National discussion panels in the United Kingdom

The 15 participants that took part in the National Panel were taken from across the supply chain with roughly equal numbers in each of the food sectors; however most did not deem themselves to work in only one sector. Of the 15 participants only 4 were academically based with their specialities being in management of food production and supply chains. The rest of the participants are being from within or having direct contact with the food industry. There were 3 representatives of the UK organisation that which is concerned with the continuing development of agriculture within the UK by to make it more competitive and sustainable of different areas; these representatives each came from a different branch of the organisation. We also had 2 representatives, 1 being from a one local and one national organisation, looking at need for links between food and the local area to help promote sustainable food from producers to consumers. These participants also had good ICT knowledge which was input in the discussions. Another group of participants represented both the long and short supply chain with one person organising the production, packaging, logistics and selling the retailer for a local producer and another representing a large company dealing with import of fruits from Africa. There were representatives

for a UK packaging company that details with food packaging for companies throughout the UK. The company deals with plastic based packing for food types including fresh. The last of the participants were from a catering establishment which have a number of outlets and offers food throughout the day including hot and cold meals/snacks.

Though we only had 15 participants we did jointly run an evening session with the New Optimists to discuss "what role could ICT play in feeding Birmingham in 2050". For this there were 12 participants from all different areas of ICT development and the supply chain; with all having an interest in the question proposed above and food sector in general. Information from this session was also added to the UK National Panel report.

National discussion panels in Greece

OPEKEPE and NKUA has organized three national discussion panels until now at OPEKEPE premises attended by 20 people both from ICT and end users. The composition of the audience was as follows: 5 users came from the ICT sector, 9 people were farmers, 1 person was from logistic area, and 5 were agriculturists. The first national discussion panel took place in April 11th 2012, the second in July 2nd 2012 and the third in November 5th 2012.

In the first national panel the participants were presented the use case scenarios resulted from the first round of the interaction with end users. Also, the participants were explained of the procedure to be followed concerning the four national panels and the expected results. In the second national panel the Greenhouse and Smart Spraying small scale pilots were presented and the list of novelties concerning the Smart Farming area (related to WP200) was discussed separately with Farmers and ICT users. The findings of the two national panels and recommendations from the end users were considered and most of them have been included in the Greenhouse small scale pilot.

The objective of the third national panel was to present the 6 small scale pilots developed in SmartAgriFood project and functionalities included so far. The participants were informed about the general idea of the pilots in the first national panel but in this one a more extensive discussion took place. In the third national panel all end users were brought together and they were introduced to the agenda of the panel. The findings of the first two national panels were summarized. The end users were also informed about the functionalities implemented in the Greenhouse so far. Presentations were given about all the 6 small scale pilots of the SmartAgriFood project but all participants agreed to focus the discussions in 3 of the pilots. The pilots to be presented

were Greenhouse pilot, Smart Spraying Pilot and Fruits and Vegetables. The first two related to the Smart Farming area while the third one was closely related to the first two pilots.

National discussion panels in Hungary

Each round of the national discussion panels were organised at the institute of Campden BRI Hungary. All six pilots developed in the project were introduced to the participants. 15-20 people participated in the discussion panels from the ICT sector and from the agri-food chain. The composition of the audience was as follows:

- Farmers
- Traders, representatives of supermarket chains
- Policy makers
- Consumer organisations
- Universities (agricultural, technological, economic and financial)
- Researchers in agri-food area and ICT area
- ICT solution providers
- ICT clusters

National discussion panels in Germany

The 1st and 2nd round of discussion panel on the smart farming pilots (WP 200) took place at KTBL in Germany with participants who all have a strong background in horticulture or agriculture, mainly agricultural engineers who work in agricultural or horticultural SMEs, in the field of agricultural and horticultural consultancy or in agricultural science. In parallel two workshops took place at the University of Bonn (Institute for Food and Resource Economics) where project partners met regional stakeholders from the FFV sector.

The 3rd round of discussion panels on the WP 200, 300 and 400 pilots was split up in smaller meetings, which took place at the Farmer's Club in Groß-Gerau, the Fruit & Vegetable Trade Area in Bornheim at Euro Pool System International (Deutschland) GmbH and at the VanWylick subsidiary in Cologne. The focus in these discussion panels was aligned to the involved stakeholders to get a more focussed discussion on the different pilots. While the meeting in Groß-Gerau focussed on the Smart Farming Pilots, the meeting at Euro Pool System focussed on Smart Food Logistics and at VanWylick on Smart Food Logistics and Smart Food Awareness.

Due to the relevance of the German Market in the Fresh Fruit and Vegetable Sector the fllowings stakeholders were involved:

- 15+ Farmers
- Traders, representatives of supermarket chains
- 2 Policy makers
- 2 Universities (agricultural, technological, economic and financial)
- 2 Researchers in agri-food area and ICT area
- 6 ICT solution providers

National discussion panels in Finland

Finnish partners of the SmartAgriFood project have organized three National discussion panels and the fourth and the final one will be organized later in spring 2013.

There were 12 participants, 7 end user representatives and 5 IT-representatives in the first discussion panel. The participants were divided into 3 groups for the group discussions.

In the second National discussion there were 11 participants, 10 end user representatives and 1 IT-representative.

There were 23 participants including the research group of VTT and MTT and there were 5 ICT-participants and 18 end users or research participants in the third discussion panel.

3 Established and current discussion and dissemination activities

This chapter presents a short summary of the established and current dissemination activities as a basis on which further community building can be developed. The aim of this chapter is to summarize the lessons learned from these activities in the SmartAgriFood project, which can be used for further community building. The successful methods and failures, traps and suggestions for modifications will be described. For more detailed descriptions of the dissemination activities and their results we refer the deliverables from WP700.

3.1 Presentations, dissemination activities

Till the end of March 2013 the following activities were carried out:

- A project web-site was established (**www.smartagrifood.eu);** public dissemination information has been added during this period.
- A LinkedIn, Twitter and a Facebook group were defined, and they have been stimulated.
- Relationships with other FI-PPP projects have been established.
- Press releases were issued by the project partners,
- Press conferences were organised,
- 8 one page research summary sheets were developed and translated into the national languages of the project partners about the WPs
- Contacts have been made with ETPs in agri-food and ICT,
- Contacts have taken with MEPs by the project partners,
- Different workshops, conferences and events were organised
  - 35 presentations
  - 21 conferences
  - 35 workshops
  - 13 meetings
  - 31 publications
  - 26 interviews
  - 12 articles
  - Several press releases
  - Training course in Brussels and in Hungary
  - Large Stakeholder Event in Brussels

Perhaps the project did not exploit the potential opportunities social media completely, so there is room for improvement here. The developed one page research summary sheets were useful in the communication. These were collected in one document and it was used as a hand-out in the conferences and workshops. In addition, each one page research summary sheet was available on the project website. The summary sheets were updated regularly and disseminated among the partners and the stakeholders. In March 2013, a pilot portal was launched on the website as a dedicated area in which the six pilots were communicated in an attractive way using short videos that demonstrated the pilots and developed prototypes.

The project partners participated in several conferences, workshops and events and several publications and articles were developed by them. Due to these activities the project is widely known among the intended users and stakeholders. This should be continued in the second phase to distribute the results as widely as possible.

3.2 Lessons learned for community building from the pilots

In the first phase of the FI-PPP programme, conceptual prototypes are being developed for the SmartAgriFood pilots in the sub-use cases to demonstrate the potential applications of the Future Internet in the agri-food chain and in the relevant sectors to the intended stakeholders. These pilots cover selected parts and aspects of the agri-food supply chain (see Figure 1). These pilots offered perfect environments for testing FI-Ware features to address complex requirements and related challenges for agri-food companies.

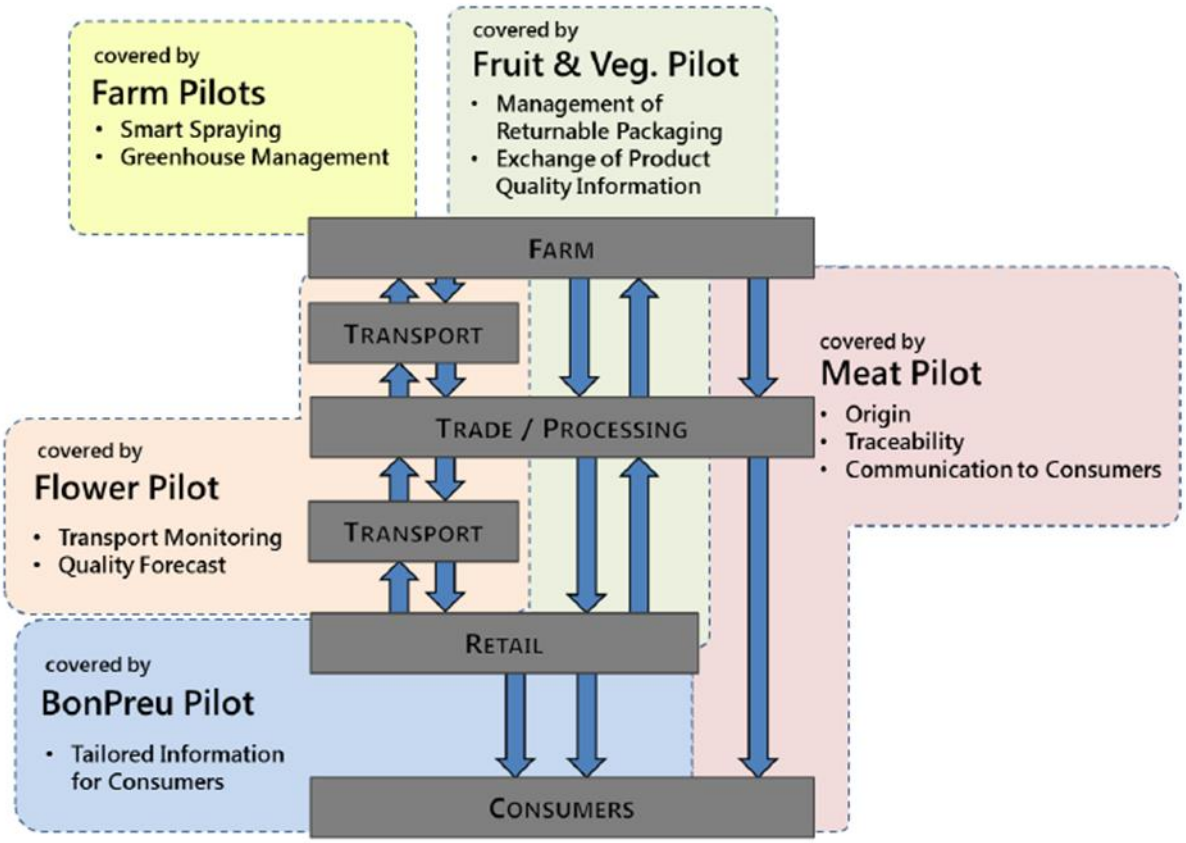


Figure 1: The various pilots in SmartAgriFood placed, indicating the scope and focus in relation to the total agri-food supply chain.

The next subsections provide a short description of each pilot followed by the lessons learned with respect to community building.

3.2.1 Greenhouse Management Pilot

The main objective of the Greenhouse Management prototype is a Future Internet compliant framework which will be able to take into account real data (e.g. weather data) from sensors and provide it to a Farm Management System (FMS) in order to take smart decisions regarding actions that need to be done and will eventually lead to the increase of the farm's productivity. External services have access to the real data collected and produce results related to smart planning of farming actions. Notifications and alerts about the current situation and actions are forwarded to the farmer. In this way, a farmer achieves having a complete surveillance of his farm.

The Greenhouse pilot test bed consists of the "Greenhouse part" and the "Cloud Part". Inside the greenhouse, the deployed wireless nodes send their measurements periodically to the gateway which is deployed on a commodity PC located at the farmer's office, not far from the greenhouse itself. From there, the information is propagated to devices residing in the internet realm and

specifically to the FMS controller. The processed information and the extracted knowledge are subsequently presented to the farmer via a web based portal, deployed on another server. External services have access to the real data collected and produce results related to smart planning of farming actions. Notifications and alerts about the current situation and actions are forwarded to the farmer. In this way, a farmer achieves having a complete surveillance of his farm.

Lessons learned from Greenhouse management pilot

The overall strategy of the Greenhouse Pilot community building plan is to involve selected actors mainly from the "Smart Farming" phase of the agri-food network as well as some stakeholders form the "Smart Logistics" and ICT era. The selection of stakeholders is based on their willing to involve the Future Internet and the ICT services in their daily life as well as their capability to multiply interests in the project and the pilot.

As far as the Greenhouse Pilot is concerned specific barriers were identified and comprised important lessons for the development of the prototype and the upcoming continuation of the project:

1. A major barrier in the overall effort came from the reluctance of both the development team and the farmer to deploy an invasive implementation. The latter would take full control of the Greenhouse and significantly minimize human intervention. However, this would require extensive tests and validation of the system under extreme/borderline cases, a requirement that could not be met during the lifetime of the project. Thus, the pilot leader opted for an advice-oriented system, where the prototype would only recommend actions to the farmer (e.g. E-agriculturist suggests "Open the shade curtains" instead of actually opening the shade curtains. On the other hand, the farmer himself felt reluctant to employ a control system which was under development (even though the functionality was simple and well understood). This activity helped us realized the following:

- There is a strict requirement for exhaustive testing of the implemented solution in border line conditions (extreme heat, extreme cold, extensive power failure etc.).
- Highlight to stakeholders (in this case farmers) the added value of the approach in terms of tangible assets (e.g. time and money saving).
- Make the user a part of the system by accommodating his input and knowledge.

These three actions have already been initiated and will be further pursued in the context of cSPACE thus enabling to reach a larger community.

2. Dissemination to wider audience was difficult due to geographic constraints. Essentially, any user before being actively involved as a tester of a system wants to see it running in practice. However, in our case this was difficult; in order to overcome this burden we opted for a video demonstration which would showcase the merits of the prototype while in parallel would be disseminated to a wide audience of viewers. We developed two videos demonstrating the user interface and the actual system in practice. The videos are accessible in the following addresses and have been embedded in the NKUA SCAN Lab web portal as well as the SAF project website:

- Farm Management System: https://www.youtube.com/watch?v=zsOEL3nEqtU
- Graphical User Interface: https://www.youtube.com/watch?v=UCnyM294qJg

Finally, positive lessons learnt from the effort appear in the following list:

- The initial phase and the interviews assisted in the dissemination of the project.
- The stakeholders meetings provided valuable insight to aspects of the prototype that would otherwise remain blind spots (e.g. provision and management of data).

3.2.2 Smart Spraying Pilot

The pilot deals with farm management infrastructure for support in planning, execution and documentation of plant protection spraying operations in crop production. The pilot aims to optimize the use of plant protection agents in spraying operations in agriculture. In addition, the pilot utilizes decision support systems such as support during machine breakdown during spraying operation. Improper and untimely application of agents may affect non-targeted organisms and can be found as contaminants in agricultural soils, groundwater, rivers, lakes, and leave traces along the whole agri-food supply chain. The main functionality is to accumulate information from machines, labour, crop as well as weather, disease and market information in order to provide recommendations for task planning to the farmer. In case the farmer approves, the tasks are sent to his spraying machine after using many subservices like weather information, disease forecast, machine status request, navigation and map service, crop/chemical market information and compliance.

Lessons learned from Smart Spraying pilot

The Smart Spraying Pilot descriptions have included use case scenarios, functional models, Bizagi models, user interface mock ups and value propositions of business analysis. The pilot de-

scriptions enabled to envision concretely the functionalities of the future farm and the role and meaning of Future Internet technologies in behind. The pilot has stimulated active discussion providing interfaces for different stakeholders to express their opinion, expectations and concerns. Farmers and farm contractors have been able to comment on value propositions. Pilot prototype on-line demos with real user interface have been able to provide the first user experiences of FI-based solutions, and farmers have been able to compare the new technology with the existing one they are using. Farmers have been able to expand their expectations towards FI also to other farm tasks than spraying during the discussions. Farmers have been able to express their concerns like availability of reliable mobile internet connections in the rural areas, and ownership of farm data.

ICT developers have been able to picture their role in developing farm service networks and to form their first perception of how to join the networks and what kind of generic services would be available to boost their business. The discussions around the pilots have highlighted the possible and obvious concerns, such as: if there will be new business with new business structures and there will be also businesses which will be losing market shares because of these developments.

3.2.3 Plants and Flowers Pilot

This pilot consists of a realistic emulation of flower (including plants) transport from grower to retailer. The purpose of this emulation is to show how start quality and quality parameters influence the quality of flowers during transportation and how the chain should/could respond to such changes concerning (i) to maximise flower quality for the consumer, (ii) to reduce overall lead-times in the supply chain and (iii) to optimally match supply with demand. The pilot aims to monitor conditions, notify unfavourable conditions and adapt to them where possible.

Lessons learned from Plants and Flowers pilot

During the definition of the pilot design, the choice was made to focus on a subject that is currently considered to be a major business challenge in the sector. This is how the idea of the “quality controlled logistics in the floricultural supply chain” was born. Because of its match with current sector challenges, this has led to significant sector interest for the project.

The next challenge was to select a supply chain that is representative for the floricultural sector and able to leverage the development of the pilot. The choice was made to select a relatively

straightforward supply chain with innovative stakeholders. This has made it much easier to come to agreements on the pilot set-up and to test the designed functionalities. However, in practice it turned out to be difficult to have full involvement of all supply chain stakeholders during the complete duration of the pilot, especially for the retailer. The main reason was that this stakeholder could not give priority to the pilot because of the current financial crisis.

On the other hand, the stakeholders were not limited to the participants of the selected supply chain. Both national and international sector associations and standardization organisations were involved to ensure a broad industry commitment, which increase the increases the chances for large scale adoption. As a result, the pilot gained a lot of exposure already in this phase of the project.

We started the pilot with a stakeholder analysis that was carried out thoroughly. The key difficulty of these analyses is always to gather the 'real' stakeholder drivers, goals and requirements, instead of getting social desirable replies. Therefore a triangulation approach was chosen that combined stakeholder meetings in which topics where discussed for the group with personal interviews and written questionnaires. This worked out well.

An important challenge that became clear during the project was the maintenance of the link to other pilots in the project and to stick to a harmonized design approach. Even though improvements can still be made on this subject, the architecture approach was considered to be helpful. By designing detailed target architecture, the coherence between the target functional design, supportive application functionality and technical infrastructure was ensured and the link to FI-Ware Generic Enablers visualised. Also, it facilitated the discussion between architects, supply chain stakeholders, developing parties and technical experts.

Components of the target architecture that are inspiring and achievable were selected for the first step towards the desired situation. However, stakeholders from the floricultural sector usually have practical attitudes and are mainly focused on short term improvements. It is not always easy to think 'outside the box' even for innovative entrepreneurs. To maintain focus on innovative solutions, mock-up screens were designed and presented that illustrate screens of the to-be-developed software solution. These screens have proved to be valuable aids in the communication with supply chain stakeholders and helped select and prioritize software functionality in a language that stakeholders can understand.

Based on the above described selection method, a prototype architecture was designed which has served as an important basis of the pilot. The supplier of the current tracking and tracing system has supported the prototype development. This has been of great value. The prototype design has

enhanced the interaction with different developing parties and therefore the developed software was kept very well in line with the designed architecture and therefore by the stakeholder's requirements. Still, improvements could be made in the maintenance of good documentation.

Finally, from the prototype architecture, demonstrative software was developed that was evaluated by the supply chain stakeholders. The response of the stakeholders was very positive and provided invaluable feedback for future developments. Involvement of stakeholders from the sector outside the selected supply chain enhanced the generalisation level of the gathered evaluation feedback and helped in spreading the positive attitude of stakeholders towards this project, all around the floricultural sector.

3.2.4 Fruit and Vegetables Pilot

The pilot deals with the fresh fruits and vegetable sector, with a focus on the large and continuously increasing segment where products are delivered from agriculture to retail through reusable crates that support reduction in packaging resources and waste but which also have the ability to act as physical carriers for information containers attached to them.

The pilot supports (1) the management of the crates in their movement along the chain throughout Europe and (2) with its physical carriers and information containers improvements in information and communication along the chain until retail and consumers. The open network situation of the sector with dynamically evolving trade relationships, the diversity of data ownership, and the European and global reach depend on the flexible utilization of cloud services that do not depend on centralized management schemes which have failed in the past.

The pilot will build on the core engagement of a trader with cooperative structure and farmers as members, the providers of crates, the retailers' trade center (procurement), a logistics provider (transportation) and the retail distribution centers as primary recipients of products for final distribution to retail outlets.

