Deliverable D800.4.1 & D800.4.2

Final Project Report

Confidential Part

WP 800

Grant Agreement number:	285 326
Project acronym	SmartAgriFood
Project title:	Smart Food and Agribusiness: Future Internet for Safe and Healthy Food from Farm to Fork
Funding scheme:	Collaborative Project - Large-scale Integrated Project (IP)
Period covered:	from 01.04.2011 to 31.03.2013
Status:	Draft

Name Title and Organisation of the scientific representative of the project's coordinator:	Dr. Sjaak Wolfert Stichting Dienst Landbouwkundig Onderzoek – DLO
Tel.:	+31 (317) 485 939
Fax:	+31 (70) 36 15 624
E-mail:	sjaak.wolfert@wur.nl
Project website address:	http://www.smartagrifood.eu

FUTURE INTERNET PPP

SEVENTH FRAMEWORK PROGRAMME

Smart Agri-Food

Dissemination Level

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)	X
CO	Confidential, only for members of the consortium (including the Commission Services)	

Note:

This report is combining both parts of the Final Project Report – the restricted and the public version. The project will finally produce a separate public version that will be accessible via the SmartAgriFood website to the public target audience.

Change History

Version	Notes	Date
001	Creation of the document	07.04.2013
002	Integration of draft partner input	03.05.2013
006	Compiling partner feedback	08.05.2013

Abbreviations

CEP	Complex Event Processing
CP	Core Platform
B2B	Business to Business
D	Deliverable
DoW	Description of Work
e.g.	exempli gratia, engl. for example
DSE	Domain Specific Enabler
EC	European Commission
ETP	European Technology Platform
FFV	Fresh Fruit and Vegetables
FI	Future Internet
FIA	Future Internet Assembly
FInES	Future Internet Enterprise Systems Cluster
FI-PPP	Future Internet Public Private Partnership
FMIS	Farm Management Information System
FMS	Farm Management System
GA	Grant Agreement
GE	Generic Enabler
HLD	High Level Description
ICT	Information and Communication Technology
i.e.	id est; engl. that is to say
IERC	European Research Cluster on the Internet of Things
IoT	Internet of Things
IP	Large-scale Integrated Project
M	Month
MS	Milestone
NDA	Non-disclosure agreement
P2P	Peer-to-peer
PF	Plants and Flowers
PoC	Proof-of-Concept
RFID	Radio Frequency Identification
RTD	Research and Technological Development
SAF	SmartAgriFood
SLA	Service Level Agreement
SME	Smart and Medium sized Enterprise
SOA	Service Oriented Architecture
TIC	Tailored Information for Consumers
TTAM	Tracking & Tracing and Awareness in the Meat sector
WP	Work package
w.r.t.	with respect to

Table of Contents

1 Final publishable summary report

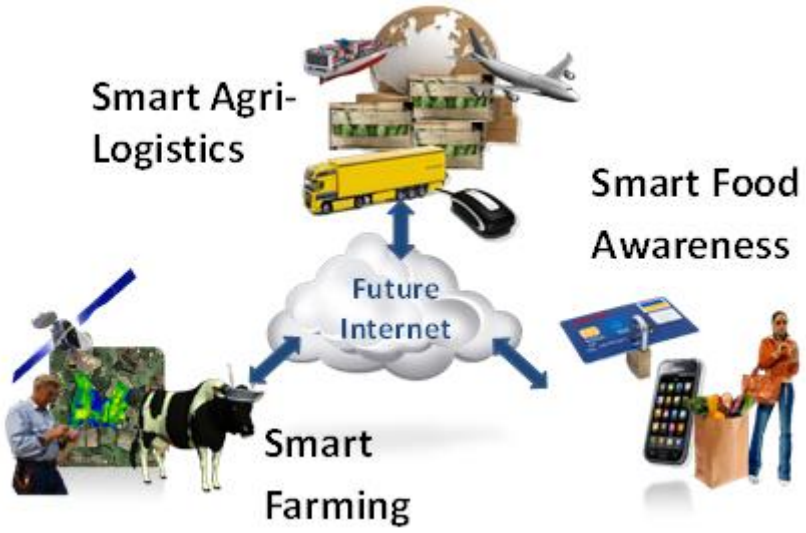
1.1 Executive Summary

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; Spain
- ASI S.L.; Spain
- Huawei; Germany
- MTT Agrifood Research; Finland
- KTBL e.V.; Germany
- NKUA; Greece
- UPM; Spain
- CBHU - Campden BRI Magyarország, Hungary
- 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
- BONPREU S.A.U.; Spain

More Information

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

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

1.2 Summary of Project Context and Objectives

Overall, the SmartAgriFood project aims to boost the application and use of future internet ICTs in the Agri-Food domain and is targeting at an increase of the competiveness of the European Agri-Food domain. Moreover, due to the structure of the agri-food sector the SmartAgriFood project will specifically affect a huge number of SMEs in the agri-food domain throughout Europe.

1.2.1 Main characteristics and challenges of the agri-food domain

The project specifically addresses the agri-food domain that could be characterised as follows:

- 40 % of the EU's land area is being farmed (Eurostat 2010), hence agriculture has a very important impact on the natural environment.
- The food and drink industry is representing 13% of EU manufacturing sector turnover (CIAA 2010, data 2007).
- The EU is the world's largest food and drink exporter with a share of EU exports to world markets of 17.5% in 2008 (CIAA 2010).
- The share of agri-food logistics in the EU road transport is about 20% (Eurostat/TLN 2008, data 2007).
- There is an 11% share of agriculture-related products in total export value of EU countries in 2009 (Eurostat Comext trade data / Eurostat).