Lessons Learned from the Fresh Fruit and Vegetable Pilot

During the project the partners involved in the pilot developed a living and active community around the pilot. Due to the different project tasks, which required involvement of stakeholders, the partners were able to get in contact with important stakeholders on a regular basis. Especially in the beginning of the project we directly involved many key stakeholders in the fruit and vege-

table sector and analysed their most urgent needs regarding web-based communication in personal meetings (see D700.1). These inputs were facilitated in the pilot as key business requirements, which continuously were re-checked with the stakeholders, as were our plans and the pilot concept. Due to the continuous contacts, picking up their ideas and needs as well as exchanging feedback between pilot and stakeholders, the stakeholders were informally integrated in the project which results in a high number of associated partnerships for the cSpace phase 2 project proposal and direct partnerships (e.g. Euro Pool System). The intensive communication also led to new dissemination possibilities as e.g. EDEKA involves their suppliers in discussions on future collaboration between retail and suppliers or BonPreu started discussion potentials for product information integration in their TIC pilot with Consumers. The highlight of the pilot was the FFV Pilot Stakeholder meeting initiated during the second discussion panel phase (Summer 2012) where all stakeholders met at one place to discuss and evaluate the pilot. Due to the success of this meeting we planned a follow-up event for the pilot in June and continuous follow-up meetings every 6 month for the cSpace project.

The lessons learned for the pilot are positive with few limitations:

- The initial phase and the interviews from WP700 where helpful to get in touch with the stakeholders and inform them about the project,
- The stakeholder meetings were highly valuable for the project because stakeholders that usually don't discuss about common strategies met and gave direct feedback to the pilot,
- The Discussion Panels were helpful to get feedback on the progress of the pilot and the overall project as well as offered potential to include new stakeholders to the project
- The timing of these discussion panels was planned according to the DoW in a static way. A more flexible time frame, which takes the pilot development status into account, would have been better for the panel organisation and the presentation of materials.
- The direct contact with the Stakeholders from the beginning of the project was helpful for specification of applications which are urgently needed in the sector and have a high potential for uptake in the sector.

3.2.5 Tracking & Tracing for Meat Awareness

The pilot is directed towards food security, information availability and transparency in the area of meat production, demonstrating how the Future Internet can improve current processes and procedures.

In the framework of the Future Internet the pilot will tackle the following issues:

- Respond to the EU demand to integrate new technologies for tracking and tracing of animal livestock, cross border, facilitating control-processes.
- Support suppliers in obtaining data-contents and data-processing for different retailer demands.
- Improve bilateral cooperation between retailers and suppliers in the processing of information.
- Enhance the transparency and accessibility of information on the meat production process towards the consumers, related to environmental impact, animal welfare, animal food, control processes and obtained guarantees.

3.2.6 Tailored Information for the Consumers Pilot

The pilot is based on the concept of tailored information for consumers. The objective is to satisfy needs of each consumer by providing transparent and tailored information about agri-food products, using FI capabilities. The consumer should be able to request information of a product in the supermarket and get trustworthy information of his/her interest about that product in a fast, easy and rigorous way. The consumer will be able to request two kinds of information always according to his/her interests and preferences: (1) What attributes has this product? (2) What criteria accomplish these logos/signs of this product?

Processes:

- Scanning of a product barcode or RFID tag and displaying of its tailored information
- Image recognition of a logo/sign and displaying of its tailored criteria
- Push information services
- Consumer profile creation and management
- Payment and Post-shopping services

Lessons learned from TTAM and TIC pilots

In this first phase of the SAF project, we have developed two pilots focused on how to improve consumer awareness using Future Internet. The pilot Tailored Information for Consumers has been defined and evaluated by involving directly the end users, the consumers. For this, several workshops have been performed in Bon Preu supermarket where a same panel of consumers participated in the requirements definition and tested the Web App. The last workshop allowed testing also fTrace in integration with the Web App, so consumers could use it in order to know the traceability of meat products. In a last step the TIC Web App has been extended to give consumers access to TTAM's fTrace information system and get rich information of supermarket meat items. In the last workshop the integrated Web App has been tested by Bon Preu's customers. The validation of the Web App has been done by consumer involvement: surveys to panel of consumers have been used as validation input.

The methodology used in phase 1 for pilot development and evaluation was based on user involvement via workshops, which have been carried out in one same geographical place (Barcelona, Spain), hence with Spanish consumers.

Involving consumers in the pilot allowed us to get a direct feedback of their impressions and needs, so we could improve the Web app and evaluate the benefits that it can create to the final consumer.

Consumers have shown high motivation and consider that the Web app would improve their way of shopping to a more conscious and aware one according to their purchase interests and needs.

The workshops carried out within the TIC pilot gave us information about which kind of information would consumers like to know of a product. However, a wider evaluation of consumer information needs should be done in next phases to define which essential information among all should be collected and transferred through all the supply chain up to consumers.

In addition to consumer validation, the concept behind TTAM has been investigated by using a questionnaire and interviews to get insight in the source of the data on the labels of consumer meat products in order to realize an improved information infrastructure in meat supply chains. This resulted in the following key impediments:

- inadequate technological upstream

- lack of standardization for integrated data exchange covering the whole chain "from farm to fork" or rather insufficient convenience, e.g. for hanging carcasses so far
- different systems between farming and meat industry
- data exchange at present limited to one step up/one step down (based on regulation (EC) No. 178/2002)
- no common and open approach ("everyone cooks his own soup")
- unbalanced cost-benefit ratio

In this way other meat supply chain partners than only consumers are involved in the design of a more open and transparent meat supply chain.

In phase 2, we should continue to involve consumers and other supply chain partners, not only from one specific country or range of age, but from a wider geographical space and a wider range of age and profiles. To do so, a pilot deployment in different supermarkets located in different partner countries should be done. In this case, of a real environment deployment, feedback from consumers should be gathered using electronic surveys answered directly from their Smartphone, as well as doing an evaluation of purchase increase regarding the smart products (those products providing more information to consumers). In addition to extending the pilots to other supermarkets, for meat pilots should also cover other meat supply chains than in phase I, as well as other types of meat. For meat community building should preferably include partners along the whole meat supply chain.

3.2.7 Conclusions

In the production and sales of agri-food products, discussions on assuring food safety and quality, and on the provision of appropriate transparency all along the chain and with consumers has been going on for quite some time. With the short time to markets, an efficient communication to this end is of paramount importance. This is especially of relevance with the globalization of markets where sites of production and point of sales (POS) are far apart. Various difficulties discussed somewhere else (see e.g. the Strategic Research Agenda published by FoodDrinksEurope or the Strategic Research Agenda published by the European project Transparent_Food) have been barriers for the realization of appropriate communication systems. With the ongoing project SmartAgriFood and its follow-up projects, new opportunities of the Future Internet overcome some of the barriers and might open the way for a revolutionary change in sector communication that would better serve enterprises and consumers alike.

However, as the sector has been confronted with similar promises in the past, the stakeholders are caught between scepticism and believe. As the communication problem is a major one, stakeholders want to believe but are afraid to getting too much engaged in a project that might become just another failure.

This is where the prototypes come in. They have a crucial role that cannot be overestimated. They constitute the difference between the classical 'talking and promising' which so often has not been followed up by results and 'demonstrating' a possible reality. Convincing requires a 'touch and feel' experience.

There is no doubt that convincing prototypes that demonstrate a real possibility of tackling the sectors communication problems towards improvements in transparency, food safety and quality will find broad acceptance and engagement of stakeholders.

However, there is a risk. Prototypes that are not convincing in terms of technology, fit with the sector's communication problem, usability, and fit with mainstream IT solutions in place would immediately loose acceptance and damage any further dissemination initiatives. This asks for a careful dissemination of prototypes which should not be disseminated too early and only after having been subject to critical reviews by selected stakeholders who have a specific interest in supporting the project's advance.

Within the SmartAgriFood project this approach has been successfully realized for small scale prototype solutions. Stakeholders that were involved in the review were prepared to strongly support the follow-up project cSpace.

The well-developed pilots in SmartAgriFood had quite a success and have the strength of having important key stakeholders in the relevant sectors. Pilots strategies for developing the prototypes also included the stakeholders and users feedbacks and could reflect them – this could be achieved by involving of these stakeholders and the end-users, and by ensuring an effective discussion with them.

However, there were also some gaps in developing these trials.

The general problem of using the pilots as a method of dissemination for all participants, showed barriers (time, cost, access), caused mainly by geographical distances. Supply chain partners and end-users from other countries than the country of testing had very limited opportunity to learn the pilots and the prototypes in detail and in practice. Partners, who were not able to attend on the spot by these barriers, could not been directly involved in the development of the pilots and had/have information only from the presentations and the descriptions.

In further stages, solving this distance problem will be a crucial point. The following questions should be answered:

- How we can overcome the geographical barriers?
- How the pilots can disseminate knowledge and experiences to other countries/partners?

To solve this problem further and regularly updated demonstrable videos could be developed, which introduce how the pilots work in practice. In addition several webinars (workshops, conferences and trainings) should be held where the stakeholders and partners from other countries can participate without any travel and accommodation costs.

3.3 Lessons learned for community building from the national discussion panels

During the project three rounds of national panels were organised in four countries (Germany, Greece, Hungary and Finland) and one panel in the United Kingdom. The objectives of the panels were to discuss the outcomes on the developments of the use case scenarios regularly with the end-users and the ICT solution providers and to get feedback and provide input to the use case work packages (WP200, WP300 and WP400).

3.3.1 National discussion panels in Finland

So far Finnish partners of the SmartAgriFood project have organized three National discussion panels (29.3., 19.6., and 24.10.2012) and the fourth and the final one will be organized later in spring 2013. In general, the organized Finnish National discussion panels have been able to fulfil the set overall objective to discuss, to get feedback and to provide input to the work of WP200, WP300 and WP400 by actively involving the end-users and ICT solutions providers to review the progress of the SmartAgriFood project.

All the organized panels applied the same methodological approach. Firstly, the organizers introduced the SmartAgriFood project and its main objectives concerning the challenges of the future Internet support food chain activity. Secondly, the individual use case scenarios and pilots were presented in more detail by representatives of each work package. After that the participants had a possibility to comment and discuss the value of the proposed future systems. This approach was adjusted a little bit in each separate National discussion panel in order to optimally serve the participating end-user groups and the time and resources available at the point of each

panel session. Some difficulty was experienced with preparation of the use case and pilot presentations due to the late delivery and scarcity of the work material from the different work packages. The organizers also needed to complete the provided material with some additional material in order to reach the level of detail that was needed for gaining the end user insights about the development of the pilots. Deepening the discussion material was also necessary because some of the National discussion panel participants have been participating two or even all three of the panel sessions and the organizers felt responsive to try to provide new and interesting facilitation material also for these participants.

Generally, the National discussion panel participants were enthusiastic and eager to give their comments on the developments of the SmartAgriFood project. Each panel has been successful to provide some new insight. Recruiting end-users and ICT solutions providers for the National discussion panel was also relatively easy and in the panels there were always representatives from variety of food chain actors as well as technology developers. However, in each panel the ICT solution providers have been in the minority.

1st National discussion panel 29.03.2012

There were 12 participants, 7 end user representatives and 5 IT-representatives in the discussion panel. The participants were divided into 3 groups for the group discussions.

In the discussion of WP200, possibilities of Future Internet in farming were described using the Smart Spraying case as a pilot. The pilot case was demonstrated using examples of the user interfaces from the spraying use case. The end-user comments which rose up in the panel were general. Therefore, comments and observations were useful also for the greenhouse case. For most participants it was not clear what was the role and importance of Smart Agri-logistics WP300 and this was one of the observations that were accounted in the preparation of the following discussion panels (more detailed work material was demanded). The presentation of WP400 was based on the material provided by the WP leader. In addition, some more elaborate information on in particular the Tailored Information for Consumers pilot was provided for the panel participants.

2nd National discussion panel 19.06.2012

There were 11 participants, 10 end user representatives and 1 IT-representative in the discussion panel. The participants were divided into 2 groups for the group discussions.

In the second National discussion panel it was decided that the two pilots; the Smart Spraying and the Tailored Information for Consumers (TIC) pilot would be on the main focus of the panel

and they would be presented and discussed in more detail. This was because the material based on which the National Discussion Panel was expected to be held was very scarce. Only material by the WP 400 leader was provided on time. In addition, the panel was organized relatively early on the given time window, on 19th of June, as in Finland the 21st of June is Midsummer, and after that many people are already on holiday. Thus, the pilots that the organizers had most information, Smart Spraying, with which the Finnish partners MTT and VTT were most closely working with, and the Tailored Information for Consumers, on which the WP leader had provided discussion materials was presented.

3rd National discussion panel 24.10.2012

There were 23 participants including the research group of VTT and MTT. There was 5 ICT-participants and 18 end users or research participants.

Total four pilots were presented (1) the Fruit and Vegetables, (2) Tracking, Tracing and Awareness Meat (TTAM), (3) Tailored Information for Consumers (TIC) and (4) Smart Spraying pilots to the participants with about 10-15 minute presentations. Once again to get more specific description of the pilots, additional information sources (e.g. D300.2, D400.2, skype interview) were used. Overall, the participants gave a positive response to the progress of the pilots. However, they though that a unified concrete pilot that is large and open enough should be developed. And, that the pilot should end up all the way to the consumers.

3.3.2 National discussion panel in the United Kingdom

The UK only ran one panel meaning we are unable to comment on the follow through of participants, ideas or development. We felt the panel went well with representatives from all areas of the industry and was most informative and interesting. The main concept that came out of the meeting was the need for a traceable system that links the whole supply chain. We felt this was very positive as it was something that the project had discussed. For many of the prototypes the group felt that they would be beneficial to the sector but could be expanded and also they was much discussion about the problem of how to ensure a large number of the users engage with the technology to make it cheap and transferrable to the sector. Though was no positive solution found to this problem but it was one that though thought was important to recognise. It was also shown how much more advanced certain organisations/sector are than others with some already having tracking and tracing enabled but unprepared to show the information. There was also much discussion about other simple system solution that the participants would like to see, that

they believe would be easy to create but would be too costly for them to create or would need input from another sectors help. Throughout the discussions we kept seeing examples of how disjointed the food sectors is with each sector/organisation working individual and not trusting anyone else.

However one of thinks we found most interesting was the difference between what one member of the food sector believed occurred in one sector to what was said actually occurred in that sector and also the differing opinion through the food sector, especially the use of technology by farmers. Though most participants said that they would say they did not fit into an exact sector of the supply chain their knowledge of the other sectors was limited especially when discussing the technology used. Many of the participants seemed to gain knowledge from snippets of information and therefore would make a generalised statement about the sector. Some of the most interesting information on technology came from the packaging group and the large importers as they had very accurate and up-to-date knowledge about their sector and how their organisation worked. In general it would have been interesting to see the outcome of a series of panels with the participants as they were most interested in the technology used and would have liked further information as the prototypes were developed.

3.3.3 National discussion panel in Greece

OPEKEPE and NKUA have organized 3 national discussion panels (11th of April, 2nd of July, 5th of November) in order to discuss the outcomes on the developments of the use case scenarios with the end-users and the ICT solution providers, to get feedback and provide input mainly to the WP200 but also to the WP300, WP400, WP500 and WP600. The participants attended all the three meetings were 20 and represented the following sectors: ICT sector (5), farming (9), logistics (1) and agriculture (5) sector.

1st National discussion panel 11.04.2012

The participants were split into 2 smaller groups (farmers-agriculturists, ICT specialists) and issues of specific interest were discussed. At last all users were brought together to a joint feedback session where they had the opportunity to exchange their views about the AgriFood sector. The discussion panel lasted 2 ½ hours. The first half hour a small introduction of the SmartAgriFood project took place. The introduction was made through a presentation prepared by NKUA and OPEKEPE. The presentation was a brief explanation of the different work packages, the project's aims and key concepts (smart farming, smart logistics, and food awareness). During this presentation there has been a small discussion about the pilots of WP200, WP300, and

WP400. At last, the participants were informed of the expectations of this procedure. They were told that this is the first national panel organized and three more will take place within the forthcoming months elaborating the advancement of the overall project. Finally, we explained that all opinions are more than welcome for the future work and they can comment whatever they think that it should be changed or improved.

When the presentation ended the participants were separated in order to discuss specific issues referred to ICT and Smart Farming. This session lasted 1 hour and the topics presented were the following:

- Key functions of the pilots
- Envisaged solutions
- Novelties
- Main benefits

The farmers and the ICT experts commented on various aspects of the above issues and a valuable conversation took place. At last the participants were brought all together in a common session of an hour. A discussion took place and some useful opinions have been expressed. Most of the end users thought that the system has a lot of functionalities that are useful for the efficient management of a greenhouse or an open-growing cultivation but the security of the data is very crucial for the technical solutions that will be provided. They thought that overall solutions could be useful and will be probably applied by the potential users. The farmers and end-users are worried about the cost of the sensors, the cameras and the investment - the large amount of sensors requires a higher cost for implementation and how they are ensured that the data that come from the systems and stored in the cloud are accurate. Most of them believed that the systems should be reliable and should assure the privacy aspects and security measures. Furthermore, most of the farmers requested from the system to simplify more the procedures that are related to the authorities or even automates them.

2nd National discussion panel 02.07.2012

The objective of the second national panel was to discuss about the greenhouse mock-up, the spraying mock-up as well as the first version of the implementation for the greenhouse pilot. Particularly, we emphasized the innovations and the functionalities that would give added value to the end users.

Firstly, an overview and the main goals of the current meeting were explained on a plenary session. Then, the participants were split into two smaller groups (farmers - agriculturists – trans-

porter and ICT specialists) and issues of specific interest were discussed. At last, all were brought together to a joint feedback session where they had the opportunity to exchange their views about the evolution of the SmartAgriFood project. The second discussion panel lasted almost two hours.

The first half hour we made a small review of the main points of the first national meeting for the SmartAgriFood project. The presentation was a reminder of the main goals and the major conclusions of the previous meeting. Furthermore, they were informed that the second national panel was organized to elaborate the advancement of the overall project. Finally, we explained that all opinions are more than welcome for the future work and they can comment whatever they think that it should be changed or improved.

When the presentation ended, participants were separated in order to present them the two videos about the greenhouse pilot, the presentation of the spraying mockup and to discuss specific issues referred to ICT and Smart Farming. These sessions lasted about 1 hour and the topics presented were the following:

- Key functions of the pilots
- Envisaged solutions
- Novelties
- Main benefits

The two videos for the Greenhouse pilot (mock-up and implementation V.01) as well as slides showing the mock-up of the Spraying Scenario.

The participants commented on various aspects of the above issues and a valuable conversation took place. At the end, the participants were brought all together in a common session of an hour. A discussion took place and some useful opinions were expressed.

The main concepts/functionalities of the pilot that were presented were the following:

- E-agriculturist service
- The cooperation of stakeholders concerning all stages of cultivation
- The view of the farm through cameras and the control of the farm over internet
- Monitoring the sensed data, if sensors have been installed in the farms.
- The day by day updated program created by the task plan analyzer
- The problems documented and solutions proposed by the system
- Access from anywhere and at anytime

- The continuity of work even if the network is down
- Search for stakeholders and services and incorporation of them in their profile

The ICT panel was also given with the opportunity to interact with the real implementation and mostly with the account of the service provider. The participants agreed that the presented mock-ups were:

- really user-friendly and useful
- the functionalities of the mock-ups are captured in an easy and understandable way to the farmers and the agriculturists

According to the audience the following value propositions seemed to be missing from the concept:

- Transparency of crop production in the farms, correct information, sharing information, creating added value
- Possibility to create methods, systems and supporting functions that help farmers to act by the rules and to follow the rules easier, precise use of information e.g. legislative rules or latest knowledge of the farming
- New contracting services for the farming business, and creates also new demand for contracting
- User friendly methods to the farms to deliver needed document for the different authorities

After that a list of the innovations was discussed. The general feeling was that all the participants were pleased to see that the Greenhouse pilot is on-going and a significant progress was made since the date that the first national panel was held. We discussed in more detailed way the novelties that arise though the SmartAgriFood project and especially the pilots of WP200 – Smart Farming and the list of the innovations discussed:

- Integration of services and the mashing up of information in a simple way for the farmer.
- Searching of services and stakeholders through repositories and registrars. The participants were positive about this simple way of searching. A discussion was made about the huge amount of information that someone can find in the repositories and registrars and how difficult is to take the needed data easy and fast.
- Transparent and easy to understand charging and accounting mechanisms

  - They believe that these mechanisms are crucial for them and should be easy and really friendly so the end users wouldn't be confused in their chargeable events
  - They noticed that the security should be one of the main priorities in this functionality to avoid unexpected chargeable events for the end users.
- Usage of social network mechanisms that will support trust among stakeholders and services as well as spread useful information in a simple way
- Usage of opinion mining or reputation schemes provide credibility to services and stakeholders in an automatic way
- The audience underlined that the popularity of the voting systems could be affected by "fake votes" and that this should be taken into account for the reliability of the system
- Enable a farmer to change an FMS (Farm Management System) provider without losing his raw data
- Usage of an interface with the underlying network infrastructure and end-devices to collect data about their status and their capabilities and improve the end users' experience
- Enhancing the FMS system with dynamic learning mechanisms. They thought that the most interesting was the learning of the system to predict the internet connection failures.
- Reconfigurable mechanisms to enable local mode of operation if there is no connection to the Internet
- Self-configuration, self-optimization and self-healing mechanisms in different points (equipment, cloud proxy, Cloud FMS). The expert system will inform them through the fault management functionality in order to avoid any undesired operation
- Secure transactions
- Interfaces to the whole food chain since it designed to communicate with the logistics and the food awareness subsystems
  - The participants claimed that if privacy issues are not taken into account, the ratings and the comments may mislead the end users.
  - Our answer was that policy rules will be developed in order to grant which user has the right to make ratings or comments and to whom stakeholder or to which service.
- Enable service developers to design and deploy their services in a simpler way

3nd National discussion panel 05.11.2012

At the third national discussion panel all pilots were presented for ICT and end-users (logistics, farmers, agriculturists) participants but we focused on the Greenhouse pilot, Smart Spraying Pilot and Fruits and Vegetables pilot. After a short introduction to the SmartAgriFood project and the pilots the participants evaluated the potential use of the Future Internet into two smaller groups (farmers - agriculturists – transporter and ICT specialists) and at last the participants were brought all together for the closing session where the ideas came out from the parallel sessions where discussed.

The main results of this national discussion panel were:

- Most of the farmers cannot invest a lot of money to new machinery although they believe that this will save time and in long term they will gain some profit.
- Farmers who are not familiar with technology asked how easy would be to handle such a system and if they could be notified in their mobile phone for the position of the tractor, problems could arise during the procedure and the status of spraying.
- It was emphasized that it is vital that many different technologies are applied simultaneously, not only believing on one type of technology solution
- The technology used was seen very interesting, but the main concern is linked with the size of the farms – how large the farm should be, to be able to cover the costs of the application compared to the benefits given by the pilot
- Some of the participants own open kind cultivations so they asked if they can use this pilot and propose to extend the functionalities. Others needed some information about automated cultivation in terraces and especially in mountain and less favoured areas.

The requirements and the expectations of the audience were:

- The end-users wanted to know how much money should be invested and if they could start using the pilots now.
- Some of the farmers said that the most important thing is to have fast internet access in order to be alerted in their mobile phone and also to have a clear view of their farms through the IP cameras installed.
- The use of the services should be easy and user-friendly
- Safety: avoid data loss by all means, even if application crashes before final step of sending data in an online application
- Traceability and quality management schemes are very relevant for all participants. The documentation has to be easy and based on the real work processes.

Farmers are eager to install new systems in their cultivations to create new and qualitative products and make their work more efficient. On the other hand, ICT users saw the different approaches in the implementation of the three pilots and urged the speakers to connect the pilots so that end user is able to "run" the whole scenario across the food chain "from farm to fork". They also proposed to have a closer cooperation with FIWARE in order to take advantage of the functionalities implemented in this project.

3.3.4 National discussion panel in Hungary

Three National discussion panels were organized by CBHU in Hungary on 16th April 2012 (24 participants), on 22th June 2012 (16 participants) and on 6th November 2012 (13 participants) and the fourth will be organized later in March 2013. The participants were from the ICT sector and from the agri-food chain. The composition of the audience was as follows: farmers, traders, representatives of supermarket chains, policy makers, consumer organisations, universities (agricultural, technological, economic and financial), researchers in agri-food area and ICT area, ICT solution providers and ICT clusters.

The objectives of the panels were to introduce the project and the developed pilot for the expected users from agri-food and ICT sectors and to provide input to the WP200, WP300 and WP400 work packages by collecting feedback about the solutions from the participants.

In the **1st round of panels** the SmartAgriFood project, the WPs and the pilots from the WP200, WP300, and WP400 were introduced to the participants and after that the following questions were discussed with them.

- What do they think about the technical solutions applied?
- Do they envisage any other applicable solutions, which are relevant?
- Are the forecasted solutions applicable and how can they apply?
- What are the potential hurdles of applicability?
- What should the solution providers change or improve?
- Questions formulated by the leaders of WP200, WP300 and WP400.

Overall solutions could be useful and will be probably applied by the potential users. Most of the participants thought that the systems have a lot of functionalities that are useful for the efficient management. Users have to see benefits of services, functions and new methods.

Usually aim is to achieve cost efficiency. The farmers and end-users are worried about the cost of the sensors, the cameras and the investment - the large amount of sensors requires a higher cost for implementation. E.g. in Hungary the majority of the farms and other agricultural SMEs

have small size, thus the smaller capabilities for implementation could be a potential hurdle. Research and development costs and the time span when functions or services are in the market were seen as challenging.

It was a general opinion and note that the retailers or even producers will not have the willingness give (detailed) information for the end-users (consumers or customers) e.g. about the exact origin (in cases of Meat Transparency or even TIC pilots) – this is not a technical hurdle but a human and business issue.

Currently getting a huge amount of information (even undemand) is a key problem.

- Clarification of the services must be described in more detail like what are resources and costs of services and how the maintenance and continuity is realized both in cloud and cloud proxy.
- There is a need for more efficiency in operations and less investment for users.
- Reliable and relevant data is required for the implementations of services as well as user supporting functions of working machines.
- Systems should be reliable and should assure the privacy aspects and security measures.
- Furthermore, most of the farmers requested from the system to simplify more the procedures that are related to the authorities or even automates them.
- There is a need for applications which will help the direct connection between the authorities and the farming society.
- Systems need to be flexible and open for use within a dynamically changing network
- Systems should not build on a centralized system or management organization
- Systems should incorporate existing standards especially those from GS/1 developed with industry cooperation

The structure of the **2nd round of panels**:

First we collected input materials from the WP leaders of WP200, WP300 and WP400.

The WP leaders answered the following questions:

1. What the pilots deliver to the users? (clear description of the value proposition and the novelty)
2. How we want to keep the interest of the participants of the discussion alive?

3. What is the new information, benefit what we offer for the participants of the second round panel discussions?
4. Is there any opportunity what we can offer the panel members to join to the FI-PPP or SAF in the second or third phase proposal?
5. Do we see any benefits of organizing or establishing national networks/discussion communities related directly to the network of the SAF project?

In the panel the following questions were discussed with the participants:

1. How the participants evaluate the value propositions?
2. Is there anything what is missing and should be added?
3. Are the participants willing to contribute to the large scale testing?
4. How they can contribute?
5. What are the resources necessary to implement the pilots?
6. Is there any part of the investments and necessary new resources which can be used parallel for other solutions? Which are these other uses?
7. Do you see any opportunities to establish national networks of smart agri-food solutions related to the network of the SmartAgriFood project?

The value propositions provided by the WP leaders were seen as good. The participants thought that the expected solutions would be helpful in the future.

However it should be considered that different actors need different amounts of information and different technical solutions. We would need to target the technology and services, as consumer and retailers are very technology advanced whereas most farmers are the opposite. Therefore they would need different information systems up and down the chain and different levels of complexity across.

The most crucial points of the applicability of the ideas are the costs and the security and safety aspects. It would be very useful if a statement about the probable costs will be developed.

The solution providers should pay attention for the users how have not smartphones or how don’t want to buy the new devices. It would be useful if some devices for the smart shopping are available in the supermarkets.

Most of the participants of the Hungarian panel are willing to contribute to the testing. Mainly the ICT participants were very interested in the testing possibilities. They can provide further technical solutions and they can participate in the implementation.

Most of the participants were interested in the establishment of national networks of SAF project. The participants thought that the national networks will be formed anyway. They can be powerful factors in the future societies.

In **the 3rd round of panels** after a short introduction to the SmartAgriFood project and the pilots the participants evaluated the potential use of the Future Internet and the pilots in a common session.

Doubts, problems of the applicability

- Most of the farmers cannot invest a lot of money to new machinery although they believe that this will save time and in long term they will gain some profit.
- Cloud services are expensive. At this stage of development it is very difficult to say how much using these actually cost.

Farmers who are not familiar with technology asked how easy would be to handle such a system and if they could be notified in their mobile phone for the position of the tractor, problems could arise during the procedure and the status of spraying.

Requirements, expectations

- The end-users wanted to know how much money should be invested and if they could start using the pilots now.
- User interfaces: must be easy to use, no learning required. User interfaces from different providers need to be similar to avoid re-learning
- The use of the services should be easy and user-friendly
- The possibility to use all applications on all hardware platforms (PCs, Smartphones, etc.) is very important for the users. The use of mobile devices e.g. for documentation purposes when working in the field is very common.
- It would be beneficiary for the consumers that the same application could be used in all the retail chains, so that consumers could have the same profile and application in all the retail chain stores they visit in their everyday life. All retail chains cannot have their own versions of applications; this would be troublesome to the consumers.
- Safety: avoid data loss by all means, even if application crashes before final step of sending data in an online application

- Traceability and quality management schemes are very relevant for all participants. The documentation has to be easy and based on the real work processes. For a complete tracking, data of previous land owners (e.g. no spreading of sewage sludge) and neighbours (e.g. potential wind drift of chemical agents) is considered as relevant.
- Standardisation issues should be tackled:
  - when collecting information it must already be considered how and where this information will be used: this has an impact on what information is relevant and on what is the level of detail that is needed

3.3.5 National discussion panel in Germany

In the first of these panels, the majority of participants were all are active farmers, mainly of vegetables and potatoes with direct and indirect marketing. All of them use Farm Management Software, most use Smartphones or similar devices for daily communication. However, they state to have little knowledge on computers and avoid spending too much time with computers and the internet. In the second and third of these panels the participants originated mainly from Logistics Service Providers as well as Trade Organisations focussed on Fruits and Vegetables. The main result of the discussion was that both pilots are of high relevance and of interest for the present actors in the fresh fruit and vegetable sector in order to increase traceability and to reduce waste. Especially Euro Pool System started already investments to be able to implement results from the FFV Pilot as additional services for their customers.

Most of the representatives of the involved stakeholders are still in touch with the project and especially EDEKA, the largest German Retail organisation signed up as associated partner for Phase 2.

The technical solutions applied offer a good chance for comparison with similar enterprises in the neighbourhood. The shared data need to be anonymous, perhaps with encryption applied. However, the enterprises, e.g. greenhouses, might be difficult to compare because each facility has its own characteristics. The fully automatic operation of greenhouses by a cloud management system seems to be not feasible, because the control of all processes has to be in real-time. Any disruption of the internet connection or criminal misuse could have disastrous results. The compatibility with existing systems is essential for the acceptance of any cloud solution by the farmers. The farmers would store data in the cloud, giving that the following prerequisites are met:

- They must see an advantage in doing so
- Manipulation of data by others must be impossible

- The farmer has full control over the data
- Access to the data is always possible, even from local devices.

Many farmers are very reluctant to publish production data and are afraid of using control of their data. In certain areas such as specialised crop vegetable farming, trade secrets and confidential knowledge on the applied processes will be a hurdle for sharing data. Information on Trade secrets (knowledge on specialised processes, especially in horticulture), Economic data and amount of allowances would never be stored in a remote data centre – even not when anonymized.

Automatic irrigation of fields for arable farming with the integration of local weather forecasts and measurement of soil moisture is seen as a relevant solution, which offers opportunities for the reduction of costs. The forecasted solutions can be applicable if the configuration is easy (plug and play). The integration of existing systems has to be easily possible. The replacement of existing solutions is seen as not applicable by the participants. The storage and exchange of data over the cloud is an interesting solution if a comfortable access is given.

Generally, the participants were very positive on the innovative potential of the pilots. Aspects to be considered are the integration of existing systems and the issue of data privacy.

- User interfaces: must be easy to use, no learning required. User interfaces from different providers need to be similar to avoid re-learning
- Safety: avoid data loss by all means, even if application crashes before final step of sending data in an online application
- The possibility to use all applications on all hardware platforms (PCs, Smartphones, etc.) is very important for the users. The use of mobile devices e.g. for documentation purposes when working in the field is very common.
- The investment in software is relatively small compared to the investment in machines and other equipment. Therefore payment models like „Pay per service" are of minor importance.
- Single data entry: Data need to be transferred from one application to the other: e.g. from FMS to accounting software, to subsidy application systems, to statistical surveys etc.
- Single login: The authentication procedure for all online applications needs to be simplified, so that the user can use all platforms once he is logged in into his own system.

- For spraying, the selection of the correct agent is of crucial importance. The participants request a knowledge tool with information on the available chemicals independent from their producer, with legal information etc. The data on the selected agent should be transferred directly into the FMS and the accounting software. The system needs to be able to deal with technical shortcomings of the spraying equipment such as residuals.
- A sophisticated planning tool could enable the farmers to share equipment and therefore avoid multiple investments. Office time could be saved by automatic coordination of work.
- Sharing of data requires a high amount of anonymisation, because users are reluctant to display their data (especially financial data) to other stakeholders. However, the direct personal contact to share information with neighbouring farmers is highly valued and of crucial importance for the participants. A good knowledge management system could be a substitute for agricultural advisors, but it could never replace skills and experience of the farmers.
- Regarding the greenhouse pilot, the link-up of existing technical solutions (weather forecast, image processing for weed detection, etc.) was regarded as interesting by the participants. The control of the work processes should be left to the farmer himself and not to an autonomous system. The participants look forward to see the technic not only in greenhouses but also for outdoor vegetable cultivation.
- Traceability and quality management schemes are very relevant for all participants. The documentation has to be easy and based on the real work processes. For a complete tracking, data of previous land owners (e.g. no spreading of sewage sludge) and neighbours (e.g. potential wind drift of chemical agents) is considered as relevant.

In summary, the farmers are willing to adopt the new technologies, when the end user requirements are considered and no additional time is needed to learn how to handle the applications.

3.3.6 Conclusions

From the panels a better understanding about the expectations and demands of the end-users and useful and detailed information about the requirements of the users for the pilot developers was derived.

The panels have been a good way to discuss the results of the pilots with the food-chain members and the ICT solution providers and collect feedback. The pilots were well-developed, how-

ever, they work like clusters, having the same advantages and disadvantages, and therefore we had some barriers in the organisation.

- We could supply new information, improvements about the pilots with some difficulties.
- Several questions were raised about the exact process of the application of the pilots (e.g. costs, needed infrastructure, the level of investments, expected benefits, etc.), but the pilots could provide limited information for partners that were not directly involved in developing the pilots.
- The participants were interested in the opportunities to join or contribute to the project even in the next phase, but there were no exact descriptions/explanations available about these opportunities, which resulted in an obvious and visible loss of interest of the participants, particularly by the ICT solution providers.

The regular discussion with the expected end-users and the ICT solution providers should be continued, but the pilots should be made to ensure that there will be available information about the solutions.

- A detailed description should be made about the joining and contribution opportunities in the second and third phases.
- The business models should be improved to answer the users' questions about the applicability.

3.4 Trainings

Based on the results of the questionnaire survey and the focus group discussions carried out in Work Package 700 we could conclude that the users usually have limited information about the new technologies and cannot imagine and interpret the operation of FI. So there is a need for systematic explanation the applicability of the Future Internet functions for the users.

For this reason a simple training course was developed for users on the current and future advanced functions of the internet based solutions for serving the needs of the food chain members and demonstration training was carried out in Hungary for the Hungarian users, and the representatives of the NTPs of the ETP Food for Life.

The preliminary programme of the training course:

- Introduction
- FI functions - Users functions of FI relevant to agri-food chain
- Generic enablers - Simple explanations of the Generic Enablers
- Examples from the WPs and the pilots
  - Smart Farming
  - Smart Agri-logistics
  - Smart Food Awareness
- Potential applications - Potential applications in other areas of the agri-food chain
- Group exercises

The training was useful for the participants, because they could have a better understanding about the opportunities of using the Future Internet in the agri-food chain. In addition we can introduce the aims and the results of the project and we can collect feedback from the participants which would be used as an important input for the second phase.

3.5 European stakeholder event

A large European event was organised before the end of the first phase to present the results of the project at international level.

The objective of the event was to show how the results can be used and applied in the agri-food chain and in the relevant sectors, and to contribute to the exchange of knowledge and views between the agri-food users and the ICT solution providers.

The event started with a plenary opening session to introduce the project and several key note speakers presented the pilot cases developed in the project. After the plenary a series of separate discussion groups were organized in order to collect feedback from the participants, and then a plenary closing session concluded the conferences.

The presentations and sessions covered the following topics:

- Objectives and benefits of the SmartAgriFood project
- Reducing environmental impact by Smart Spraying
- Improved greenhouse management with the future internet
- Higher resource efficiency in a smart flower supply chain
- Tracing vegetables with smart boxes
- Tailored Information for Consumers
- Tracking & Tracing for Awareness in Meat Chain
- Challenges and opportunities of the Future Internet for the food processing sector – towards the food factory of the future
- Next steps and potentials for Industry and Research for being involved in further phase

The benefits of the organisation of the large European Event are that the project will be widely known at international level and further important stakeholders would be accessed and involved in the next phase.

3.6 National workshops

Beside the international event national workshops will be organised in each participating country of the project, where the results of the whole project will be disseminated at national level.

The most important aim of the workshops is to initiate a dialogue about the Future Internet possibilities in the agri-food chain and the collaboration between the agri-food sector and the ICT community at national level, which could promote the establishment of national networks.

Target audience of the events contains the national stakeholders:

- members of national platforms of ETP Food for Life
- members of national platforms of Manufuture ETP
- different ICT ETPs (NESSI, ARTEMIS, EPoSS, ISI, Net!Works, etc.)
- food businesses along the chain - SMEs
- policy makers, food control authorities

- consumer organisations
- system solution providers, standard providers

3.7 Conclusions and recommendations

Based on the community building activities of the SmartAgriFood project, which were described in the previous sections (3.1 - 3.6) some future recommendations were identified.

1. The regular discussion with the expected end-users and the ICT solution providers should be continued within the framework of national discussion panels.
   - The pilots should ensure that there will be available information about the solutions (informative videos, webinars, etc.).
   - A detailed description should be made about the joining and contribution opportunities in the second and third phases.
   - The business models should be improved to answer the users' questions about the applicability.
2. For overcoming the geographical barriers informative videos should be developed and put on the website, which demonstrate how the pilots work in practice. In addition, several webinars should be held where the stakeholders and partners from other countries can participate in the development of the pilots without any travel and accommodation costs
3. The users from the agri-food chain have usually limited understanding of capabilities of the current and particularly of the Future Internet, which enable new services and technical solutions. There is a need for developing further training materials and organisation of pilot/demonstration training sessions.
4. All existing initiatives and networks where the project partners are involved should be used for creating awareness and discussion of the outcomes of the project. These may include:
   - the EUREKA network through the sequence of international and national events. This programme is aimed to foster transnational innovation projects based on interdisciplinary collaboration of the food sector with the ICT, manufacturing, water, energy, surface technology sectors and involve the European Technology platforms: ETP Food for Life, ETP EPoSS, ETP ManuFuture and EUREKA umbrellas and clusters: EuroAgriFood-Chain, ITEA2, EURIPIDES, ProFactory+, E!SURF, EUROGIA, ACQUEU.
   - the network of the National Food Technology Platforms of the ETP Food for Life in more than 30 countries and the SPES consortium of 13 food industry federations, which all have their network of food SMEs at national level.
   - the European Food Cluster Initiative

- international innovation programs
- EFITA, European Federation for Information Technologies in Agriculture, Food and the Environment.

5. Establishing links with other FI-PPP projects in order to understand and know what are the solutions and benefits provided by the Future Internet in other relevant economic sectors and to find collaboration possibilities with stakeholders who are involved in these FI-PPP projects.
6. Further presentations should be organised on a large number of events attended by agri-food chain members and ICT solution providers.
7. Organisation of specific events by the project such European stakeholder eventsand national workshops in the countries of the participants for dissemination of the results of the next phase.
8. The project website should be maintained and updated regularly.
9. More popular and accessible publication outlets such as Facebook, Twitter, LinkedIn and YouTube should be exploited for dissemination.
10. Preparation of scientific publications for the scientific community in the agri-food and ICT sectors.

4 User Community Building Plan for Phase 2

4.1 Introduction

In October 2012, a proposal called ‘cSpace’ was submitted for Phase 2 of the FI-PPP programme as a merger of the phase 1 use case projects FInest and SmartAgriFood 2. Therefore the plan for user community building in this deliverable will be based partly on this proposal and partly on what was described in the previous chapters. We first provide a general description of cSpace in Section 4.2. The agri-food trial communities in cSpace are then be described in detail in Section 4.3. Section 4.4 presents the plan for open collaboration and exploration.