At the same time, the SmartAgriFood project is aiming at addressing the following challenges:

- Increase of world population and dramatic increase in the need for food and water.
- The need to reduce the effects of climate change.
- Complying with changes related to the growing welfare in emerging economies.
- Supporting measures addressing a shift towards a bio-based economy.
- Consequences with respect to competing claims on land, fresh water and labour.

1.2.2 The SmartAgriFood Context

SmartAgriFood project focused on three sub systems of the agri-food sector:

- smart farming, focussing on farm management, sensors and traceability;
- smart agri-logistics, focusing on real-time virtualisation, connectivity and logistics intelligence;
- smart food awareness, focussing on transparency of data and knowledge representation.

At the same time, the SmartAgriFood project addresses agri-food agribusiness as a use case for the Future Internet (FI). Together, the three sub use cases work towards an ideal scenario that is characterised by a tighter integration of agri-food business with advanced Internet-based network and service capabilities, a scenario with possibly one of the highest social and economic impacts.

The three sub use cases deal with challenges in the agri-food chain in three aspects: to increase efficiency in agricultural production, to increase efficiency in food logistics, and to ensure food quality and food safety.

The SmartAgriFood project addresses these three major aspects by the conceptualisation of different pilots. These pilots cover selected aspects (see Figure 1) and with that offer different perfect environments for testing features of the FI WARE project in order to address complex requirements and resulting challenges for agri-food companies.

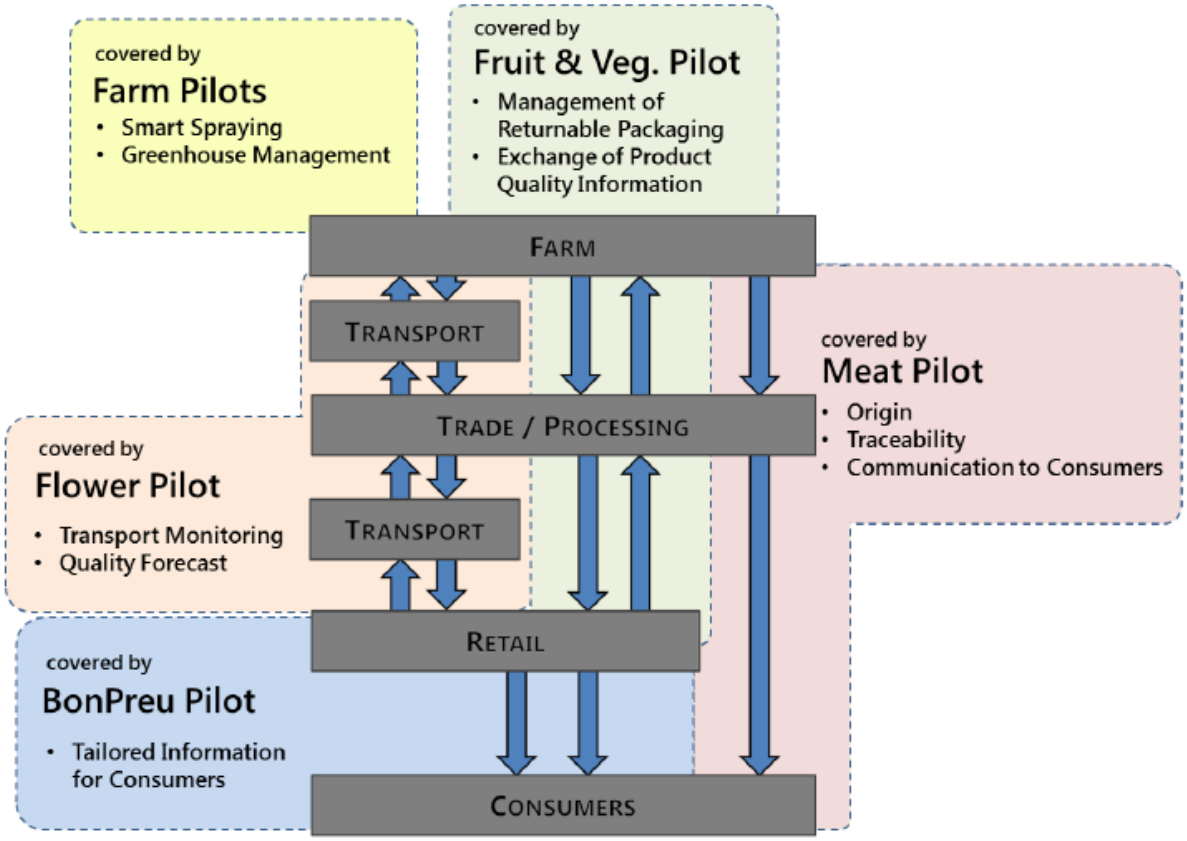


Figure 1: The various pilots in SmartAgriFood placed, indicating the scope and focus in relation to the total agri-food supply chain.

1.2.3 Conceptual Prototypes for Validation and Community Building

In the first phase of the FI PPP programme, the SmartAgriFood project especially developed conceptual prototypes for the pilots in the sub use cases that were employing the generic enablers of the FI WARE project and at the same time serving for their validation based on real user requirements.

Moreover, towards phase 2 of the FI PPP programme, the basic idea is to follow the philosophy of the living lab concept, which highlights the essential role of the end users and their interactions with various service providers in the market place and related service infrastructure. As presented in Figure 2, the essential approach is to enable the different actors to take advantage from the available technologies:

- End-users, benefiting from the fast adoption of technologies and reduced costs to adapt systems to their specific needs.
- Information system providers, being empowered to focus on added-value features of their products highly facilitating the integration with other system solutions.
- Other service providers that can easily adapt to the needs of end-users, the specifics of the technological environment and highly focus on app type solutions.
- The overall public audience that will benefit from the reduced efforts in terms of costs as well as added-value features that will not only enhance their consumers' experience but enhancing the availability and safety of food.