4.2 General description of cSpace

4.2.1 The marriage of SmartAgriFood and FInest

Insights gained in FI PPP Phase 1 emphasize the need for novel ICT solutions that allow radical improvements for collaboration in business networks. Primary sectors demanding such solutions are Agri-Food and Transport and Logistics industries: several actors (incl. enterprises, authorities, service providers) need to exchange information & communicate across organizational borders to conduct business. Drawing on these insights, cSpace leverages the outcomes of two complementary Phase 1 use case projects: FInest & SmartAgriFood with the aim to pioneer towards fundamental changes on how collaborative business networks will work in future.

Although the two domains of agri-food (SmartAgriFood) and transport and logistics (Finest) differ on the micro-level of business activities, they do share many comment elements such as transportation of goods and face similar challenges arising from fragmented market landscape and lack of level playing field. These common challenges translated into the need for the application of new business models, enabled through advanced ICT and the Future Interne, that allow all players, small or large, to collaborate and compete on an equal footing. To address this need, the cSpace project proposes to answer the following three key questions:

Can a novel business model be developed using emerging Future Internet services that allow SMEs and large enterprises in the agri-food and transport and logistics domains to collaborate and compete for business on an equal basis?

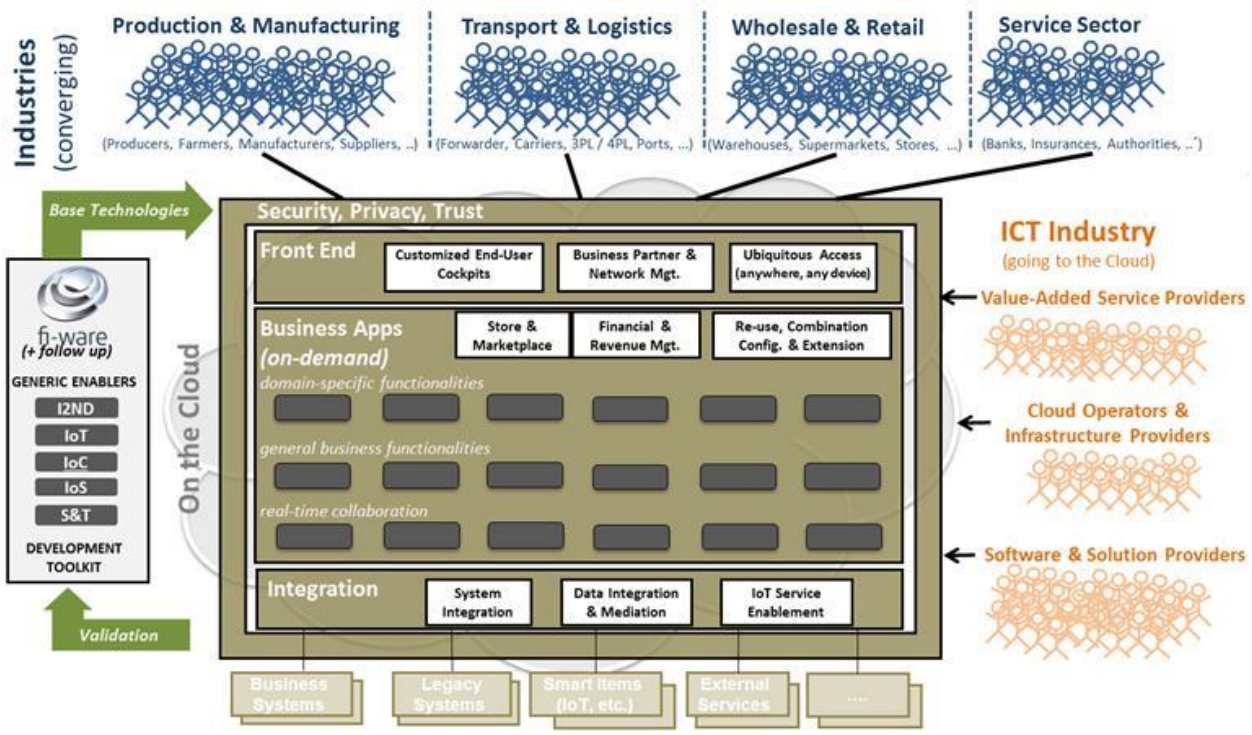
Can novel applications of ICT, enabled through Future Internet technologies, be implemented that improve the production and distribution activities of organizations collaborating in the agri-foods and transport and logistics domains?

Can the bi-directional integration of information generated during the production and distribution of agri-food (and possibly other) products be used to improve both producer and consumer capabilities for managing their production/consumption activities

4.2.2 Key concepts and approach

The ultimate aim of the cSpace project is to develop, validate, and establish a future business collaboration space (the cSpace) that facilitates radical improvements for information exchange, communication, and coordination among business partners and prepares the way for fundamental changes in how collaborative business networks and the involved stakeholders work in the future. The cSpace will utilize Future Internet technologies developed in the FI PPP, and be implemented in an open manner so that other FI PPP projects, as well as external IT providers and interested users, can easily use, test, and exploit its features and services and contribute to its expansion and establishment.

Figure 2 below depicts the overall vision for the cSpace service. The cSpace will be a value added Collaboration Space in the Cloud that enables actors operating in Collaborative Business Networks (e.g., enterprises of all sizes, authorities, public and private service providers) in various application domains to seamlessly interact, communicate, and coordinate activities with business partners and to easily create and act in open and dynamic networks of connected businesses – similar to modern web-based solutions already existing in the B2C world, but focused on the requirements arising in B2B environments. In addition, the cSpace propagates a future business model for enabling the rapid development of high-quality ICT solutions at minimal costs by enabling the provisioning, consumption, and re-use of on-demand solutions in the Cloud. General business, as well as domain-specific, functionalities (referred to as 'Apps', as the envisioned usage and economic model is similar to mobile apps for smartphones) are developed by IT solution providers (project partners and external providers). These 'apps' are provided via the cSpace Store, from which the Apps can be consumed and new Apps can be developed by re-using the features of existing ones. The Apps can be selected based on a number of criteria including their functionality, pricing model, past reliability, focus, etc.; furthermore, the Apps can be "mashed up" for individual business needs using the mechanisms and tools provided by the cSpace; this allows for the rapid creation of integrated solutions, composed of possibly multiple Apps, that address specific B2B requirements at minimal cost, which can be "discarded" once the problem or business opportunity has been successfully addressed. In this way the cSpace enables businesses to proactively act on issues or business opportunities without having to incur the overhead and cost that has plagued traditional monolithic applications.



BUSINESS BENEFITS	
Industries (actors in collaborative business networks)	**ICT Industry** (Software & Service Providers)
• Seamless B2B Collaboration (**information exchange, communication, coordination of activities**) • **Rapid & easy development** of customized solutions at minimal costs • **Quick formation & evolution** of open business networks	• Paving the **way to the cloud**, pioneering on both future **technology** and **business models** • Enable new market & distribution channels • Facilitate **novel business opportunities**, esp. for market entry & participation for SMEs

Figure 2: cSpace Overall Vision - A multi-domain Collaboration Space for Business Networks.

The idea behind the cSpace is to truly move forward in conceiving of a new paradigm in computing that is based on emerging Future Internet technologies and leverages the full potential of the cloud-based services concept[1]. The cSpace pushes boundaries on how business software will work in the future, facilitating innovation and market impact by laying the foundation for adoption by large user groups and external solution providers that can provide additional, novel, and disruptive Apps for the cSpace. In the context of the FI PPP, the cSpace complements the mission of the FI PPP Core Platform Objective in addressing the overall aim of the FI PPP: while "FI-WARE aims to provide a framework for development of smart applications in the Future

1 See HolgerKisker: "The Changing Cloud Agenda: cloud computing shifts from cost to innovation", Forrester Research, April 24, 2012.

Internet"[2], the cSpace will exploit its technologies for enabling substantial increases in the efficiency and effectiveness of cross-organizational business processes and pioneer on novel business models that allow for innovation by external stakeholders with high prospects for industrial uptake and market impact. An important point to note is that the innovative aspect of the cSpace model is the model itself (covering both the technical solution and the proposed business model) – it is not any specific 'technology innovation' such as, e.g., new algorithms, software engineering concepts or the like.

The project will lay the foundation for realizing the vision and prepare for large-scale expansion, complying with the objectives and expected results of the Phase 2 use case projects. To achieve this outcome the project will focus on the following four primary work areas, for which we outline the main concepts and approach below:

1. **Implement the cSpace as an open and extensible Software-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 **Agri-Food and the Transport and Logistics** domains
3. **Provide a working Experimentation Environment** for conducting **early and large-scale trials** for Future Internet enabled B2B collaboration in several domains, and
4. **Prepare for industrial uptake and innovation enablement** by pro-active engagement of stakeholders and associations from relevant industry sectors and the IT industry.

Successful achievement cSpace's goals will be demonstrated through extensive trial experiments in the domains of agri-food and transport and logistics, which comprise diverse European trial sites, stakeholders and usage scenarios. One ultimate outcome of cSpace will be the inclusion of stakeholder groups and providing guidelines, plans and recommendations for the large scale expansion of platform usage in Phase 3. The following Figure 3 shows an overview of the key activities and workpackages (WP) that will jointly allow cSpace to achieve the aforementioned vision of a multi-domain collaboration space for business networks.

2 See FI-WARE Product Vision: https://forge.fi-ware.eu/plugins/mediawiki/wiki/fiware/index.php/FI-WARE_Product_Vision

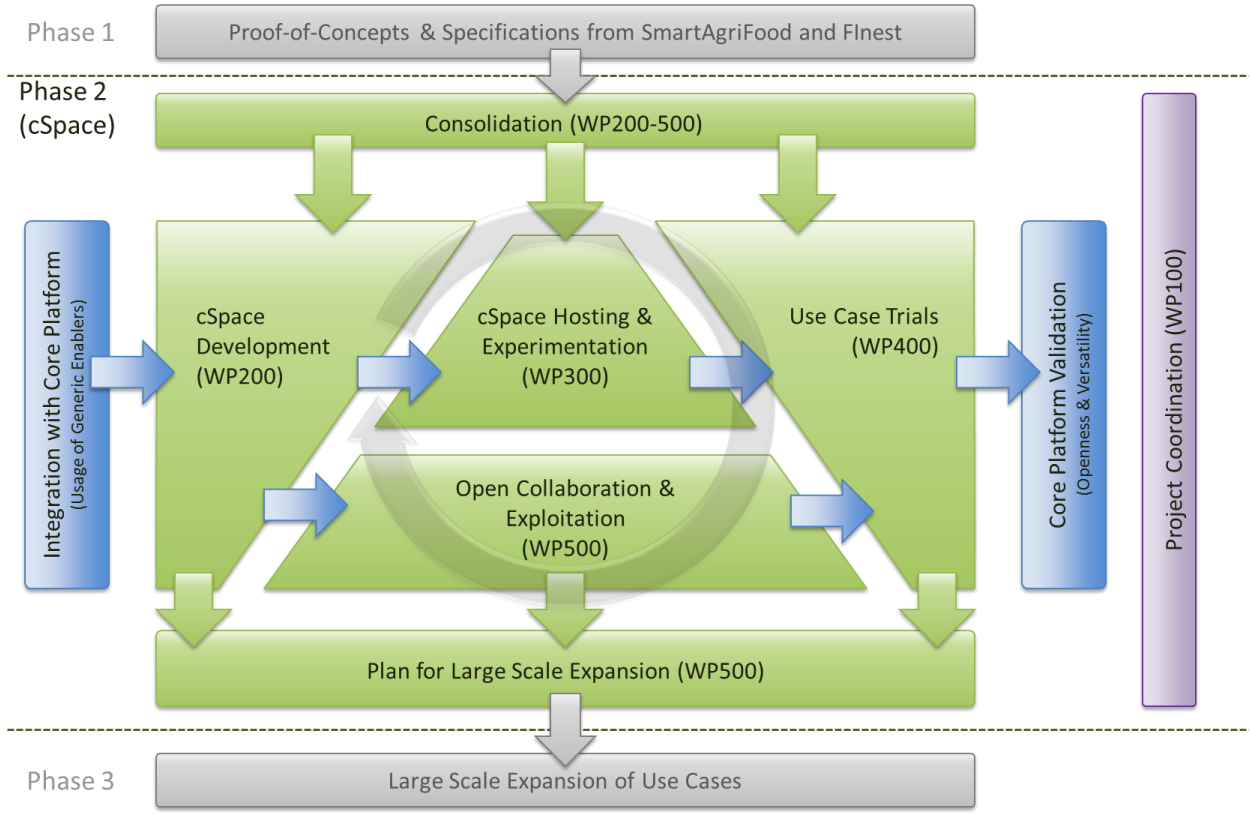


Figure 3: Project strategy in relation to the work packages of the cSpace project.

4.2.3 The cSpace consortium

In order to ensure the necessary expertise for successful realisation of the RTD tasks and to minimize the potential risks in achieving the goals, the cSpace consortium includes 29 partners, out of which 12 are RTD partners, 9 are technology providers (i.e. software vendors, offering ICT related consultancy & ICT providers) and 8 are end-users from different business domains/industries. Out of this cSpace consortium there are some 7 SME type organisations, while it is also intended to specifically involve additional SME type local solution providers and system integrators in the cSpace project by the Open Call.

The partners have been carefully chosen for a successful completion of the project and for an optimal distribution of activities and responsibilities. The consortium includes the necessary and sufficient number of complementary partners covering all the required multidisciplinary expertise to successfully carry out the required RTD tasks as well as to assure a manageable project structure. The whole consortium is described in Table 10, together with a short overview of the partners' characteristics and roles in the project. Furthermore, studying the structure of the consortium and the competencies represented within it, the achievability of a relevant critical mass is proved, as emphasised below.

Table 10: cSpace consortium members

Nr.	Partner/ Role	Key expertise	Role in the project
1	**DLO** RTD NL	Project Coordinator; applied research in healthy food and living environment domains with a strong record in multidisciplinary projects and practice-oriented research	RTD Partner, Project Coordinator, Leading WP 100 Project Coordination, while being directly involved in all management activities. Leading 2 trials in WP 400 on crop protection and flower & plants monitoring as well as being involved in the app development. Leading the elaboration of the cSpace plans for phase 3 and overtaking a major role for ecosystem incubation and dissemination also aiming at European & International Networks. Summarising this feedback also as input for work in WPs 200 & 300.
2	**K+N** Industrial End-User, CH	Deputy Project Coordinator; leading logistics service provider with world-wide operations; strong end-user; trials & experimentation site	Industrial end-user, Deputy Project Coordinator, Leading the coordination of the FI PPP activities and mainly supporting the monitoring and reporting; Leading WP 400 on the use case trials and experimentation site realisation. Contributing to the import & export of consumer goods trial and directly supporting the realisation of the generic and domain specific app development. In community building activities, supporting the community building and exploitation planning, also with a focus on international usage of project outcome.
3	**ATB** RTD DE	Administrative Project Coordinator; Applied Research & Development of user centred support, context modelling &AmI solutions/knowledge based systems	RTD Partner, Administrative Coordinator, Leading legal, administrative & financial management in WP 100; Contributing to cSpace realisation in WP 200 with focus on front end realisation, business & legacy system integration and contributing to development environment. In WP 300 supporting experimentation execution & facilities development. Involved accordingly in WP 400 to contribute to app with focus on exception reporting; also backing the FFV trial realisation. Supporting ecosystem incubation and business model development.
4	**UDE** RTD DE	Technical Architect; Research on advancing software engineering to meet challenges introduced by Future Internet	RTD Partner; Technical Architect; Representative for the FI PPP Architecture board or similar boards if refined in Phase2/3 and established communication channel to FI-WARE. Leading conceptual architecture elaboration and overall design, as well as validation of core platform GEs together with supporting progress harmonisation and control in WP 200. Harmonising and contributing to experimentation environment realisation in WP300. Contributing to developing e-contracting and predictive monitoring Apps in Task 450. Supporting knowledge transfer and educational activities and leading online supporting tools (WP513)
5	**SAP** Software Vendor DE	Chief Software Engineer; Software Vendor	Software Vendor; Chief Software Engineer; Leading overall WP 200 on cSpace development, taking specifically care for progress harmonisation & control and release control; Leading work on task 220 about front end and task 230 on store and operations. Leading realisation of collaboration management component. Supporting task 280 for development environment realisation. Developing app on transport planning. In WP 500 contributing to ecosystem incubation and w.r.t. exploitation and dissemination of project results.
6	**IBM** Software Vendor IL	Software Vendor	Software Vendor; Leading the WP 300 on the realisation of the experimentation environment. Taking care on coordinating the experimentation environment also in relation to the Core Platform GE adoption and on the experiment execution support. Leading the realisation of the development environment and development of the RT B2B collaboration core and the operation environment. Supporting task 280 for development environment realisation. Developing app on real-time exception detection and handling. In the task on community building contributing to the ecosystem incubation and specifically w.r.t. exploitation and dissemination of project results.

Nr.	Partner/ Role	Key expertise	Role in the project
7	**ATOS** Software Vendor ES	Software Vendor	Software Vendor; Technical Architect and member in the architecture board; Leading the coordination of the open call for involving local solution providers and system integrators. This is closely managed with the leadership of Task 450 for the and trial app development. Taking care for a smooth involvement of new partners in the consortium. Leading tasks 250 on system & data integration and 280 on development environment. Also contributing to the store and operations realisation, while supporting the set-up of the WP 200 development environment. In WP 500 leading the exploitation and IPR related task and leading work on policy and integration, Supporting the dissemination, ecosystem incubation and the business model development.
8	**KOCSISTEM** Software Vendor TR	Software Vendor	Software Vendor; Leading the task 270 on security, privacy and trust, also contributing to the validation of core platform and realisation of the development environment. Main involvement in WP 300 as leader for the infrastructure hosting and support for realising the experimentation environment. Leading the GE integration and the experimentation facilities development. Supporting the development of apps in Task 450. In WP 500 having a major role in dissemination and contributing to the ecosystem incubation and development of business models.
9	**TOG** ICT provider; SME UK	Security/ Enterprise Architectures/ Interoperability/ Standards	Software development; Mainly contributing to the Task 270 on security, privacy and trust. Supporting the realisation of the development environment and supporting the architectural modelling based on TOGAF. Providing sources and references on technological standards and contribution to standardisation in WP 500. IPR handling and support of community building.
10	**ASTON U** RTD UK	Supply chain management, knowledge management, technology and operations management	RTD partner; Contributing to task 250 on system and data integration with a focus on semantic interoperability for data handling and integration. Also supporting the business and legacy integration. In WP 450 and 500 promoting the enhancement of existing relevant domain specific standards and elaborating contributions for standardisation. Also supporting the work on policy and regulation aiming at formulation of related proposals in Task 530.
11	**CentMa** RTD; SME DE	Food chain mgt, tracking & tracing, sustainability, environmental mgt.	RTD partner; leading the trial on fruit & vegetables deviation management in Task 432 managing the realisation of the experimentation site and supporting the app and trial app development. In WP 500 taking care for community building in combination with knowledge transfer & education, supporting the business modelling from trial perspective. Aiming at contributions to policy & regulation as well as on dissemination.
12	**ENoLL** Living Lab Federation/ RTD BE	International federation of benchmarked Living Labs in Europe and worldwide	Multiplying organisation and direct contact to European Living Labs; Established communication channel to the CONCORDE project, facilitating the involvement in boards & working groups; Leading Task 510 on ecosystem incubation for community building, knowledge transfer and open call dissemination. Supporting exploitation by international and non-European partners as well as mainly contributing to dissemination and planning of phase 3.
13	**iMinds** RTD BE	Media and ICT, focus on innovation, policy & socio-economic aspects	RTD partner; leading WP 500 with a focus on the business model elaboration. Establishing an interface to all trials and the related technology adoption. Bridging the cSpace value network and generic business models. Business modelling for trial service and the aggregation, also as input to work on cSpace plans for phase 3. Supporting the community building and exploitation.
14	**KTBL** RTD DE	Knowledge transfer of scientific findings into agricultural practice	RTD partner & knowledge transfer organisation; Supporting the trials with expertise on relevant standards specifically covering technological system. Main contributor to standardisation in WP 500. Promoting the enhancement of standards, provision of agri-food domain related knowledge and uptake of the standards related cSpace results.
15	**MRTK** RTD NO	Marine related technology research, ICT services, logistics, maintenance	RTD partner; leading the trial on fish distribution (re-)planning in Task 431. Leading the overall task on perishable goods logistics and contributing to the business model development in WP 500. Supporting the community building in task 511.

Nr.	Partner/ Role	Key expertise	Role in the project
16	**NKUA** RTD GR	System design, autonomic & cognitive networks, network mgt., service provision and mobile applications	RTD partner, leading the work on ubiquitous access and multi-device support w.r.t. the front end in Task 220; leading the IoT integration in combination with the data handling and integration in Task 250. Leading the greenhouse trial from RTD point of view in Task 420 and supporting the app development. In WP 500, based on established relationships, supporting community building and contributing to the business modelling in relation to the greenhouse control trial in close cooperation with IBBT.
17	**UPM** RTD ES	Multimedia communica-tions, collaborative apps, communication &QoS architectures	RTD partner, leading the work on the personalisation and configuration for end-users in task 220 and directly supporting the realisation of the development environment realisation. Developing related elements for realising the experimentation environment in WP 300. Leading the RTD related work in the trial on tailored information for consumers and contrib-uting to the app development. In Task 510 focusing on community building and specifically on knowledge transfer training and educational activities.
18	**WU** RTD NL	Logistics, mathematical modelling, ontology-based knowledge mgt., precision agriculture	RTD partner, representative in the FI PPP architecture board or follow up boards in phase 2, representing the continuation of established communication channels from phase 1 project SmartAgriFood. Leading the RTD related work in the trial on tracking and tracing of meat in close collaboration with GS1.
19	**ARC** Industrial End-User, TR	Trial site; Consumer durables/ electronics and IT equipment manufactur-ing company	Industrial end-user, providing and defining in detail the experimentation site for the trial on import and export of consumer goods. Identifying and set-up of the experimental site and supporting the test of the finally working experimentation site. Harmonising concepts on provenance and consumer awareness. Involving additional supply chain partners from primary manufacturing up to retail of white goods and towards consumer experience.
20	**Bon Preu** Retailer/ End-User ES	Trial site; retailer; con-sumer involvement, fidelity programs, food chain	Retailer operating supermarkets, providing and defining in detail the experimentation site for the trial on tailored information for consumers. Identifying and set-up of the experimental site and supporting the test of the finally working experimentation site. Harmonising concepts on provenance and consumer awareness. Involving additional food chain partners with a focus on information provision and reporting w.r.t. consumer related information.
21	**EPS** Industrial End-User, DE	Trial site; returnable packaging provision and added value services for the food chain	Industrial end-user, providing and defining in detail the experimentation site for the trial on Fruit and vegetables deviation management. Identifying and set-up of the experimental site and supporting the test of the finally working experimentation site. Harmonising concepts on perishable goods logistics. Involving additional food chain partners from farmer, trader up to distribution centre, supermarket and subsequently to consumers.
22	**Florecom** Industrial End-User, NL	Trial site; Logistics, auctions, trade and standards & codes for flower chain messaging	Industrial end-user association, providing and defining in detail the experimentation site for the trial on flowers and plants chain monitoring. Identifying and set-up of the experimental site and supporting the test of the finally working experimentation site. Harmonising concepts on perishable goods logistics. Involving additional supply chain partners from auction, trade, producers.
23	**GS1 G** ICT Standards Service Provider SME; DE	Trial site; identification, communication and process standards	Industrial end-user, providing and defining in detail the experimentation site for the trial on tracking and tracing of meat. Identifying and set-up of the experimental site with partners from the meat chain and supporting the test of the finally working experimentation site. Harmonising concepts on provenance & consumer awareness. Involving additional partners from the meat chain; producers, certification, processors.
24	**Kverneland** Industrial End-User, NL	Trial site; machinery and agricultural equipment provider	Industrial end-user, providing and defining in detail the experimentation site for the trial on crop protection information sharing. Identifying and set-up of the experimental site and supporting the test of the finally working experimentation site. Harmonising concepts on smart food production. Involving additional partners, especially farmers and related service providers.

Nr.	Partner/ Role	Key expertise	Role in the project
25	**M&A** Software Vendor; SME NL	Software Vendor	Software Vendor; Supporting the trial realisation for flowers and plants chain monitoring, based on requirements from existing solutions. Establishing the experimentation site, also supporting the realisation of the experimentation facilities for sound validation. app development.
26	**NCL** Industrial End-User, SME NO	Trial Site; container ship operation and container transport	Industrial end-user, providing and defining in detail the experimentation site for the trial on fish distribution (re-)planning. Identifying and set-up of the experimental site and supporting the test of the finally working experimentation site. Harmonising concepts on perishable goods logistics. Involving additional fish and logistics chain partners.
27	**OPEKEPE** End-user & service provider GR	Trial Site; Farmer support at national level	End-user and service provider; providing and defining in detail the experimentation site for the trial on greenhouse control mobilising involving their supported farmers. Identifying and set-up of the experimental site and supporting the test of the finally working experimentation site. Harmonising concepts on smart food production. Involving and mobilising farmers.
28	**AgroSense** Software Vendor; SME NL	Software Vendor & Consultancy	Software Vendor; Supporting the trial realisation for smart crop protection. Establishing the experimentation site, also supporting the realisation of the experimentation facilities and experimentation execution support. app development and contributing to the front end realisation in WP 200 with a focus on personalisation and configuration for end-users, based on the AgroSense domain specific enabler integration.
29	**INNOV** ICT Provider; SME GR	ICT Vendor and integration	ICT vendor, Supporting the trial realisation for greenhouse control. Supporting the realisation of the experimentation site. app development with a focus on ICT integration and migration also aiming at ubiquitous access and IoT integration.

The planned work and the associated research issues are well-covered by the selected ICT, RTD and industrial end-user partners and their competencies. Certain redundancies in the working teams ensure good research conditions, whereby members of various ICT and RTD partners can come together and offer feedback and new points of view. All of the partners of the consortium requesting EU funding are established and operate in the member states of the EU, the associated countries or the list of International Cooperation Partner Countries.

4.2.4 Use case trials

The cSpace project will establish working experimentation infrastructures across Europe where cSpace pilot applications for selected real-world business scenarios from the Agri-Food and the Transport and Logistics sectors are developed and tested. These trials will leverage and extend the work performed in Phase 1 of the FI PPP, in particular from the use case projects SmartAgri-Food and FInest. The conceptual prototypes that were developed in Phase 1 will be implemented within the cSpace environment using FI-WARE Generic Enablers and domain-specific enablers. These implementations will be tested in limited use case trials in order to determine whether the underlying technologies being utilized are capable of delivering the functionality, performance, security, privacy and reliability necessary for large scale expansion. In total, the project aims at establishing 8 use case trials, organized along 3 themes:

(A) **Farming in the Cloud** addresses food production issues at the farm level and covers two use case trials:

1. Crop Protection Information Sharing – use of field sensor and satellite data to intelligently manage the application of pesticides for maximum crop protection
2. Greenhouse Management & Control – use of sensors to monitor key growth factors (UV radiation, moisture and humidity, soil conditions, etc.) and to feedback data to control systems to modify the growth environment for maximum yield and optimal quality

(B) **Intelligent Perishable Goods Logistics** addresses monitoring and environmental management issues of perishable goods as they flow through their supply chains so that waste is minimized and shelf life maximized covering three use case trials:

1. Fish Distribution and (Re-)Planning – focuses on the planning of logistics and transport activities, including transport order creation, transport demand (re)planning and distribution (re)scheduling
2. Fresh Fruit and Vegetables Quality Assurance – looks at the management of deviations (transports, products) that affect the distribution process for fresh fruit and vegetables (transport plan, food quality issues), either deviation from the plan or other external events requiring re-planning.
3. Flowers and Plants Supply Chain Monitoring – the monitoring and communication of transport and logistics activities focusing on tracking and tracing of shipments, assets and cargo, including quality conditions and simulated shelf life. Focus is with Cargo and Asset Quality Tracking ("intelligent cargo"), Shipment Tracking ("intelligent shipment") and lifecycle information tracking of cargo characteristics/Cargo Integration along the chain.

(C) **Smart Distribution and Consumption** is about helping consumers to obtain better information on the goods they purchase, and producers to better control the flow of their goods to the consumer, covering three use case trials:

1. Meat Information Provenance – ensuring that consumers, regulators and meat supply chain participants all have accurate information concerning where a meat product originated (production farm) and how it was affected by its distribution (quality assurance).

2. Import and Export of Consumer Goods – the intelligent management of inbound materials to a production site and the smart distribution of finished goods to consumers.
3. Tailored Information for Consumers – the provisioning of accurate information to individual consumer's needs and feedback of this information to the producers

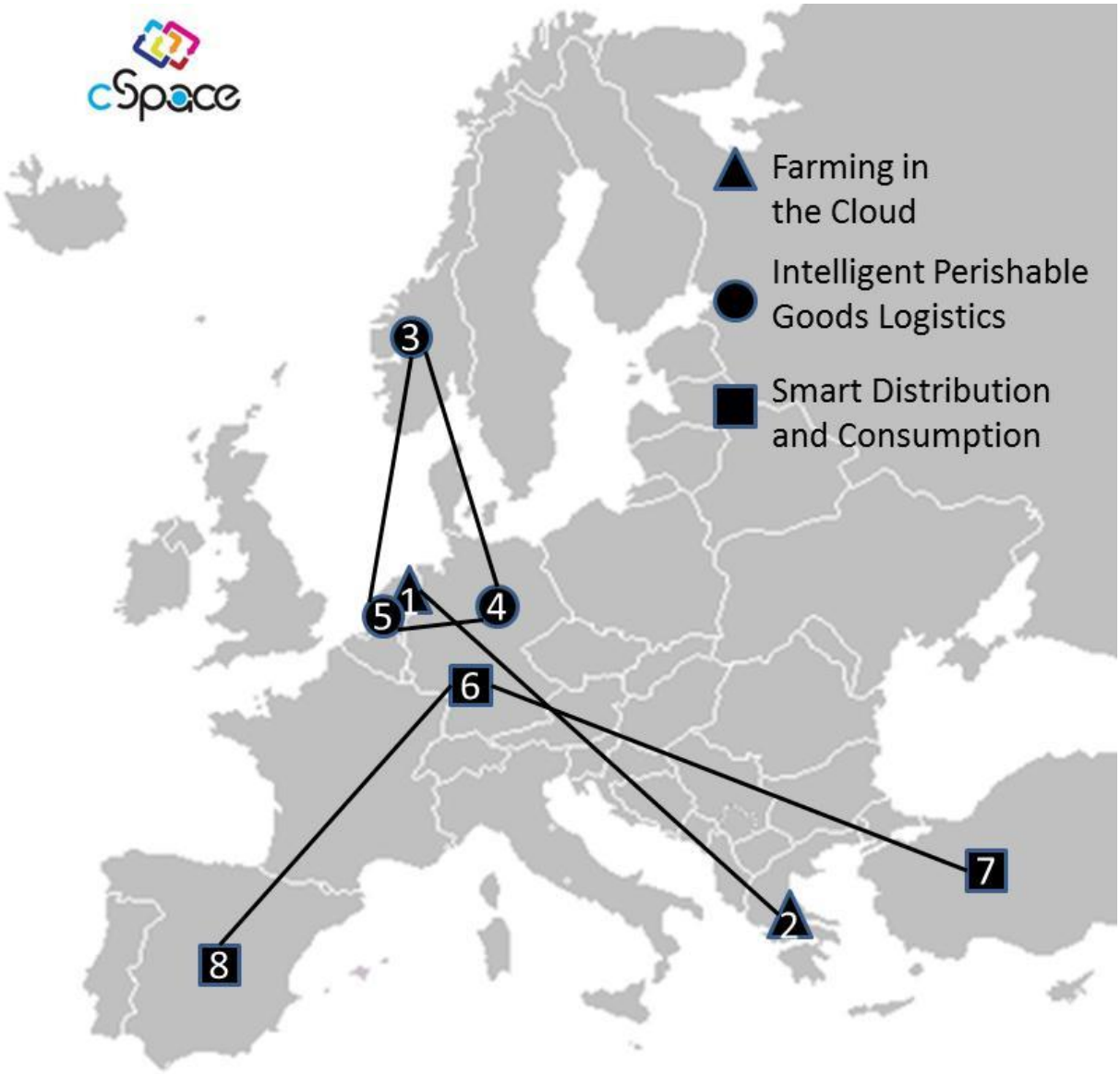


Figure 4: The eight cSpace use case trial experimentation sites in Europe divided in three themes. No trial is an island on its own. Each of them uses common cSpace elements and FI-WARE enablers. The theme-related trials will also share other specific services.

By nature, trials in the Agri-Food and Transport and Logistics domains are not bound to one geographical location, because the essence is in moving the goods from production sites to end users. However, the experimentation infrastructure for each early trial involves some key stakeholders that are located in specific countries as represented in Table 10. These use case trials will be conducted in a linked fashion utilizing shared infrastructures where possible to demonstrate the cross domain/use case capabilities of the cSpace and the supporting FI-WARE GEs.

Based on the needs of the use case trials themselves, general purpose and domain specific Apps for the cSpace will be developed in order to perform the trials / experiments, and test / validate the features and business model of the cSpace as outlined above. For this, the development and testing of two types of cSpace Apps is planned, which will be developed by project partners together with additional contributors obtained via the Open Call of the project: (a) an initial set of general purpose Apps that provide general business and / or domain-specific capabilities exploiting the features and envisioned future support requirements for business collaboration, and (b) a set of pilot Apps that support the tasks of the specific scenarios elaborated in the trials. The latter Apps will be defined during the project as part of the use case / Trials elaboration; for the former, the following Apps are planned:

1. **Business Services and Contract Management**: its main objective is creating a prospecting mechanism to find business opportunities, enabling integration with external marketplaces and supporting marketplace operations based on Linked-USDL vocabulary.
2. **Real-time Exception Detection and Handling**: its main objective is enabling users to define constraints, observations and mediations for their business processes, constantly checking the compliance to these constraints and detecting potential process violations.
3. **Logistics Planning**: its main objective is providing logistics planning functionality both for the logistics service clients and providers, building a transport chain plan based on the client's demand and online available services, and enabling the description of transport services that can be used by the clients.
4. **Product Information Service**: its main objective is providing product information via event-driven information exchange between the systems of the stakeholders of a supply chain, supported by the IoT infrastructure located in the stakeholder’s facilities.

Ultimately, the following general business benefits are expected:

- Better satisfy customer requirements, such as:

  - End-to-end visibility and event management,
  - Enhanced monitoring and tracking of goods as they move along the value chain,
  - Less costly and better tailored offers, goods and services,
  - Significantly reduced waste of perishable products,
  - Immediate notification of deviations and the occurrence of hazardous events,
  - Lower environmental impacts through increased network efficiencies, and
  - More transparent operations.
- Substantially increase business efficiency and optimization throughout the value chain by:
  - Significantly reducing manual efforts for planning and re-planning,
  - Enhanced interoperability among heterogeneous systems based on business standards,
  - Automating support for coordination of operational activity execution,
  - Providing accessibility anywhere and anytime via any device, and
  - Facilitating the rapid identification and contracting of capable business partners.
- Facilitate new business opportunities by:
  - Providing more efficient and transparent service offer management,
  - Optimizing partner contract negotiations,
  - Facilitating new business partner interactions and collaboration opportunities, and
  - Providing access to true end-to-end business and consumer performance metrics.

4.2.5 Ecosystem incubation and large scale expansion preparation

One of the main work areas of the cSpace project is concerned with preparing for industrial uptake and innovation enablement, therewith preparing for the large-scale expansion planned for Phase 3 of the FI PPP where 20 new projects shall act as innovation platforms to rapidly connect communities of SMEs, and web-entrepreneurs to take up the technologies developed in Phases I and II. For this, the aim is to allow for industrial uptake of the cSpace by enabling external solution providers to provide additional, new, and disruptive Apps for business collaboration into the cSpace ecosystem and allowing for conducting large-scale trials expanded across borders and industrial sectors. In preparation for this – in awareness of the overall timing of the FI PPP pro-

gram[3] – the following activities are planned for the cSpace project: (1) provisioning of the cSpace implementation, Apps, and experimentation results in an open manner so that other FI PPP projects, external parties, and especially Phase 3 projects can easily use and exploit the project results, and (2) pro-actively engage with potential users and external solution providers that shall serve as a basis for industrial uptake and large scale expansion.

The former will be achieved by proving the cSpace implementation, the developed Apps and Pilot Applications, and the experimentation results of the Early Trials in an open manner. For this, the all software implementations (cSpace components and Apps) will be hosted on a working Cloud infrastructure with controlled access to the public, and all relevant information for understanding and using the cSpace will be provided on a public web page; this shall include usage guides for End-User and Developers and technical specifications for the cSpace, its main building blocks and the Apps developed in the project, and the documentation on the early trials and experiments conducted in the project (i.e. all public project deliverables). In addition, the cSpace Experimentation Environment as outlined above will be easily adaptable to new use case trials (esp. for Phase 3 projects), leveraging on the experience and best practices gained in Phase 2. The cSpace project will ensure software, hosting, and experimentation capabilities throughout the project by coordinating internal efforts and delivering detailed plans to move into Phase 3; this will be done in close collaboration with the other FI PPP Phase 2 projects, in particular with the Capacity Building CSA and other Use Case projects.

For the second activity, the cSpace project will pro-actively approach the relevant communities of stakeholders in order to engage larger user groups and external IT solution providers in taking up and contributing the large scale expansion of the cSpace project results; we refer to this as *Ecosystem Incubation*. Referring to Section 3 for further details, this shall be achieved by:

1. Engaging players and associations from relevant industrial sectors and the IT industry
2. Exploiting contacts to existing communities and stakeholders in the Agri-Food and the Transport & Logistics domains as well as Living Labs and IT partner networks
3. Leveraging on the local ecosystems on the Experimentation Sites established in project by engaging the business partners and customers of the Early Trial owners (see above)
4. Collaborating with the other FI PPP Phase 2 and Phase 3 projects, in particular with the other Phase 2 use cases and capacity building project,
5. Conducting knowledge transfer and education activities, and

[3] Phase 3 of the FI PPP shall start 12 months after Phase 2, so that the projects are running in parallel for one year

6. Providing a thorough and detailed documentation of the cSpace project results available to the public to support easy exploitation and community building.

Activities (1) – (3) shall allow for a rapid engagement of communities as potential proposers for Phase 3 projects, proposers for the cSpace open calls and for further commercial exploitation; Activity (4) acts as a mechanism to reach other communities (not related to Agri-Food or Transport & Logistics) interested in using the B2B capabilities of cSpace and to support cross-project collaboration towards Phase 3; Activities (5) and (6) are the main instruments and tools provided by cSpace to those communities to facilitate the scale up, as explained above.

4.2.6 cSpace agri-food trial communities

As can be derived from the previous section, the original 6 sub-use cases or pilots from SmartAgriFood are all planned to be continued within the cSpace project albeit in a slightly different naming and context, especially that they should be integrated in the cSpace platform. In this section we will described briefly these plans for these 6 trials and focus on the community building aspects.

Trial 1: Crop Protection Information Sharing

Numerous actors contribute to the food on consumers' tables: suppliers of crop protection material, farmers growing crops, processors, and retailers. These actors have at present independent, mostly proprietary solutions to supply each other and the consumer with information. Transparency and fluid information transfer is lacking.

There is a great need for tracking and tracing information about inputs, including crop protection agents and the quality of food. This is relevant for consumers' food awareness and, in case of food emergencies, for a rapid response. Many sources of information are also required to support farmers in decision-making, for example on the application of plant disease agents. cSpace will connect actors along the agri-food supply chain, enhance licence agreement orchestration, and enable seamless creation of different tailored services for, and amongst, stakeholders.

The trial demonstrates the use of Future Internet technologies with functionalities to address social, business, and policy objectives (e.g., optimization of the use of plant protection agents), create environmental benefits, transparency, and food security. Protection of potatoes against *Phytophthora*, which requires at present approximately ten spraying actions, will be used as a first use case for this trial.

The Future Internet provides possibilities for real-time support for farmers (Figure 4). Real-time weather information from sensors and rain radar will be made available and integrated in real-time, as will medium range weather forecast. *Phytophtora* development will be forecasted based on this information and data on cropping history and crop development. A disease warning will be generated should analysis indicate that this is necessary. Recipe formulation with the optimal type of crop protection agent, scheduling of the operation with respect to weather conditions and resource availability and task formulation will start as soon as a disease alert is given. The actual measured crop density is used for real-time dose adjustment based on parameters determined during recipe formulation. Actually applied dosages, sensor information and machine status will be logged and made available by IoT sensors. Sensor data will thus be available for real-time situational support as a service in the cloud, and may even be offered to the public, e.g., by providing information on recently treated fields for hikers with allergies in the form of a "Spray Alert for Hikers" App. Data from such remote monitoring can also be used for fault diagnostics and tracking and tracing purposes by authorised users.