Furthermore, one need to take into account that SmartAgriFood is dealing with the complete supply chain ('from farm to fork'). Hence, end users are not only consumers but also retailers, logistic service providers, farmers, input suppliers, etc.

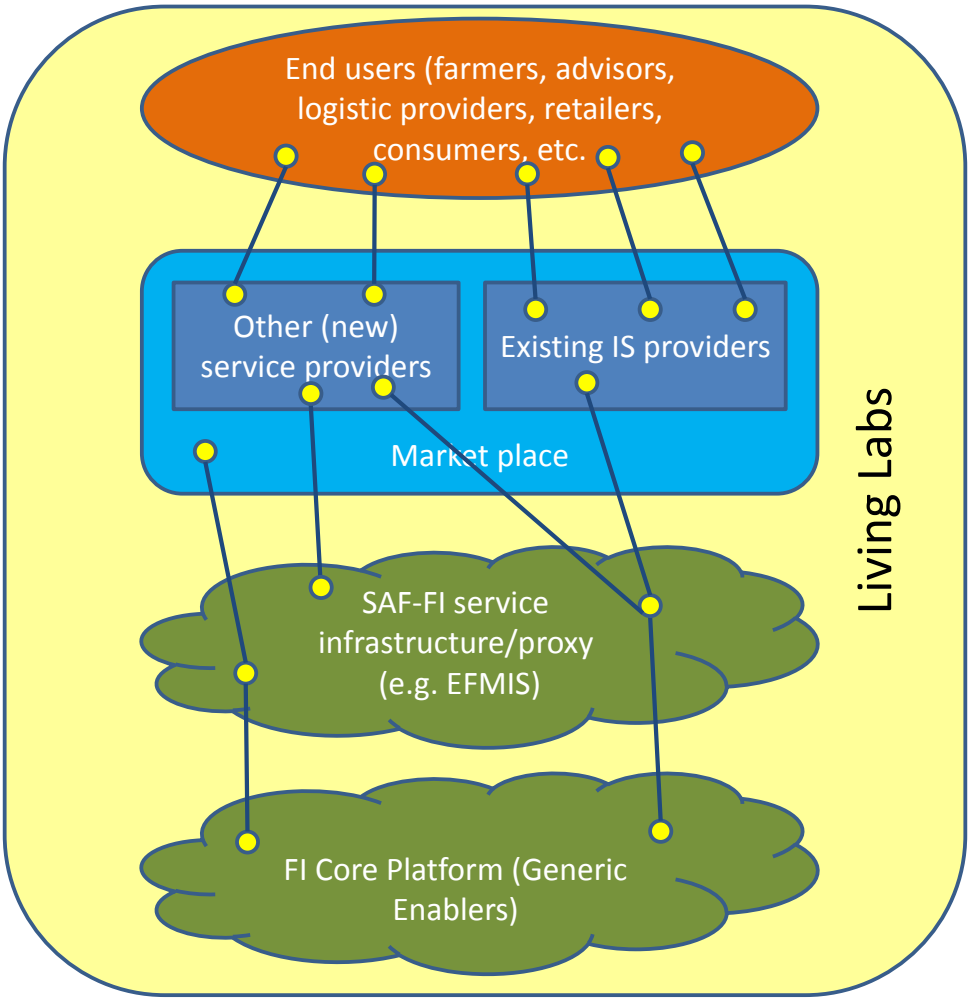


Figure 2: A general framework to analyse the large-scale experimentation infrastructure.

Therefore, what this project means for ordinary citizens is better food produced with less impact on the environment through better operations based on improved flow of information, and greater knowledge and awareness about where our food comes from.

For the food chain members from agricultural production through food processing and retailing, the project promises to contribute to the design of enabling tools for decision making and controls for lowering of inputs, reducing costs, increasing access to market relevant data for all people and organisations involved, and the recognition that farming and food production while technically challenging is central to our collective future.

1.2.4 Final Project Results and their Potential Impact and Use

The promising project results that were elaborated in the scope of the project are confirming both the needs for a Future Internet in the agri-food domain as well as the interest and motivation of the diverse actors involved. Moreover, already at the moment, there is even a larger interest of organisations beyond the current partnership. Diverse external agri-food actors were already involved in the project work to validate the first findings as well as plan activities for the FI PPP phases 2 and 3.

Nevertheless, prerequisite to create momentum and convince the agri-food business domain of the Future Internet potentials is to further develop convincing solutions and have a more practi-

cal access to the innovative potentials. Therefore, SmartAgriFood worked on the development of key features that are of benefit for the different target audiences in farming, agri-food logistics and for food awareness. The elaborated results were also further validated using kind of simulations and experimental systems within this project. These efforts shall be further continued by large scale demonstration in Phase 2 that started in April 2013.

Therefore, there were already contacts with experimentation infrastructures (e.g. initiative of living labs, the European EPC Competence Centre (EECC)) as well as an established communication with the existing clusters (e.g. IERC) as well as with the FI-PPP support action INFINITY that will provide an inventory of research infrastructures that are available in Europe.

Finally, everybody is highly welcome to access more information via the SmartAgriFood website (http://www.smartagrifood.eu), join us in Twitter (http://twitter.com/#!/SmartAgriFood) and Facebook (http://www.facebook.com/pages/SmartAgriFood/201411716577654), as well as participate our public discussions in LinkedIn (http://www.linkedin.com/groups/SmartAgriFood-3996825).

1.2.5 Contents of the Final Report

This final report is summarising the main results of SmartAgriFood, outlining the use cases and implemented pilot demonstrations. It is highlighting the potentials towards a future usage of results. Details are presented about the relevant standardisation within the agri-food domain and on how to bring the phase 1 results towards its exploitation by the project partners as well as in the frame of the FI PPP phase 2 and 3.

Finally, the report is listing the available resources and publications that can be accessed via diverse channels.