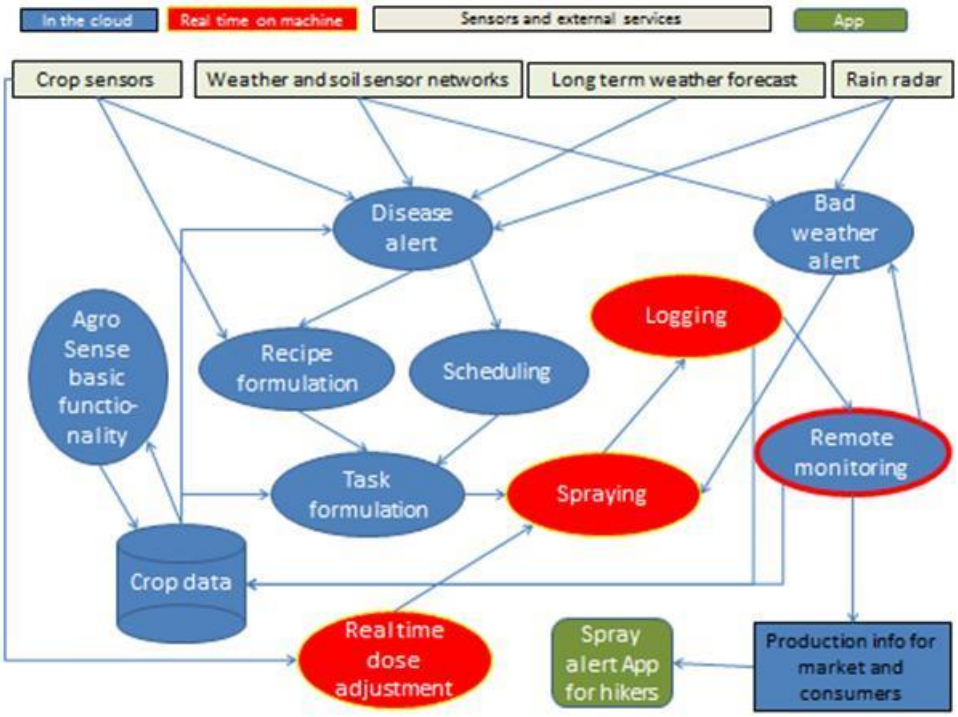


Figure 5: Layout Crop Protection Information Sharing Trial

The trial will be set up by four partners: DLO-ASG, as trial leader, will add new information requirements to the reference model for arable farming, mapping this on the Object Storage GE. Weather forecast, rain radar data and data from soil and weather sensors will be made available following the Publish and Subscribe mechanism. Scheduling algorithms for field operations are

made available as a SaaS solution. DLO-PRI will make algorithms for disease warning and recipe formulation available as a SaaS solution. Their algorithm for real time dose adjustment will be implemented by Kverneland as a Resource on an IoT Device on the tractor-sprayer combination. DLO-PRI evaluates the overall effectiveness of the Crop Protection Information Sharing concept. Kverneland provides the IoT Devices for Task Control, Tractor, Spraying, and Crop Sensors, which use the ISO11783 communication protocol (ISOBus). A Gateway is to provide information for the IoT backend and Object Store. Several Generic Enablers such as Security, Privacy and Trust and System and Data Integration are used. AgroSense, will realize Task Formulation and take care of all the required Client interaction with the cSpace platform.

For the execution of the trial five farmers are involved (vd Borne, PPO, Wage, Claassen and KMWP) from which three will evaluate the whole Crop Protection Information Sharing concept. These farmers are pioneering in the application of modern ICT technology and Precision Agriculture and are an important source of information for farmers that intend to adopt these technologies.

Kverneland and DLO-ASG participate in ISO working groups for standardization of Electronics in Agriculture. The results of this Smart Crop Protection trial will thus lead to drafting updates and developing new standards, such as for wireless communication. This provides a basis for wide spread use of cSpace services. Fleet Management, Job Control, Remote Machine Diagnostics and even Environmental Control by auditing agencies are logical extensions and possible apps for the open call in the third phase of the FI PPP project.

Trial 2: Greenhouse Management & Control

The greenhouse trial focuses on improving greenhouse management and control processes. The goals are a) provide affordable sophisticated applications and services to the farmers b) enable them to interact with other stakeholders along the food chain in a more efficient and transparent way, and c) provide the means to integrate any legacy systems they may have through the cSpace.

The layout of the trial is presented in Figure 5. Farmers install locally in their greenhouses the required sensors (e.g., temperature, CO2, luminosity, relative humidity, etc.) and actuators, and possibly a low cost/capabilities proxy machine. The collected data, as well as the intelligent applications that may have access to these data, are located in the cloud. The intelligent applications will provide alerts and notifications to the farmers through a variety of devices allowing the farmer to improve his productivity. Moreover, the farmer, using cSpace, will have access to a

market place of services and stakeholders with the same ease as a mobile user today for installing, using or deactivating services in a smartphone. This approach is expected to provide radical changes to the farm management market where today only monolithic, proprietary and usually expensive solutions for the farmers exist.

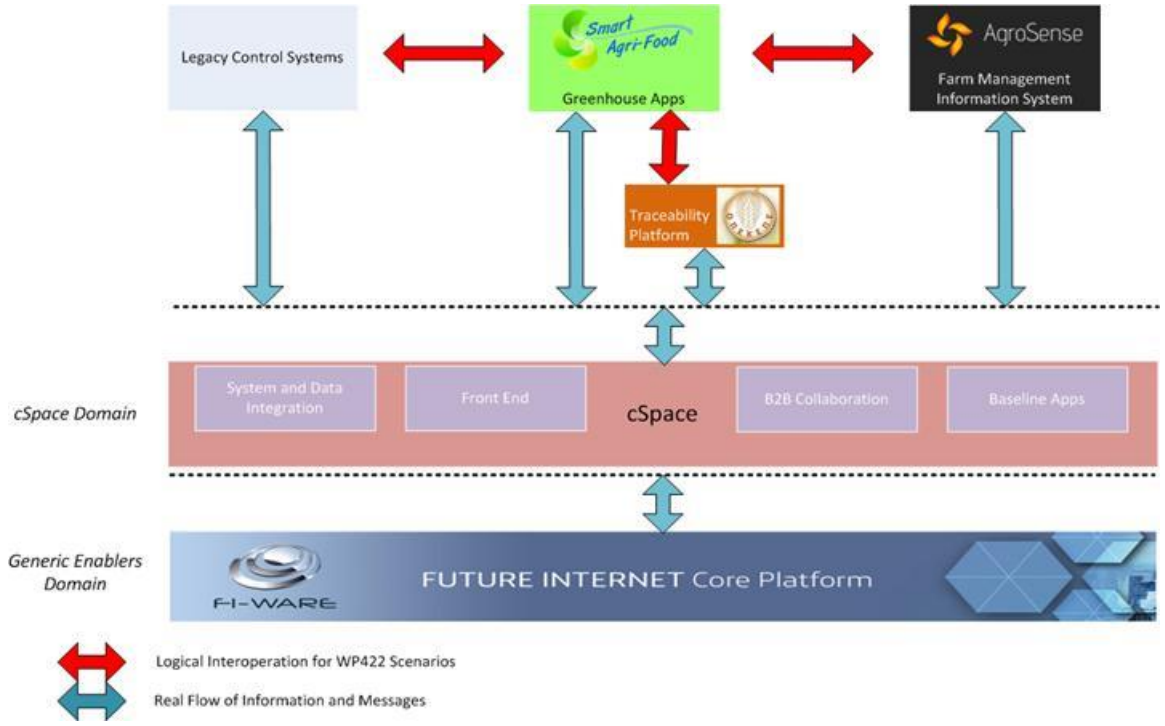


Figure 6: Layout of Greenhouse Management & Control Trial.

In the context of this trial, cSpace will provide the greenhouse and services (e.g., expert system for different vegetables) and the end-devices (boards with a number of sensors installed and wireless communication modules) that were developed in SmartAgriFood. These services will be ported into cSpace and additional services (e.g., task planning, inventory) will be developed. Moreover, software solutions to integrate a legacy greenhouse control system with cSpace and provide interoperation scenarios with the above mentioned services will be provided. This experiment will prove in practice how legacy systems can be integrated with cSpace to improve their operation. The results will lead to the future integration of other similar products from other companies with cSpace. Moreover, the consortium partners will further test the integration capabilities offered by cSpace by implementing test scenarios of these services with the AgroSense software that will be used in Trial 1.

Additionally, in this trial cSpace will integrate a traceability platform developed in Greece by OPEKEPE and provide interoperation scenarios with the previously mentioned services. The goal is to present end-to-end scenarios where the farmers can provide information to the end us-

ers or collect information about how their products were "treated" along the product chain. A specific benefit of using the OPEKEPE platform is that it will foster large scale expansion in Phase 3 since the consortium partners will have access to a significant number of high end users (farmers) that are willing to use such advanced services.

Trial 3: Fresh Fruit and Vegetables Quality Assurance

This use case trial will look at (a) transparency along the chain (forward and backward) regarding food safety, food quality and transportation issues and at (b) deviations (transports, products) that affect the distribution process in general either deviations for the plan or other external events requiring re-planning. Based on transparency, focus is on the detection of the deviations and signalization to all concerned stakeholders in a complex business network environment in due time, so that corrective actions can be taken in a timely manner. Due to the complexity of food networks with its many SMEs and its need to dynamically rearrange supplier-customer relationships because of unreliability in supplies, past technology could not provide appropriate solutions to the transparency problem irrespective of many efforts in industry and research. The scope of the information and deviation management trial will demonstrate cSpace functionalities regarding:

- The exchange of product- and process-related information between agri-food enterprises in order to enable information flow (regular, on demand) along the supply chain network from farm to retail,
- Evaluation and monitoring of this information flow in order to identify deviations from predefined product and process schemes,
- Distribute exception messages regarding a potentially identified deviation within a process, or regarding a specific product, to other involved actors within the supply chain network. This includes, e.g., the signaling of an inadequate product quality status (based on, e.g., laboratory results, transport damage and other detected deficiencies that have an impact on food safety and quality) triggering a need for reactions by suppliers or customers such as, e.g., removal of products from the distribution process or recalls.

These core functionalities will be found in the "Product Quality Information" App (developed as part of this trial). The idea behind this App is to make sharing of reliable product- and process-related information within the food supply network much easier and enable agri-food companies to react to deviations in a timely way in order to reduce negative impacts and waste. The concept behind this App is based on results of the CuteLoop, Transparent_Food and SmartAgriFood pro-

jects and is developed and tested in the cSpace project together with a consortium of notable associated partners to determine if it meets their needs.

The trial is aligned to the fresh fruit and vegetables supply network, where short time to market, fast distribution and timely communication of deviations are of great importance in order to detect and remove unsafe products from the distribution process before they can harm consumers. Rapid detection of deviations is extremely important for agri-food enterprises as inadequate monitoring of quality in the past has had extremely negative impacts on their reputation and caused massive loss of trust in several companies.

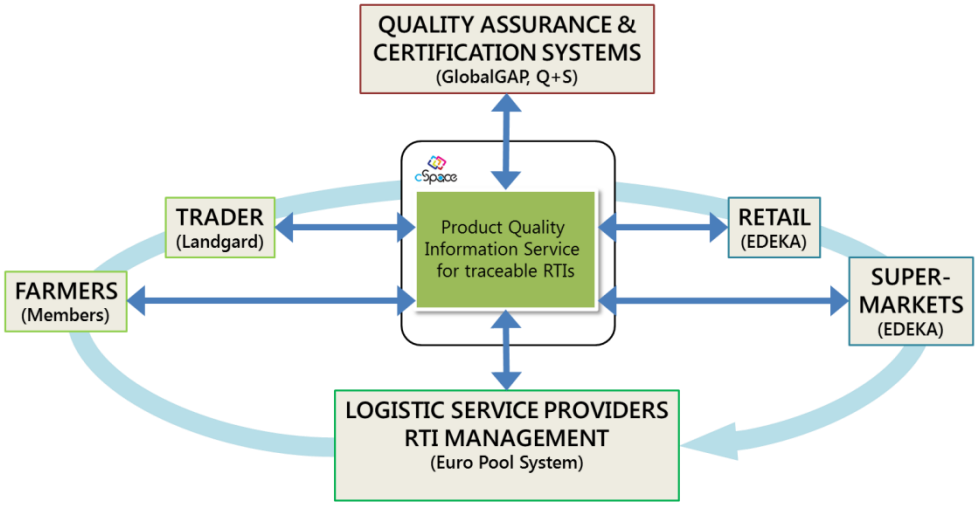


Figure 7: Layout of Fresh Fruit and Vegetables Quality Assurance Trial.

This trial brings together different business partners with different points of view on the fresh fruit and vegetable market (Figure 6). The involved business partners (EDEKA group, Landgard, Euro Pool System) oversee a multi-national European supply network, where fresh fruit and vegetables are distributed from different places in an international agricultural production chain (Landgard; 5000 members). The major certification scheme for Good Agricultural Practice (GlobalGAP) and the German leading quality assurance certification provider Qualität und Sicherheit (Q+S) are supporting the trial. Together with Euro Pool System and their integrative logistic services, a representative fruit and vegetable supply chain can be facilitated as a trial site including the aforementioned companies and their experts from the quality management, logistics and IT departments. CENTMA will take care of the overall coordination and safeguard the architectural coherence within the whole project. It is supported by partner Europool who assures the continuous business representation and interaction. The scope of the trial experimentation is to test the product quality information app under realistic conditions, supervision of the associat-

ed partners and evaluate the feasibility of the approach. If the experiment is successful, these players can guarantee a large-scale expansion in Phase 3 and beyond.

Trial 4: Flowers and Plants Supply Chain Monitoring

This trial is concerned with monitoring transport and logistics processes and focuses on the tracking and tracing of shipments, assets and cargo, including quality conditions and simulated shelf life. The trial will demonstrate the continuous monitoring, control, planning and optimisation of business processes based on real-time information of real-world parameters. The experiment will test, in particular, dynamically updating rich virtual profiles of products, containers and shipments, providing multiple views for distinct purposes of usage; the combination of different types of sensor data; a timely and flexible availability of product and quality information to a variable network of downstream and upstream partners; and proactive control of distribution activities (i.e., triggering deviation management and planning).

The scope of the trial will demonstrate cSpace functionalities regarding:

- Cargo and Asset Quality Tracking (“intelligent cargo”): monitoring and control of quality status of the cargo and related assets and its relevance for customer’s quality requests; communication of monitoring results to stakeholders;
- Shipment Tracking (“intelligent shipment”): monitoring and control of shipments from (primary) producers to end customers, and specification of its relevance for customer expectations;
- Lifecycle Information tracking on cargo characteristics along the supply chain: information collection and distribution along the whole chain ensuring correct information on the cargo accessible for any stakeholder involved in the products’ lifecycle and especially consumers as the final customers.

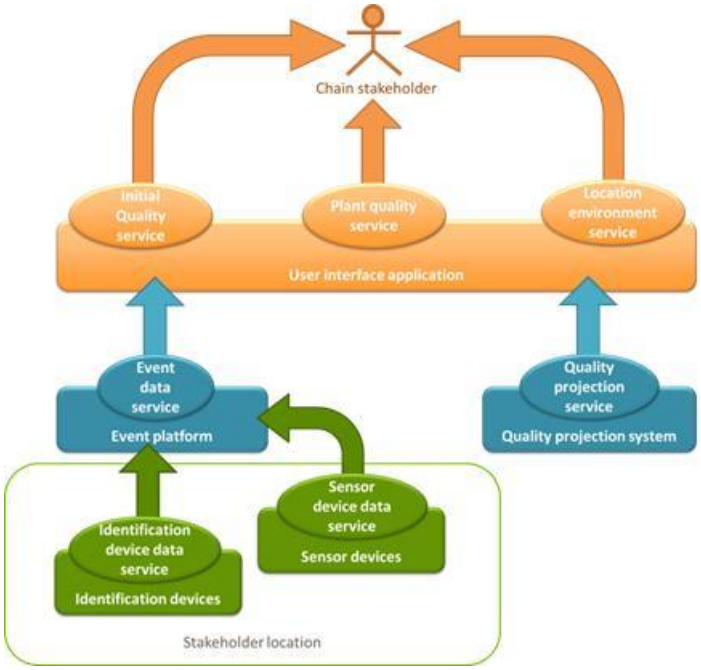


Figure 8: Layout of Flowers and Plants Supply Chain Monitoring Trial.

The trial is aligned to the flowers and plants supply network (see Figure 7). This sector is characterised by high uncertainty of both demand and supply. Supply uncertainty is high because product is vulnerable to decay, weather conditions, pests, traffic congestion and other uncontrollable factors. Further, demand uncertainty is high because of weather-dependent sales, changing consumer behaviour, and increasing global competition. This results in high variability of supply capabilities and demand requirements in terms of volume, time, service levels, quality and other product characteristics. As a consequence, the timely, error-free and flexible monitoring of products, assets and shipments is a key challenge in floricultural supply chains.

Europe is the leading producer of flowers and plants in the world. Within Europe, The Netherlands is by far the largest producer, accounting for approximately 40% of the total production value. For this reason, the trial experiment will focus on Dutch floriculture. It will include the main supply chain actors, i.e. growers, traders (including wholesalers, exporters, and importers), auctions / producer organisations (including FloraHolland, the world's largest flower and plant auction), transporters, suppliers of Logistic Assets (containers, crates, etc.) and retailers. These supply chain business partners are involved via FLORECOM, which is an active industry association for supply chain information in the Dutch plants and flowers sector owned by the auction house FloraHolland (growers cooperative with about 6,000 members), the Association of Wholesale Trade in Horticultural Products (VGB) and the Trade Council Agricultural Wholesale Trade (HBAG). DLO-LEI will act as coordinator and technical architect of the trial. DLO-FBR will

contribute by delivering quality decay models as a service. This ensures the basis for large-scale expansion in Phase 3 of the FI PPP.

Trial 5: Meat Information Provenance

This trial aims at providing reliable information about the meat supply chain for various stakeholders (from farm to fork and from fork to farm). These stakeholders are interested in different information. Stakeholders can make a profile of what kind of meat-related information they are interested in. Consumers are interested in the farm where the animals were raised, in health risks and in animal welfare. Other stakeholders require other information, e.g., slaughterhouses are interested in expected numbers of animals in the next time period, farmers in the price of meat, meat retailers (including supermarkets) are interested in the current location of the product in case of a food alert and the consequential need for recall, and, finally, the authorities require information according to legislative directives. All information should be reliable through certification.

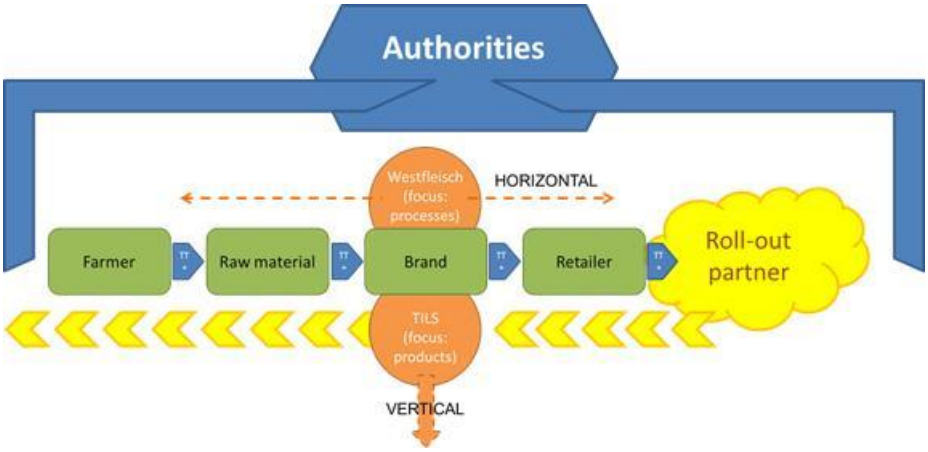


Figure 9: Layout of Flowers and Plants Supply Chain Monitoring Trial.

Recently, experiments providing consumers with provenance information on smartphones have become successful. However, efficient, effective and tailored provision of meat transparency information to consumers still requires widespread support for adoption of standards. Standards facilitate access to data in order to enlarge the number of participant and reduce cost of implementation. Moreover, provision of meat transparency information is currently limited by the willingness to collaborate along the supply chain and the loss of information in the slaughtering process of large slaughterhouses. In this use case trial the basic infrastructure as presented in

Figure 8 will be developed based on cSpace where specific apps on the topics mentioned can be implemented in the area of information delivery to consumers.

GS1 Germany (with broad expertise in internationally uniform identification, communication and process standards) and WU (expert in food supply chains) will set up the experiments in a meat supply chain with key players from the German meat sector, e.g., WestfleischeG and Tils GmbH as associated partners. The experiment will closely cooperate with ORGAINVENT GmbH as associate partner, the largest German labelling organisation in the beef sector, and with GLOBALG.A.P (supporting partner), which sets standards for the certification of production processes of food products around the globe. This trial and its partners promise a large-scale expansion in Phase 3 and beyond.