1.3 Main S&T Results/Foregrounds

1.3.1 Introduction

1.3.1.1 Main Motivation

The SmartAgriFood project[1] is part of the Future Internet Public-Private Partnership (FI-PPP) program[2] and addresses farming, agri-logistics and food awareness as use cases. The intelligence, efficiency, sustainability and performance of the agri-food sector can be radically enhanced by using information & decision support systems that are tightly integrated with advanced internet-based networks & services. Concurrently, the sector provides use cases for Future Internet design from the physical layer all the way up to the service layer.

The SmartAgriFood project was using a user-centred methodology. Use case specifications were developed with a particular focus on transparency and interoperability of data and knowledge across the food supply chain. Therefore, the project results include:

- Use Case descriptions for smart farming, including sophisticated and robust broadband sensing and monitoring of plant production processes and real-time assistance for farmers;
- Use Case descriptions for smart agri-logistics, including intelligent transport and real-time logistics of agri-food products;
- Use Case descriptions of smart food awareness, focussing on enabling the consumer with information concerning food safety, health, environmental impact and animal welfare;
- Identification of requirements for generic enablers of the FI-WARE Core Platform[3];
- Extensive community and user organisation involvement both in requirements gathering, pilot demonstration and evaluation;
- Specification of interfaces and functionalities for integration to FI-WARE Core Platform;
- Significant contributions to standardisation and regulatory bodies in Europe.

Key features of SmartAgriFood concepts are demonstrated and verified by simulations and experimental systems within this project as well as by large scale demonstration in Phase II that starts in 2013 (i.e. the FIspace project[4]).

1.3.1.2 Purpose and Relevance of the SmartAgriFood project results

The main contribution of the Internet is that it enables the sharing of information on a global scale. However, standardized functionalities to efficiently handle this sharable information and use its full potential to enhance cooperation in business networks and develop the formation of new ones are lacking. Presently, businesses must significantly invest in application software to benefit from the available data. The Future Internet initiative aims to extend the current Internet with functionalities to effectively share and handle the large quantities of available information. In the Future Internet vision, the functionalities are offered as web services with standardised interfaces. This would make innovative, high-tech, applications available to SMEs without investments beyond the SMEs' capacity. Furthermore, the rapidly growing services market would offer opportunities for the ICT sector and in particular enable SMEs to swiftly introduce innovations, thus boosting SME-driven economic recovery.

1 http://www.smartagrifood.eu
2 http://www.fi-ppp.eu/
3 http://www.fi-ware.eu/
4 http://www.FIspace.eu

Agri-food is a typical SME sector. Millions of smallholders and SMEs deliver their produce to domestic and world markets through supply chains operated by some multinational companies and a host of SMEs, also operating both domestically and globally. Farming and agri-logistics nowadays are data-intensive industries. In addition to regular business information needs, data are required to cope with health risks of food, uncertainty associated with the use of living materials, and perishability of the products. A growing host of data is available in individual farms and their suppliers, food processors, traders, carriers, and retailers, but infrastructures to effectively share this information are scarce and fragmented and many of the information flows are still paper-based (we consider e-mailing a scanned form or a PDF document as a paper-based process).

The Internet offers the potential to enhance efficiency and sustainability by sharing electronic data throughout global supply networks and to re-establish the connection between farmers and the consumers of their produce. ***Downstream information flow*** can inform supply chain partners, consumers, and other stakeholders like authorities about the origin, quality, sustainability, food safety, and other social responsibility aspects of a food product. ***Upstream information flow*** can enable better tuning of supply to demand, both qualitatively and quantitatively, and thus generate new business opportunities for farmers and other agri-food supply chain partners. Enhanced creation and sharing of information enables closer collaboration in supply networks, and will enable the emergence of new business arrangements which we can only partly foresee.

In the European Commission's FI-PPP programme the FI-WARE Core Platform offers a basic set of functionalities as web services (Generic Enablers), upon which innovative Future Internet applications can be built. The SmartAgriFood project lays the foundations for using the FI-WARE Generic Enablers to deliver innovative applications to the agri-food sector. It does so by defining a set of ***domain specific services***, which support the ***formation of flexible business networks and service agreements in the agri-food sector***, enable the creation and use of reliable, tailored, information, and share it both among the network partners and with consumers and other stakeholders like food safety authorities. In addition to the value this can deliver to farmers, supply chain stakeholders and consumers, and the opportunities it offers to the Internet industry, the SmartAgriFood and the Future Internet aim to contribute to the reduction of major societal and environmental problems like food waste, health hazards, transport mileage, animal welfare, and exhaustion and limited availability of resources to feed the growing world population. To summarize:

- A growing amount of useful data is available, but hardly shared in the agri-food sector.
- Future Internet extends the Internet with functionalities to handle and use shared data.
- The FI-WARE Core Platform (CP) defines and implements a set of basic functionalities.
- On top of the CP, SmartAgriFood offers collaboration and data sharing applications.
- It boosts the SME-driven economy and helps to resolve major societal food issues.

1.3.1.3 Structure

The analysed agri-food sub-use cases are closely connected and are presenting an integrated chain from farm to fork. This dimension is presented in the following section 1.3.2. The analysed sub systems of the agri-food sector are outlined in the sections 1.3.3, 1.3.4, and 1.3.5. The validation of the developed conceptual prototypes and especially of the used Generic Enablers is outlined in section 1.3.6. As this leads towards the large scale experimentation as well as to standardisation, related details are provided in section 1.3.7. The previous aspects are representing the main results of SmartAgriFood that is ending with the phase 1 of the FI PPP programme. Therefore, section 1.3.8 is detailing the latest status towards a transition to FI PPP phase 2 and 3. Finally, the main dissemination results and sources are listed in the sections 1.4 and 2.

1.3.2 Use Cases and a smart Agri-Food Vision

The purpose of the agri-food supply chain is to produce plant and animal products and to deliver the produce to consumers. Nowadays the realisation of agri-food products and specifically the operation of supply chains has become increasingly complex.

The first source of complexity of agri-food supply chains is in the great amount and diversity of actors involved at each supply chain stage. In the European Union, primary production takes place in millions of farms. They deliver their produce through a great diversity of distribution channels, from local market places to complex organized international supply chains. Many SMEs are involved in trade and logistics, while on the other hand, large food producers and retail companies are important stakeholders in the chain.

The second source of complexity is in uncertainties associated with plants and animals, which are sensitive to weather conditions, diseases, and food contaminations. Due to this uncertainty, the supply chains are dynamic. Production and delivery schedules and final product quality are uncertain. Products are perishable and sensitive to variations in storage and transport conditions. Due to the uncertainties, business relations and logistics must be very flexible, resulting in dynamic supply networks rather than stable supply chains.

The third source of complexity is in the manufacturing of food and the related complex combination of diverse ingredients stemming from different types of agri-food related chains. This includes the sourcing from farms and fisheries as well as the usage of miscellaneous additives that range from ingredient type of substances up to chemical additives for food protection and conservation. Hence, the manufacturing of food and the analysis of impact of related ingredients cannot stop at the manufacturers' cooperation with its suppliers and customers but needs to take into account a chain wide view from seed and fertilizer industry up to the consumers and subsequent handling or even reuse of food related waste.

The fourth source of complexity is related to the uncertainties discussed above. It is the increasing information-intensity of agricultural production and logistics, following from policies to reduce uncertainty or to deal with it by continuous re-planning. Precision farming technologies require vast amounts of data, as do the dynamic distribution systems. In addition customers and authorities require equally large quantities of data to control health risks and environmental impact. It is obvious that, given this information intensity and the millions of stakeholders involved in the agri-food supply chains and network, the Future Internet holds great promises for the sector.

In the first phase of pilot specifications, the SmartAgriFood project has identified four services to be provided in the Future Internet to all stages in food supply chains. In the SmartAgriFood vision these services perform the following functions.

- The Product Information Service delivers information about individual products, based on Internet of Things (IoT) technologies. Individually identifiable products can be tracked and traced based on RFID or QR code labels, attached to the products or their packaging. In case of repackaging or redistribution, e.g. cutting of meat, new labels can be linked to previous ones. By using IoT services, sensors in the environment can be discovered and data from the sensors can be used to monitor and predict product quality. Sensor data can be linked to production and logistics management data. The Product Information Service can inform consumers and stakeholders in all supply chain stages about product history, destination, quality, sustainability, and social responsibility attributes, enforcing user identification based data access policies.
- The Business Relations Service supports the formation and operation of dynamic, complex, supply networks. It enables identification of potential partners, set up electronic contracts for new business service networks, real-time and on-time management of relation-

ships based on the contracts and monitors the maintenance of service level agreements and billing processes. The main features of the Business Relations Service are (1) visualisation of business services options, reducing the barriers for SME to participate in global business collaborations, (2) integration of on-line information about service level agreements, reducing the present overcharging due to lack of information, and (3) creation of feedback channels, enabling dialogues across the supply chain and customer-specific interventions.

These two basic services are to be supported by the Identification Service and the Certification Service, which are essential for building trust across supply networks where too many stakeholders are active in order to build trusted relations based on personal interactions.

- The Identification Service guarantees that electronic services which claim to be acting on behalf of a particular stakeholder indeed do so.
- The Certification Services guarantees that information provided about stakeholders and products is trustworthy.

These general SmartAgriFood services build heavily on the functionalities provided by the FI-WARE Generic Enablers. Initial versions of these four services have been developed to support the prototype implementations in the three sub-use cases: Smart Farming, Smart Agri-food Logistics, and Smart Food Awareness. Evaluations of the pilot implementations of the SmartAgriFood prototypes will be reported in Deliverable D500.6, including additional requirements to the Generic Enablers resulting from the pilots.

The SmartAgriFood services are to be elaborated for trials in the FI-PPP's second phase, in addition to services for more specific business functions, such as dynamic, on-line logistics planning and re-planning based on real-time information, and real-time exception detection and handling. Together with the general SmartAgriFood services, these services provide an open platform for the integration of additional, SME-provided services and legacy systems. They can be integrated in innovative agri-food applications, based on service composition by dynamic workflow controllers. By exploitation of the workflow controllers and productivity-boosting functionalities offered by the FI-WARE Core Platform, the SmartAgriFood platform facilitates the availability of innovative software solutions for the agri-food sector and consumers of its produce. Figure 3 depicts this product vision and shows that the approach builds heavily on Generic Enablers in the FI-WARE Core Platform.

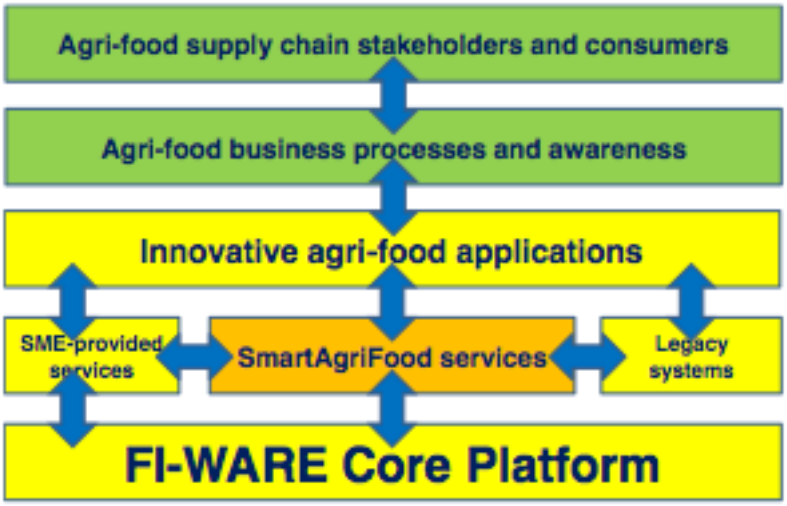


Figure 3: Summary of the SmartAgriFood product vision, building upon the FI-WARE Core Platform.