Trial 6: Tailored Information for Consumers

This trial will demonstrate how Future Internet technologies will be able to improve food awareness among consumers. Agri-food products contain a lot of information, some of which is shown in the labelling of the product; other information is provided by certifications communicated through package logos (environmental footprint, quality or health related) . The trial will showcase a novel App(s) that helps consumers (through using their personal, mobile device) to become more aware of the food they buy in the supermarket, and which they eat. The App(s) will support both pre-shopping and post-shopping activities and will enable customization in the way the information is presented. The scope of the Tailored Information for Consumers (TIC) trial concentrates on demonstrating cSpace functionalities by (see also Figure 9):

- Defining supermarket products and user profiles: Defining supporting tools for enabling supermarket operators to load product information into data bases.
- Implementing mechanisms for selection of products by matching products info with consumer profiles using personal preferences.
- Defining and creating mechanisms for sharing personalised profiles with other consumers, by the use of publish and search mechanisms.
- Supporting pre-shopping activities: user registration, user location and login, user profiles accessing and updating.
- Supporting post-shopping activities: alert notification and consumer feedback management (using the Business Service and Contract Management cSpace baseline app).

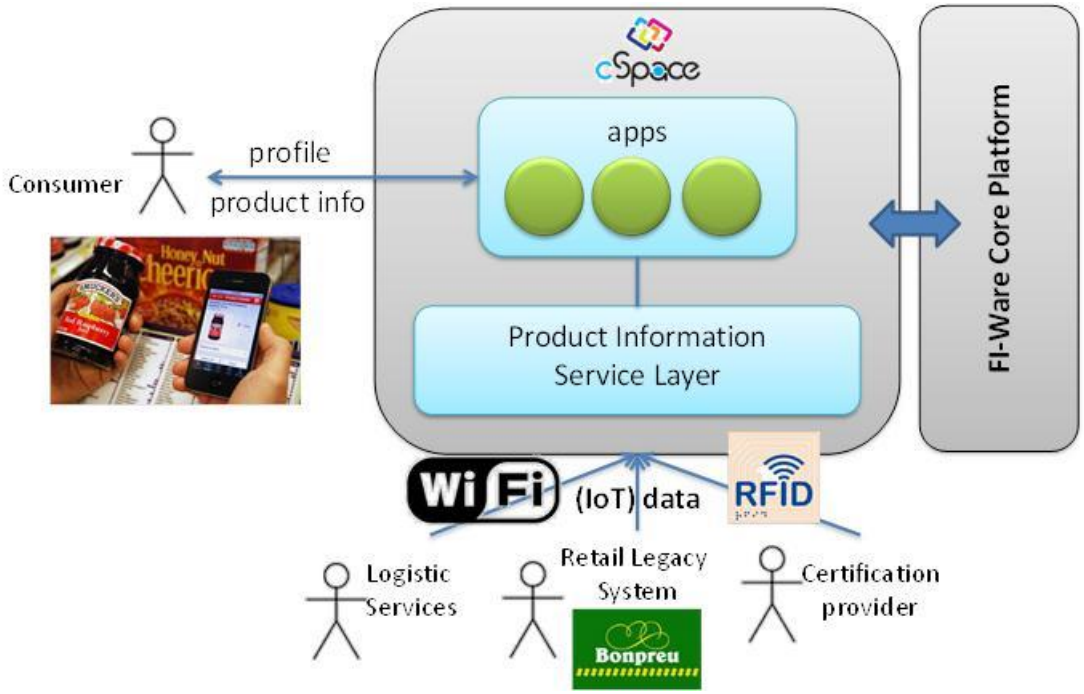


Figure 10: Layout of Tailored Information for Consumers Trial.

The App(s) that will be defined and implemented will consider:

- Facilitating consumer's registration and identification in the supermarket, taking advantage of location capabilities and contextual information.
- Creating an alert control system regarding food notifications and to provide critical information about food to the right group of consumers in a reliable way.
- Allowing for optimum information filtering representing tailored information in consumer's mobile devices.
- Creating facilities for enabling the consumer to provide and access information regarding products and the supermarket such as reviews and recommendations, and information from social media.

The involved partners will be ATOS and UPM as leading the technical work, and BONPREU supermarkets, providing physical support for the scenario and end user testing and validation. For this trial we will extend the experimentation infrastructure that was developed in SmartAgriFood, aligning the functionalities with the cSpace platform, developing the mentioned App(s) and validating them in Bonpreu's facilities, considering a subsequent large scale expansion to other supermarkets and related businesses in Phase 3.

4.3 Plan for open collaboration & exploration

4.3.1 Community building plan

The community building plan in cSpace focuses on mobilizing, engaging, and preparing stakeholders across Europe (mainly SMEs and Web entrepreneurs) to apply as App developers building on and extending the cSpace service and enriching the use case trials towards the large scale expansion in Phase 3 of the FI PPP. To this end, the plan aims at building and nurturing the local, regional and virtual communities that are able to exploit cSpace project results in Phase 3 of the programme and beyond (i.e., not using FI PPP funding but other kind of private and public funding).

In addition, cSpace will foster and demonstrate innovation potentials and market impact in the agri-food and transport & logistics sectors, addressing aspects such as business models, standardisation, policy and regulation and exploitation of results. Exploitation of cSpace outcomes will be supported on two levels: (i) through the overall exploitation strategy and plan, which will be broken down into and support the (ii) individual exploitation plans of the consortium members enriched by analysis of the IPR aspects.

The community building for the trails in cSpace builds upon activities and outcomes of FI PPP Phase 1 and upon strengths, capabilities, and previous research results brought by the consortium partners, and it performs activities in closer coordination with the rest of the FI PPP projects, and activities also serving to some the programme objectives for Phase 2 and Phase 3. The different tasks in community building will be developed in coordination with the FI PPP WG (EBM WG, DWG, Policy and Regulation WG, Standardisation WG).

The community building plan is organised in 5 different tasks and it performs activities in coordination and supporting other WP activities, as laid out below.

Table 11: Tasks in the community building plan

Task	Objectives and Tangible/Measurable Outcome
Task 1: Ecosystem incubation	This task is concerned with the building of local, regional and virtual communities across Europe. In line with the project objectives, these communities will get to know, to understand and to use the cSpace capabilities for their own interests. At the same time, their integration results will be used to exploit the potential for innovation of the project results (and for extension the FI PPP programme results). The primary outcomes of this task are: • The **building of strong communities** based on existing communities from Phase 1 and European Living Labs. • Knowledge transfer, training and educational activities with these communities. • Setting up and running a collaborative supporting tool. • Providing communication and dissemination support for the Open Call.

Task	Objectives and Tangible/Measurable Outcome
Task 2: **Business Models**	This task is concerned with the construction of the cSpace value network and the outline of a number of business models for (i) the cSpace platform as such, taking into account its open and generic infrastructure and set-up and (ii) for selected, representative trials. The work will be based on relevant business stakeholders and their ancillary roles. This task will provide the following major outcomes: • The identification of the value network and generic business models for the cSpace service. • Delineation, analysis and validation of **applied business models for** selected exemplary **trials.** • Optimization, configuration, adjustments and validation of the generic cSpace business model and FI PPP by **aggregation and feedback** from the trials analysis.
Task 3: **Exploitation & IPR**	This task is concerned with (i) the adaptation of the exploitation to what is developed in the trials and (ii) the adoption of trial developments to market needs. Preceding, a market analysis and the identification of market requirements will be done. Major outcomes of this task will be: • The **identification of market needs** in the food, logistic and ICT related sectors in order to support the development of the right applications and tools on the cSpace service and its Apps. • Aligning project outcomes with market needs. • Support of individual Exploitation Plans of the partners. • Support of the **Overall Exploitation Plan** of the project. • **IPR analysisand handling** of the project's assets and the FI-WARE Generic Enablers. • **Assessment of exploitation possibilities** beyond the consortium, including relevant European and non-European players.
Task 4: **Dissemination**	The objective of this task is to promote and disseminate the project results through participation in various events such as workshops and conferences; publication of the main results in scientific journals, conference proceedings and books. Project outcomes and results will be communicated for external awareness creation and knowledge building within the targeted user, industry, public and scientific communities of the European Union and beyond. This communication will demonstrate the benefits of project outcomes to potential users in European and International networks. Major outcomes of this task are: • Dissemination and Marketing plan. • Project website and dissemination materials. • **Broad dissemination activities**, including industry and academic publications.
Task 5: **Plan to move into FI PPP Phase 3**	The objective of this task is to aggregate relevant results concerning the cSpace platform, the required and deployed infrastructure and the performed trials as well as the progress of community building towards ecosystem building, business modelling, regulation, standardization and exploitation, in order to draft specific requirements, deployment options and recommendations for eventual FI PPP Phase 3 projects and to draft detailed plans for the large scale expansion of platform usage facilitated by local and regional stakeholders including SMEs. The major outcome of this task is to • Deliver a **detailed plan to move into Phase 3**, including detailed plans for the large scale expansion of platform usage facilitated by local and regional stakeholders including SMEs.

Furthermore, the following sections explain the strategies for exploitation, dissemination, and standardization that will be undertaken in order to properly capitalize on the project results, for which the work plan defines dedicated tasks. The focus here is on the strategy for eco-system incubation and large-scale expansion that is planned for Phase 3 of the FI PPP; we also depict relevant targets and events for dissemination of project results, outline the strategy for standardization, and define the management of IPR and other innovations that will arise from the project.

4.3.2 Exploitation

In full awareness that market impact is considered as a key result of use case projects in Phase 2 of the FI PPP, the cSpace project aims at (1) **transforming project results into real exploitable assets** and (2) **demonstrating real business opportunities of those assets**. For this, it is a central goal of the project to prepare for commercialization and establishment of the cSpace, fostering and demonstrating the potential for innovation of cSpace related to market impact and business creation in the Agri-food and transport and logistics sector. It is also an exploitation objective to foster the B2B collaboration capabilities of the cSpace to other business domains through cross-project collaboration.

4.3.2.1 Towards FI PPP Phase 3: Large-Scale Expansion

Phase 3 of the FI PPP offers to cSpace a good opportunity to demonstrate market impact and business creation and possibility to scale up cSpace-based solutions all across Europe. For this, 20 new projects will be selected to act as innovation platforms to rapidly connect communities of SMEs and web-entrepreneurs to take-up in the technologies developed in phase 1 and phase 2 of the FI PPP. Phase 3 projects will have as target outcome a large set of innovative and technologically challenging services and applications developed under the previous phases of the FI PPP. These new projects will bring together partners in full ecosystems that support SMEs to deliver new applications and services allocating 80% of the project budget in open calls for SMEs that will build and experiment applications, scaling up the FI PPP results in phase 1 and 2.

Strategy for Phase 3 Preparation: Phase 3 is considered as the exploitation phase for the cSpace concept in the context of the FI PPP, using, exploiting, and expanding on the results from Phase 2. The cSpace project will address Phase 3 preparation and large-scale Trials by**:**

- **Ecosystem incubation** is designed to identify, build and prepare ecosystems for phase 3, supporting proposers and selected projects, so they are ready to deliver using the cSpace project results; external parties have already confirmed interest (see Support Letters)

- **SMEs and developers community building** pro-actively engaging players and associations from relevant industries and IT industries.
- **Providing the right tools for developers and users**: a professional online space (wiki) for users and developers containing all the guides, technical documentation of all cSpace components, demos cases and other relevant information.
- cSpace will provide intensive **knowledge transfer** and **educational activities** to phase 3 proposers and projects, and to the SME and developers community. cSpace will organise 2 rounds of training workshops for phase 3 projects based on cSpace V2 and V3 public releases, targeting the ones oriented to the Agri-Food and T&L domains.
- cSpace will disseminate phase 2 capabilities beyond its ecosystem for wider European outreach during phase 3 proposal preparation (3.2.2) and promote cSpace capabilities to all the phase 3 projects providing **a communication channel with phase 3** and supporting the engagement of the cSpace SME community with the phase 3 projects.
- cSpace will **ensure software capabilities, hosting capabilities and experimentation capabilities during the project life** through a dedicated task (T570) that coordinates efforts from all the cSpace WPs. The cSpace experimentation environment will be adaptable to new use case Trials once they come in phase 3, leveraging the experience gained and lessons learned during phase 2.
- Applying **measures to support phase 3 projects after cSpace project conclusion**: cSpace is provided in an open manner and specification of the software will be open and publicly accessible. Every cSpace component and every App will be open so that everyone can use & test it and there will be public website / Wiki space where all the Components & Apps will be described and accessible. Close cooperation with phase 3 projects (transferring knowledge) and capacity building project, for the deployment of several cSpace Experimentation Environment across Europe, will also contribute to support SME uptake in year 5 of the programme.
- cSpace will work in **close collaboration to other FI PPP projects for phase 3 success** and in particular the other Phase 2 projects, the capacity building project, close collaboration with the phase 3 selected projects for Technology Foundation Extension and Usage, target outcome d) (usage and participation) focused on the involvement of the take-up actors and support to them (year 2 of the cSpace project).

Approach for Ecosystem Incubation: referring to the first strategy activity, the aim is to engage external stakeholders to build local, regional and cross-border communities across Europe,

that get to know, to understand and to use the project capabilities, and therefore are able to exploit the potential for innovation of the cSpace project results (within and beyond the context of the FI PPP program). For this, the project will work towards:

- **Build ecosystems upon existing communities and partner contacts** pro-actively engaging players and associations from relevant industries and IT industries and transferring assets from phase 1(communities of interest created by SAF and Finest during phase 1 and existing Living Labs/innovation ecosystems engaged with FI PPP) to accelerate the community building process.
- **Build upon the cSpace project pilots,** where project partners are involved, and therefore the transfer of knowledge can be easily managed (using local languages), and where incubation of ideas and collaboration opportunities can more naturally happen around the existing demonstration capabilities (pilots).
- **Collaborate with the FI PPP projects,** to more easily reach other communities across Europe (i.e. communities already engaged in FI PPP but not naturally with cSpace), to foster cross-use case innovation capabilities and demonstrate the potential of cSpace B2B collaboration in other domains.
- **Living Labs across Europe (and worldwide):** Definition of criteria for extension across Europefostering and building ecosystems of innovation or Living Labs across Europe able to experiment and exploit cSpace results. Engaging local and regional authorities, and linking the cSpace expansion to the Smart Specialisation Strategy of the regions.
- **Transfer knowledge:** provide open documentation and training material to educate interested users and App developers to exploit and contribute to the cSpace ecosystem.

Ecosystem incubation is not only about targeting specific stakeholders separately but to support them to know each other, to collaborate together creating open innovation platforms for project generation, and providing them capabilities to create and experiment innovative solutions in a collaborative way using cSpace project results. Stakeholders of these communities shall include SMEs and web entrepreneurs, system development organizations, enterprises and businesses from various sectors, owners of certification schemes, local, regional and national policy makers, Local and regional researchers, incubators, infrastructure owners and funding communities (e.g. venture capitalist, regional funding agencies), etc.

A central pre-requisite for successful ecosystem incubation is that several **cSpace project partners have direct access to multiples networks and industrial and non-industrial relevant actors**. In addition to the membership in related European and national initiatives, the most relevant direct connections for ecosystem incubation and community building are:

- **DLO** has many contacts with organizations and groups that are involved in the Agri-Food domain and contain potential cSpace stakeholders. These contacts are not only on a national level, but also European and worldwide. A selection of the relevant stakeholders: Dutch Ministry of Economic Affairs; Agriculture and Innovation; Several DGs (SANCO, MARE, ..); Greenport Digital Community; Agri-Food Living Lab; EFITA network; AgroConnect; The Sustainability Consortium; Sustainable Agriculture Initiative, VIAS; Whole Chain Traceability Centre, US; AgGateway, US
- **Wageningen University** has working relationships with farmers that are front-runners in precision agriculture. Moreover we have strong links with VIAS (Dutch Society for Informatics in Agriculture), EFITA (European Federation for Information Technology in Agriculture, Food and the Environment) and the larger food related industry in the Netherlands and Europe.
- **KN's** service partners are also potential interested parties who would benefit from a service such as that being developed under the cSpace project effort.
- **SAP** customers and business partners as potential users (pro-active involvement possible & planned), established contacts to international, national, and regional networks in relevant industries (production, manufacturing, transport & logistics, retail, etc.); SAP Partners as potential providers of cSpace Services & Apps.
- **ATOS** has well-established industrial connections to e.g. Carrefour, Mercadona, Condis, Eroski, Bonpreu, Auchan, Tyco Electronics, Renault, Akzo Nobel, RHI, Magna Steyr, Schmitz Cargobull, Continental, Britvic, StoraEnso, PSA, KingSher, Vivarte, Printemps, Metro Group, Flora Holland, FNAC, InterSport
- Many of the 400+ members of **The Open Group** are cSpace stakeholders being involved in either the supply of cSpace related technologies, or users that are part of the industry segments targeted by cSpace. TOG supports multiple industry groupings addressing the evolution and interoperability of many of the technologies addressed in cSpace.
- Network of contacts in agri-food in local region (West Midlands UK) through **Aston University**, and to the major food industry associations in Germany (many of them located in Bonn) through **CentMa**

- Network of worldwide Living Labs through **ENoLL** that can also provide access to many SMEs not only through its network but associated networks such as EBN (European BIC Network) and IASP (International Association of Science Parks).
- **Euro Pool** network all over Europe with subsidiaries in the seven most important exporting countries. Euro Pool's customer base involves the major retail groups as well as the majority of companies in the European agricultural production.
- Stakeholders within maritime industry (Shipping companies, such as NCL and Wallenius Wilhelmsen, DNV, ports, system developers etc.) through **Marintek**, complemented by close connection within academia and research (MARINTEK is part of the SINTEF Group, co-located with Norw. Uni. of Science and Technology), stakeholders within standardization bodies (IMO, ISO, IEEE), and stakeholders within governmental bodies (Norw. Coastal Adm., Norw. Maritime Directorate etc.).

Some of the stakeholders listed above showed the intention and interest to be part of the cSpace ecosystem contributing to the trials, to build phase 3 projects, to disseminate project results and / or for assessment of commercial exploitation. In addition, in preparation of the project the consortium has addressed relevant actors at European and non-European level committed to assess the possibility of implementing some cSpace experiments (out of the European context and funding) and to assess real possibilities of further project results exploitation targeting non-European markets. These are called the "cSpace associated partners". The associated partners will be invited to 1 or 2 international working sessions and they will also become members of the cSpace Advisory Board. Already engaged organisations are:

Borborena Group (Brazil): The Borborema Group operates in the production and distribution of banana prata, palmer mango, lime and Formosa papaya. It consists of several irrigated fruit farms. It consists of several irrigated fruit farms, processing centers equipped with cooling systems logistics technical and administrative staff prepared for international management. The Borborema farms produce fruit all year round, using good agricultural practice gap, through clean technologies and preservation of the environment in accordance with Brazilian law. It has international consultants to ensure quality, standardization and traceability of fruit sent to market, safely and well-being of employers, serving the domestic and foreign markets.

Centre of Excellence in Farm Business Management (OneFarm) (New Zealand): The Centre of Excellence in Farm Business Management is a joint Massey University & Lincoln Univer-

sity project. The aim is to lift the Farm business Management capability of farmers, rural professionals and the universities www.onefarm.ac.nz

China Telecom Corporation Limited Beijing Research Institute (CTBRI) (China)

EDEKA (Hamburg, Germany): The Edeka Group is the largest German supermarket corporation, currently holding a market share of 26%. Founded in 1898, it consists today of several cooperatives of independent supermarkets all operating under the umbrella organisationEdekaZentrale AG & Co KG, with headquarters in Hamburg.

Eurofins GmbH (Hamburg, Germany) is an independent trade laboratory serving customer in the food industry.

European Retail Academy is a network of 200 research institutes worldwide. It runs www.european-retail-academy.org and for agriculture www.european-retail-academy.org/ABF. The institute is mainly a disseminator worldwide for standards or the pre-period of standards.

Future Logistics Living Lab (Australia): The Future Logistics Living Lab is a collaboration between NICTA, SAP and Fraunhofer. Australia's first Living Lab provides a platform for industry and research to work together, to investigate real-world problems and to demonstrate innovative technologies that will provide logistics solutions for the future. The Living Lab is both an exhibition space located in Sydney, Australia, and a vibrant community driven by a mix of logistics companies, research organisations, universities and IT providers.

Global G.A.P. c/o FoodPlus GmbH (Köln, Germany): a non-profit company developing standards for certificate and implement Good Agriculture practice worldwide, covering all agricultural production parts (crops, livestock, aquaculture).

JOHN DEERE GmbH & Co. KG European Technology Innovation Center (Germany): John Deere is the brand of Deere & Co. which was founded in 1837. Today, 60.000 employees are located at 65 factories and development centres in 18 countries. John Deere products are delivered to more than 160 countries. The worldwide total turnover is 24 billion € (about 75% is agricultural and turf machinery). Outside the US there are about 30.000 employees of whom 6,000 are in Germany (at JD). Other important manufacturing sites in Europe are Spain, Finland, France and The Netherlands. John Deere development and production has been being present in Europe since 1956.