The four services outlined above and detailed in the WP 500 deliverables form core components to enable our longer term vision of an integrated end-to-end scenario (or "super scenario"). In

this, we envision the integration of the agri-food supply chain in such a manner that information can flow easily from farm to fork. The architecture for such a scenario has been developed extensively in D500.3 and D500.4 and it provides a more complex set of challenges than those provided by the individual pilots.

In order to enable such a scenario we have also identified the importance of deciding on appropriate data standards as these are essential if different software systems from different providers are to interoperate seamlessly. The vision of a systematic ecosystem of SMEs providing a variety of services, whether real world or data-centric, depends on the relevant APIs using established standards to share and transmit data. The importance of this is clear for Phase II and the development of a B2B environment (cf. below Section 1.3.7).

1.3.3 Smart Farming

This paragraph comprises a consolidated report of the main achievements of WP200 during the second year of the SmartAgriFood project. The main results evolved essentially around three axes, namely the Greenhouse Management and Control Pilot, the Smart Spraying Pilot and the Integration effort between them. Orthogonal aspects (e.g. GEs integration, architecture) were also considered and are also presented in both cases.

In order to prove the validity and viability of the designed systems, we deployed them in the actual field. An excerpt of this work is provided by means of short videos, publicly available via the following link: http://www.smartagrifood.eu/pilots. The prototypes do not only realize the concepts explained in the following, but are also fully aligned with the architectural specifications. More details about the pilots are available in their factsheets, both available in the link mentioned above.

1.3.3.1 System Architecture

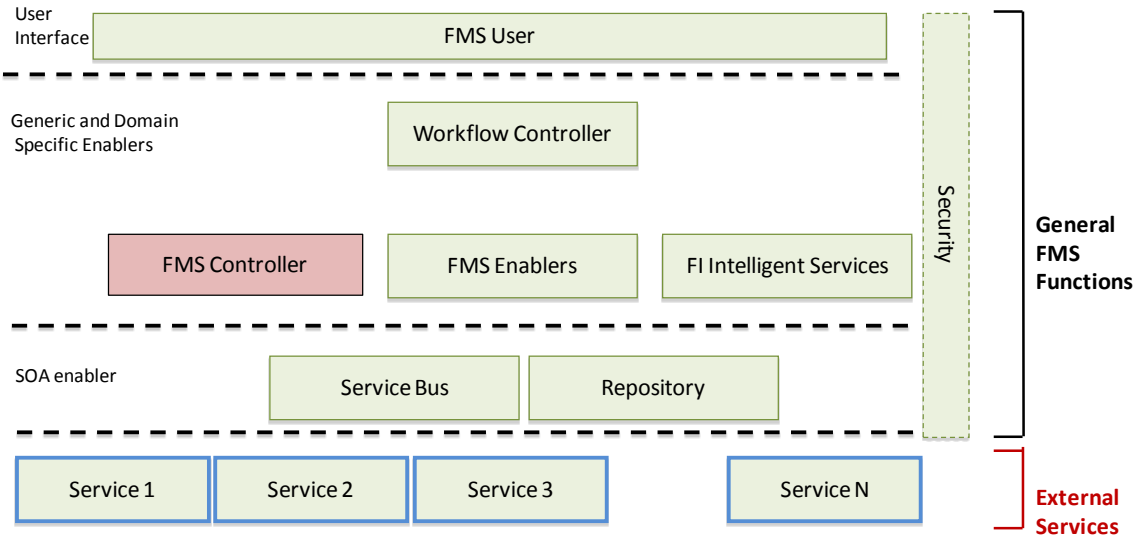


Figure 4: Cloud FMS Architecture

The refined architecture of a Cloud Farm Management System (Cloud FMS) consists of four layers, each performing specific operations. Figure 1 presents this concept. On the top of this stack lays the FMS User, the system's end user. The end user of the FMS can be a farmer, a worker in a farm or any stakeholder along the food chain such as a trader, an agriculturist, a service provider, a consumer, etc. An FMS User wishes to interact with the FMS and receive high quality services and experience. For this reason, the bottom layer depicts a variety of External Services that the user would like to employ. Any developer, can create his own agricultural service, e.g., weather service, e-agriculturist, etc that could be advertised by any

FMS instance and subsequently consumed by an FMS user. The FMS, in order to enable the usage of any service, has the ability to communicate with them and transfer from or to any kind of data requested. The actual transfer is achieved via the third layer from the top, named SOA enabler layer (a layer enabling the realization of Service Oriented Architecture - SOA) that sets the communication links between the core modules of an FMS and a service that is available in the internet.

1.3.3.2 Integration with FIWARE Generic Enablers

Six GEs have been integrated in the context of the Greenhouse Pilot. These GEs are fully integrated in the prototype however they are exploited in several different scenarios. Of course, a super scenario can be identified still however experimentation has taken place with minimum interaction between these cases.

Scenario 1

A user provider logs in the platform and attempts to register a service. In order to do so, he exploits the dedicated user interface available and provides details about his service, company etc. In general, he provides all details required in order to perform proper indexing and storage of his service (key-words, charging profile etc). The service description is formulated and transmitted in linked-USDL format. As soon as the farmer checks the marketplace in his end-user application he notices the existence of the new service and registers. Upon registration, the service is added to his application profile and he is able to access its functionalities. The usage of the service is constantly monitored; the application provider can validate the logs and based on the performed actions charge the user.

Repository GE: Through REST API calls we offer functionalities regarding uploading/accessing a service description in linked-USDL format. The GE offers the capability to upload the service description. Therefore we can upload USDLs to the repository and access all the available services information.

Mediator GE: Acts as a medium between a web service and a web service client. Every time our service (or method of a service) is invoked, an event is logged. Afterwards we count the number of the events happening in a specified time frame and use it for charging the users.

Scenario 2

The user has deployed the pilot in his Greenhouse. The devices constantly transmit information to the cloud which before storage is assessed by the Statistical Analyzer. The latter, upon identification of a problematic situation, triggers a notification action which is in turn forwarded to the farmer through the appropriate communication channel.

Data Center Resource Management GE: We have used the graphical interface of the portal to create a linux virtual machine in which we deploy the Statistical Analyzer. Furthermore we have a dedicated VM in which the Publish/Subscribe Broker GE is running.

Publish/Subscribe SAMSON Broker GE: This GE exposes its functionalities through REST API calls. We register a context with specific attributes to the Publish Subscribe Broker and query the attributes to get their values.

Cloud Edge GE: This GE is used in the farmer's premises in order to facilitate the communication of the local system with the cloud infrastructure.

Scenario 3:

Service Composition & Application Mash GE: It has been integrated in the GUI frontend of the Greenhouse Pilots. It can be used to provide graphic mashups that exploit the capabilities of the

widgets provided by the Mashup Factory (i.e. email). In the background, these widgets/services compose a new one in a service composition manner.

In the Smart Spraying pilot potential use of three essential FI Generic Enablers were identified: Global Customer Platform GCP IdM, Marketplace and Things Management. The GCP and the Marketplace GEs are tightly integrated into the Smart Spraying Service Framework architecture. IoT GEs are needed in the context of automatic discovery and utilization of location aware sensors and sensor networks.

Scenario 1

User licenses a smart spraying service framework implement and walks through the sign up process to register it.

Global Customer Platform GCP IdM GE: A smart spraying service framework implement aims to use the GCP for IdM and session management operations. The priority is in sign up, sign in and session management as well as to provide the user easy-to-use customer self-care management tools.

Scenario 2

When a user signs up as a smart spraying service framework implement user, the services already registered into the GCP IdM become visible through integrated Globally Registered Services view. One of the core functionalities in the Smart Spraying service framework is to enable automatic data and functionality exchange between the framework registered services. A user finds and licenses a disease pressure service (DPS) from an integrated marketplace. Usually a DPS algorithm needs weather information (either nowcast or forecast) for the proper calculations as well as the information on performed actions on the field both current and the last year. The framework implement registered DPS automatically detects that the user has a GCP registered weather stations and a weather service with a license to use it also in third party services and suggests them as a one of the alternatives in GCP calculation. The information on the farm operations is provided by the farm data storage service.

Global Customer Platform GCP IdM GE: The globally registered services of a user become visible and accessible within the smart spraying service framework. The user's GCP registrations are queried using relevant REST API.

Marketplace GE: The integrated marketplace enables the user to easily find, license and switch the e-agriculturist services needed. The services and the offering relevant to the smart spraying service framework implement are presented in a Market view. The contract and money sharing issues are taken care by the SLA management and the revenue sharing and settlement systems, which are part of the applications and services ecosystem and delivery framework.

Things Management GE: IoT encapsulation in weather stations and weather station network makes it easier for a user and third party services to discover and access the location aware sensor data.

Scenario 3

A user has two weather stations in his/her fields. He/she needs to share the weather station data with minimum efforts to third party services. A user might also want to sell the nowcast data to third parties to cover the expenses.

Things Management GE: Gives a single point of contact to the user. IoT encapsulation in weather stations and weather station network makes it easier for a user and third party services to discover and access the location aware sensor data.

Marketplace GE: A weather station backend service is registered into a marketplace as an offering.

Scenario 4

A spraying contractor receives an order from his/her existing customer farm to take care of fungicide spraying in certain fields. To fit the new task in his/her work schedule and to carry out the work in correct time the contractor licenses a disease alarm service using an embedded marketplace in his mobile implement of the service framework to the customer farm's fields. Due to a trusted relationship the contractor has an access to the farmer's farm data service as well as other relevant services the farmer has registered into the Global Customer Platform. For the best disease pressure calculation outcome the contractor selects or the system suggests the most relevant weather station registered for the farmer's use in the GCP to be used in the calculations. After the set-up the contractor is able to follow the progress of disease status in the customer's fields to fit their treatment optimally to his/her own task schedule.

Global Customer Platform GCP IdM GE: The globally registered services of a user become visible and accessible within the smart spraying service framework. The user's GCP registrations are queried using relevant REST API.

Marketplace GE: The integrated marketplace enables the user to easily find, license and switch the e-agriculturist services needed. The services and the offering relevant to the smart spraying service framework implement are presented in a Market view. The contract and money sharing issues are taken care of the SLA management and the revenue sharing and settlement systems, part of the applications and services ecosystem and delivery framework.

Things Management GE: IoT encapsulation in weather stations and weather station network makes it easier for a user and third party services to discover and access the local aware sensor data.

1.3.3.3 Greenhouse Management and Control Pilot

The Greenhouse Management prototype is a Future Internet compliant framework which takes into account real data (e.g. weather data) from sensors and provides 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 Management prototype has been implemented in order to fulfil a number of innovative concepts. In particular:

- Lower investment cost since the intelligence of the system is located in the cloud.
- Automatic communication of the system with any equipment using SOA.
- Storage of raw data and guaranteeing user-independence from any FMS.
- Service adaptation according to user preferences and end-device capabilities.
- One-stop market place facilitating the end-user in his everyday needs.
- Integration of domain specific services (e.g., advisory services).
- Learning schemes focusing on improving operations through exploitation of accumulated data.