ORGAINVENT (Germany) is the largest German labelling organization in the beef sector. In addition to this officially approved labelling system, they also provide voluntary proof of origin

for pork and poultry meats. ORGAINVENT continues to act as a coordinator for agricultural businesses in the QS system for all kind of products.

Pardalis (Oklahoma, US): Pardalis' mission is to promote Whole Chain Communication[tm] of confidential, trustworthy and traceable data in real-time from the beginning links of enterprise supply chains to consumer demand chains. Pardalis' globally patented methods introduce trust and provenance into social Web interactions. This is accomplished by facilitating selective sharing which incorporates fixed data elements at a single location with meta-data authorizations.

Sebrea Minas Gerais (Brazil): Sebrae is a civil, private, non-profit institution focused on the development of micro and small-sized businesses in Brazil. Sebrae's purpose is to provide entrepreneurs with all required knowledge and skills for a successful performance in the economic and social scenarios. Our mission is to promote competitiveness and sustainable development of micro and small-sized businesses and foster entrepreneurship. www.sebraemg.com.br.

Union Fleursaisbl (Belgium)

WestfleischeG (München, Germany): Westfleisch group belongs to the consumer industry and the business cases are trading of livestock, slaughtering of pigs and cattles, and the production of different meat products including self-service fresh/ frozen meat, sausages and pet food.

The following provides support letters for the project by various stakeholders from the addressed industries, including representatives from the following stakeholder groups:

Institutions from the Agri-Food sector

- Agroconnect: agribusiness, solution providers and service providers
- Tuinbouw Digitaal: Greenport Digital community (NL)
- Centre for Agroecology and Food Security. Coventry University (UK)
- Geomations SA: Management and Control for Greenhouses, Fisheries, Irrigation Networks and other Agricultural Facilities
- KoninklijkeMaatschapWilhelminapolder, KMWP is pioneering in the application of precision farming technology by the use of sensors on farm machinery
- PASEGES: Pan-Hellenic confederation of Unions of Agri-cultural Co-operatives
- GreenHouse in Nafpaktos (Greece)
- Maatschap: Farm pioneering in the application of precision farming technology by the use of wireless sensors for soil moisture and microclimate monitoring (NL)

- Nursery Greenhouse in east Peloponese (GR)
- ZLTO: organisation of 19.000 agricultural entrepreneurs in the South of the Netherlands.

Companies from the Transport & Logistics sector

- Koc Holding: the largest private conglomerate in Turkey, which operates in four core industries: Energy, Automotive, Consumer durables and Finance
- Tupras (Turkish Petroleum refineries co): the largest industrial enterprise in Turkey

Business Development and ICT Associations/representatives

- Gaia association of Electronic and Information technologies in the Basque Country
- Yasad: Turkish Software Industry association
- Universiy of Pireaus Research Centre / TNS Living Lab (Greece)
- NICTA (National ICT Australia): NICTA develops technologies that generate economic, social and environmental benefits for Australia and the world
- TUBISAD, Turkish informatics Industry Association

Public Authorities

- Technological institute of Aragon (Spain)
- Ministry of Rural development and food (Greece)
- Malaga city (transport and logistics) (Spain)

4.3.2.2 Commercial Exploitation of the cSpace

In order to facilitate the commercial exploitation of cSpace project results, the elaboration of business models is planned as a main activity in the community building plan, aiming at:

1. Creating a full understanding of the complex, end-to-end cSpace value network and outlining a number of generic business models for cSpace solutions, focusing both on the platform itself (ICT side) and changes brought in the sectors envisaged (e.g., SaaS, PaaS from an ICT perspective, potential role shifts/new roles in agricultural and logistics models);
2. Identification of market needs, and assessing the project outcomes with respect to theses
3. Delineating, analysing and validating applied business models for several exemplary services to be implemented and tested within the project, and;

4. Constructing a clear set of validated business models for which a strategic fit exists between the different stakeholders in terms of the cSpace-enabled value network (including the platform itself, the module and service providers, but mostly the beneficiary sectors), its functional architecture, the cost and revenue structure for the cSpace enhanced service provision and the value proposition offered.

For the Overall Exploitation Plan, this is complemented with the Individual Exploitation Plans of the project partners. The project objectives have mainly been driven by industrial needs.

4.3.3 Dissemination

Dissemination Principles (Mission Statement): The project dissemination approach will achieve effective communication of the cSpace results to relevant stakeholders, including end users, scientific communities, public and industrial adopters and vendors. We acknowledge the importance of adequate dissemination of results and its influence on the momentum the project will attempt to build. Thus all partners will contribute to the communication of the project results, ensuring that the following main target groups are addressed: (a) potential users from the Agri-Food and Transport and Logistics domains as well as related industrial sectors, (b) the IT industry, and (c) the broader public.

Dissemination Approach: the cSpace project will promote and disseminate the project results through participation in various events such as workshops and conferences; publication of the main results in scientific journals, conference proceedings and books; to relevant stakeholders, including general public and end users, industry and SMEs, scientific communities, FI PPP community, public and industrial adopters and vendors and policy makers. To ensure the dissemination activities to be effective for awareness generation and uptake of the project results, an integrated approach will be followed, combining early identification of relevant stakeholders, strategic planning, and guidelines on one side with an effective communication platform, the timely publication of results, and the participation in key events on the other. The cSpace project will also contribute to the dissemination of the FI PPP by pro-active participation in the Dissemination Working Group (DWG) facilitated by CONCORD.

The major **target audiences** for dissemination are:

- Industry and SMEs, including early adopters, vendors and decision makers,
- The general public and end users,

- Scientific research communities and FI PPP community, especially on Future Internet technologies and research on domain-specific ICT support for international agri-food, transport and logistics,
- Public bodies/Policy Makers.

Major sectors for dissemination are:

- The agri-food and transport and logistics sectors, which are interested in the cSpace results from the application side ("application pull")
- ICT industry, which is interested in the cSpace results from the technology provider side ("technology push")
- The broader public for awareness generation and uptake by external parties.

It is necessary to define the most suitable messages and communication approaches most appropriate for the different target audiences, which are listed above. This will include both cSpace project messages as well as the FI PPP programme level messages. The over-arching message at the FI PPP programme levelhas been identified through the slogan: "The Future. Now".

The **main messages for the target audiences** of cSpace are as follows:

- **For the general public and end users**: cSpace will provide a convenient and easy access to a multi-party collaboration platform, which allows interacting with all parties related avoiding dedicated set up of complex ICT integration among the parties. The cSpace PPP will increase the transparency and efficiency of agri-food and logistics and transportation operation and it will contribute to sustainability by reducing emissions caused by global transport. Cost reduction due to higher efficiency and lead time optimization due to high level of transparency all over the SCM and production process will benefit the global supply chain business. The programme level message will be the developing solutions to the key social challenges as well as to design future scenarios for sustainable development.
- **For the Scientific research communities and FI PPP community**: the cSpace as well as FI PPP is industry-led and coherent with EU ICT policy (e.g., the Digital Agenda) on the one hand, while open to the engagement of all of Europe's ICT innovation ecosystems including SMEs and individual researchers on the other. For researchers, the use cases and scenarios thus can serve as relevant and realistic case studies and thus have the potential to create sig-

nificant interest in the project results. The main message within the FI PPP community is to improve the spirit of cooperation and collaboration working towards common goals.

- **For Industry and SMEs:**cSpace is a tool for quick and easy business partner integration. Time would not be a major constraint to make business networks operational. Overall process transparency allows complex monitoring and reducing the impact of process deviations. This is the key to reduce costs and improving the service quality.

Dissemination Instruments and Channels: the following multi-channel instruments will be prepared and use for dissemination, in close collaboration with the FI PPP DWG activities:

- Project website,
- Events, Conferences and Trade Shows
- The cSpace corporate identity, consisting of the logo and its uses, and templates for a coordinated graphics image,
- Material to create awareness at relevant events such as pop-up posters, flyers, brochures, banners, leaflets and others
- Press releases and media outreach to inform the general public and niche communities;
- Publications at highly visible conferences and in journals, ranging from forums that address practitioners to forums that are targeted towards the research community.
- Writing articles for magazines

The main Communication Channels used to convey information, from the FI PPP Portal to press releases.

- Thematic Networks and Associations (European and Non-European)
- Social Media (LinkedIn, Twitter, Facebook, etc)

Leveraging on contacts and impact making within and by existing initiatives, the cSpace project also plans to perform dissemination through National, European and international networks by:

- Collect information on suitable national, European, and international networks, including e.g. European Technology Platforms (ETPs), National Technology Platforms (NTPs), Industry Federations and Associations, and Industrial Research Associations
- Establishing contacts and foster direct communication with their members, and obtain access to the networks' communication channels.

5 Conclusions and next steps

The objective of this deliverable was to describe a plan for community building for large scale experimentation to be used in the second phase of the FI-PPP programme. In Chapter 2, the current user community that was formed in the SmartAgriFood project was described. Initial activities in WP700 that were related to community building turned out to be difficult, because in the beginning the three subdomains (Smart Farming, Smart Agri-Logistics and Smart Food Awareness) were still described at a high level and also Future Internet was difficult to grasp in a tangible way. Hence, the six sub-use cases and pilots that were developed later in the project provided a much better way to communicate with stakeholders; especially in the last phase when concrete prototypes and mock-ups could be demonstrated. Each pilot organized various stakeholder meetings at different stages. Additionally there were national workshops in four selected countries. Finally there were also several general dissemination activities that supported user community building. The approaches and results of these activities were described in Chapter 3, including lessons learned and recommendations for continued user community building in Phase 2.

Most important ones are:

- The regular discussion with the expected end-users and the ICT solution providers should be continued, but the pilots should ensure that enough comprehensive information will be available.
- There should be detailed and clear descriptions made available about joining and contribution opportunities in the second and third phases. In relation to this, business models should be improved to answer the users' questions about the applicability.
- Users from the agri-food chain have usually limited understanding of capabilities of the current and particularly of the Future Internet, enabling new services and technical solutions. Hence, there is a need for developing further training materials and organisation of pilot/demonstration training sessions.
- All existing initiatives and networks where the project partners are involved should be used for creating awareness and discussion of the outcomes of the project (e.g. EUREKA, various ETPs, EFITA, etc.).
- Social media should be used more intensive (e.g. Facebook, Twitter, LinkedIn and YouTube)
- To overcome geographical barriers and enlarge the range of dissemination activities, virtual methods such as videos, webinars, etc. should be further exploited.

These lessons and recommendations were used in Chapter 4 where a concrete plan for community building in Phase 2 was described based on the cSpace proposal, which is a merger of the Phase 1 projects FInest and SmartAgriFood. Hence, also the user community and plans that were formed in the FInest project were included. The core of the cSpace proposal is a collaborative, cloud-based platform for B2B that includes an AppStore environment will be developed. In this way stakeholders from the end-users' side (agri-food, transport & logistics) and the ICT users' side will be brought together on the platform. The platform will be developed, largely based on FI-Ware generic enablers. Eight use case trials will be used for large-scale experimentation, based on the platform by developing and using its functionalities, ultimately by several use-case specific Apps. Thus the cSpace platform will validate the FI-Ware GEs from a general ICT- and use-case specific perspective. Six of the eight use case trials are the continuation from the SmartAgriFood project; two additional ones come from FInest. Although there were a few changes in the location and partners involved in the trials, the stakeholder communities that were established around the trials in SmartAgriFood can be continued and further enhanced. Some of the stakeholder companies that were externally involved in SmartAgriFood have now become full partner in the cSpace project. Others have become either associated partner or supporting partners. During the execution of the project the community of supporting partners will also be extended. It is expected that these partners will play an important role in plans for Phase 3 of the FI-PPP. Because in Phase 2 actual applications (Apps) will be developed, it is expected that also a larger community of ICT developers can be attracted. To support community building, various information and training materials will be developed that will be used in several European or national events of different kinds (e.g. workshops, dedicated trial meetings, etc.). Beside trial-specific activities for community building, also the general ways of dissemination will continue to support this by communication through the website, conferences, workshops, publications, social media, etc.

6 Appendix A. Involved stakeholders

Pilot 'Smart Spraying'

Category/ Organization	Type of Organization	Country	Business Size
End users			
	Farm/contractor	Finland	SME
	Farm	Finland	SME
	Farm	Germany	SME
	Farm	Germany	SME
	Farm	Germany	SME
Established IS provider			
	FMIS provider	Finland	SME
	FMIS provider	Germany	SME
	FMIS provider	Germany	SME
	FMIS provider	Germany	SME
	FMIS provider	Germany	SME
Other service provider			
	Machine manufacturer	Germany	Large enterprise
	Extension services (disease service)	Finland	SME
	Sensor data service (weather)	Finland	SME
	Government e-services (Subsidy rules)	Finland	SME
	Weather services	Finland	SME
	Chemical supplier	Finland	SME
	Planning data and standards provider	Germany	SME
	extension service	Germany	SME
	pesticide registration agency	Germany	SME
Market place			
	software developer (portals)	Finland	SME
	software developer (SaaS)	Finland	SME
FI-SAF Service Infrastructure			
	Telecom solutions	Germany	Large enterprise
	Semantic search	Germany	SME
	Semantic web technology provider	Germany	SME
Existing Living labs			
	Living Lab (for novel farm information management, automation and robotics)	Finland	n.a.

Category/ Organization	Type of Organization	Country	Business Size
Existing Public Private Partnership (PPP)			
	Data exchange	EU	n.a.
	Competence Cluster (Environmental data service)	Germany	n.a.
	Competence Cluster (ICT / Future Internet)	Germany	n.a.
Existing Community of Practice			
	Farmers' Union Finland	Finland	n.a.
	association of machinery service providers	Germany	n.a.

Pilot 'Greenhouse management'

Category/Organization	Type of Organization	Country	Business Size
End users			
	Fruits producer	Greece	SME
	Producer Unit of Fruit preserves and jams	Greece	SME
	Production and distributing Unit of fruits and vegetables (especially peaches) in both inland and abroad	Greece	SME
	Olive Processing Industry	Greece	Large enterprise (annual turnover > €60 million)
	Fruits and vegetables producer	Greece	SME
	Tomato canning producer	Greece	SME
	Fruits and vegetables producer	Greece	SME
	Fruits, vegetables and juice producer	Greece	SME
	Fruits, vegetables and juice, oil and oil olive producer	Greece	SME
	Olive and Oil Oilive producer	Greece	SME
	Cheese producer	Greece	SME
	Poultry Farming Cooperative	Greece	SME
	Super Market	Greece	SME
	Farmer	Greece	SME
Other service provider			
	Government Agency	Greece	SME
	Weather services	Greece	SME
	Agricultural Products Certification and Supervision Organization	Greece	SME
	ICT Solutions	Greece	SME

Category/Organization	Type of Organization	Country	Business Size
	Software development	Greece	SME
FI-SAF Service Infrastructure			
	ICT consulting	Spain	Large enterprise
	Telecom solutions	Germany	Large enterprise
	FMIS Research	Greece	SME
Existing Living labs			
	NKUA	Greece	
Existing Public Private Partnership (PPP)			
	TBA	Greece	

Pilot 'Flowers'

Category/Organization	Type of Organization	Country	Business Size
End users			
	Trader	The Netherlands	Large enterprise (€90million)
	Trader/auction	The Netherlands	Large enterprise (€4 billion)
	Trader	Germany	Large enterprise
	Supplier	Germany	Large enterprise
	Asset management	The Netherlands	Large enterprise
	Grower	The Netherlands	SME
	Transport	The Netherlands	SME
	Retail chain	Germany	Large enterprise
	Retail chain	Germany	Large enterprise
	Retail chain	Germany	Large enterprise
	Retail chain	The Netherlands	Large enterprise
Established IS provider			
	Standardisation	Germany	Large enterprise
	Certification	Germany	Large enterprise
	Software vender	The Netherlands	Large enterprise
	Software vender	The Netherlands	Large enterprise

Category/Organization	Type of Organization	Country	Business Size
Other service provider			
	Software vender	The Netherlands	SME
	RFID integrator	The Netherlands	SME
	Sensor Integrator	The Netherlands	SME
FI-SAF Service Infrastructure			
	ICT consulting	Spain	Large enterprise
	Test laboratory	Germany/EU	Large enterprise
	Telecom Solutions	Germany	Large enterprise
Existing Living labs			
	Living Lab	The Nether-lands/EU	N/A
	Industrial associations	The Netherlands	N/A
Existing Public Private Partner-ship (PPP)			
	Industrial associations	The Netherlands	
Existing Community of Practice			
		The Netherlands	

Pilot 'Fruits and vegetables'

Category/Organization	Type of Organization	Country	Business Size
End users			
	Reusable Packaging Pool Man-agement	The Nether-lands/ Germany/EU	Large enterprise (Marketshare 41%)
	FFV and Flower Trader coop; largest supplier of EDEKA	Germany/EU	Large enterprise (€1841 mln)
	FFV Trader + Import/Export	Germany / EU	Medium
	Retail group	Germany/EU	Large enterprise (€43.5 bln)
	Growers, 5000 SMEs	Germany/EU	SME
Established IS provider			
	Standardization	Germany/ International	Large enterprise
	Software vender	Germany/ International	Large enterprise

Category/Organization	Type of Organization	Country	Business Size
	Research & Development	Germany	SME
	Quality Management System / Product Information System provider	Germany	SME
	Farm Management System providers (also Product Information)	Germany	Large enterprise
Other service provider			
	Quality System provider	Germany	Large enterprise
	Certification provider for food chain related topics	International	Large enterprise
	Certification provider for good agricultural practice	International	SME
	Technology consulting	Germany	SME
	Control and Certification Agency	Spain/ International	Large enterprise
	Laboratory analytics	Germany / EU	Large enterprise
Market place			
	ICT system developer for logistics	Germany	Large enterprise
	System development	Belgium	SME
	App developer	Germany	SME
	TT-System provider	The Netherlands	SME
	TT-System provider	US	SME
	TT-System provider	Norway	SME
	Communication and integration services for Product Information	Netherlands	SME
FI-SAF Service Infrastructure			
	ICT provider	Germany	SME
	ICT provider	Spain	Large enterprise
	Telecom solutions	Germany	Large enterprise
	Test laboratory	Germany	Large enterprise
Existing Living labs			
	Standard. with test environment	Germany/ International	Large enterprise
	Test laboratory	Germany	Large enterprise
Existing Public Private Partnership (PPP)			
	Retail Research Assoc.	Germany/EU	Large enterprise
	Quality consortium	Germany/ International	Large enterprise
Existing Community of Practice			
	Industrial association	Germany/EU	N/A

Category/Organization	Type of Organization	Country	Business Size
	Industrial association	Germany/EU	N/A
	Regional Business Cluster/Network for Fresh Fruit and Vegetable Trade	Germany	N/A

Pilot 'Tailored Information for Consumers (TIC)'

Category/ Organization	Type of Organization	Country	Business Size
End users			
	Organization of Consumer. The CEO of ASGECO is a member of the EESC, representing consumers	Spain	Large
	Retail Group	Spain	Large enterprise (Annual turnover 700M €)
	Spanish federation of industries from food and beverages	Spain	Large
	Federation of breeders and farmers associations	Spain	Large
Established IS provider			
	Global solutions provider for supply chain leaders. Warehouse Management System solutions providers. http://www.manh.com/	UK	Large enterprise (330M $)
Other service provider			
	Manufacturers and distributors association	Spain	Large
	International logistics service provider. Operates a pool of more than 125 million RPCs (Reusable Plastic Containers). http://www.ifcosystems.at/eu/AT/en/about/index.php	Spain	Large enterprise (730M $)
	Environmental, social and traceability reporting (indicators) experts	Spain	SME (9,1M €)
FI-SAF Service Infrastructure			
	ICT Consulting	Spain	Large enterprise
	Telecom solutions	Germany	Large enterprise
	Test laboratory	Germany	Large enterprise
Existing Living labs			
	Technology Demonstration area focused in the	Spain	Large

Category/ Organization	Type of Organization	Country	Business Size
	supply chain, point-of-sale and home applications.		

Pilot 'Tracking, Tracing and Awareness in Meat supply chains (TTAM)'

Category/Organization	Type of Organization	Country	Financial Turnover
End users			
	Veal supplier	Germany	SME
	Slaughterhouse	Germany	Large enterprise (turnover > €2.2 bln)
	Farm	Germany	SME
Established IS provider			
	Standardisation	Germany/ International	Large enterprise
	Control and Certification Agency	Spain/ International	Large enterprise
Other service provider			
	Global standards	UK	Large enterprise
	GAP assurance	Germany/ International	Large enterprise
	Labelling & traceability organisation	Germany	SME
	Quality assurance	Germany	SME
FI-SAF Service Infrastructure			
	Test laboratory	Germany	Large enterprise
	ICT Consulting	Spain	Large enterprise
Existing Living labs			
	Test laboratory	Germany	Large enterprise