The Greenhouse pilot testbed 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 the internet and specifically to the FMS controller which is deployed in a server with public internet IP. The processed information and the

extracted knowledge are subsequently presented to the farmer via a web based portal, deployed on another server.

1.3.3.4 Smart Spraying Pilot

The Smart Spraying Pilot targeted to investigate and demonstrate the requirements for Future Internet technologies from the point of view of Precision Agriculture and beyond. The Smart Spraying Pilot targeted 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, food safety and environmental impacts. Well controlled precision spraying task with optimal timing and spraying setups is a complex and demanding task for a farmer. Extra challenge is to cope with the suddenly changed situations like change in weather or machine breakdown during the spraying. When contracting spraying, the challenge is also to serve optimally customer farm's business targets and act correctly in sometimes unfamiliar fields.

The scope of the pilot was to tackle the complexity related to precision spraying operation management and diversity of farms with different business goals and resource. The challenge is firstly, to create and provide farm/customer specific assisting services available for fluent task planning and execution, and secondly, to enable the employment of the assisting services in an organized and user friendly way by the farmer or contractor, especially during the mobile work. The aim is that the results are applicable also to all other farming tasks, their management and execution support.

During the project we specified and developed using user-centric approach a Service Framework solution which allows:

- Registering of different farm machinery, devices and sensors to farmer's use via Global Customer Platform
- Providing third party services to provide their applications in a Marketplace,
- Providing farm machinery, devices and sensors as services to possible customers in a Marketplace
- Registering of different third party services to farmers use via Global Customer Platform
- Separation of farm data from applications so that farm data can be used by all application
- The farmer to purchase services in the Marketplace, and register and take them in use via Global Customer Platform

The user-centric concept development followed a sequence of modelling steps which were accomplished in collaboration with a small group of farmers and technology providers. The output of this development was a user-oriented functional description of the Smart Farming Concept, including the Smart Framing Service and the Smart Spraying system levels. The user-centric development work also resulted in a proposal for the user's interfaces, for both on service and spraying system levels.

From a technical point of view, the Service Framework employs SOA architecture, Internet of Things technologies and FI-WARE Global Customer Platform and Marketplace Generic Enablers. Usability is improved by third party service User Interface exchange and embedding which gives impression of operating only one application. The functionalities implemented in the Smart Spraying Pilot are divided into two parts; namely, the general service framework functions and the E-agriculturist functions. The service framework of the Smart Spraying Pilot is hosted on the MTT CropInfra platform.

1.3.3.5 Integration

The Greenhouse Management pilot has been successfully integrated with the Smart Spraying Pilot. Two different cases where considered:

- A farmer in Finland exploits the functionalities of the FMS Controller residing somewhere in the public internet, while at the same time the same functionality would serve a farmer in Greece.
- A service provider established in Finland offers a service that is subsequently deployed by a farmer in Greece.

The key message of the first scenario is that two distinct implementations, residing in the two extremes of Europe exploit the capabilities of the same FMS controller, residing somewhere in the public internet (one of the novelties introduced by the Future Internet). The second scenario comprises an extension of the first and highlights how a third party trusted developer can provide a service to a user though the Open APIs thus demonstrating the added value of the SAF/FIWARE approach. It should be pointed out that everything takes place transparently to the user; therefore the user himself is not aware of all the –inherent- complexity of the message exchanges that take place in the background.

1.3.3.6 User Involvement, Business Models, and Standardization

The developed concepts were validated from the end-user perspective utilizing the V-model developed in WP100. In total, 5 workshops were organized in Finland and Greece, aiming at collecting the end-user feedback. The results were encouraging, as mainly positive feedback was received. Business cases were developed as well, in order to quantify the economic benefit of FI technologies in Smart Farming.

In WP200 a thorough analysis of the applicable standards was performed. The standards such as agroXML, Sensor ML, ISOBUS XML, Observations and Measurements, are found to be applicable in smart farming applications and were utilized in the pilots. However, several deficits in these standards are detected and improvements for FI-boosted smart farming applications are proposed.

1.3.4 Smart Agri-Food Logistics

1.3.4.1 Aims and background

The food and agribusiness is an important sector in European logistics with a share in the EU road transport of about 20%. The sector faces specific challenges that heavily impact the required information systems. In particular, there is a high uncertainty regarding fresh product quality as well as available volumes due to variations in the natural production process. As a consequence, the prediction and planning concept and accompanying logistics system needs to be very flexible, enabling last minutes changes and real-locations, but also provide a robust planning.

Due to these characteristics the current state of the art of ICT in the agri-food logistics is characterized by large amounts of available data, but there is a poor level of integration and the support for intelligent use of these data is insufficient. The complexity of the current solutions is too high and jeopardizes the development and operation of affordable solutions. As a result, there is a mismatch between the state of information technology in agri-food and the high and increasing need for intelligent solutions that combine interoperability with flexibility and that are both sector-specific and suitable for SMEs. Smart Agri-Food Logistics aims to overcome this mismatch by utilizing the intended development of Future Internet (FI) technologies. The remainder of this document summarizes the main results of this WP:

- a specification for experimentation on smart-logistics in agri-food supply chains;
- a definition of user requirements;
- design of a Future Internet based architecture for Smart Agri-Food Logistics;
- two pilots that analysed and demonstrated the possibilities of future internet technologies;
- a definition of the standardisation needs for Smart Agri-Food Logistics.

1.3.4.2 Specification for experimentation

The Work Package started with a specification for experimentation on smart-logistics in agri-food supply chains from a user's point of view. Generally spoken, Smart Agri-Logistics starts when the primary produce is shipped (farm gate) and ends when the agri-food products are received by the retailer (retail gate). At this, the focus is on agri-food specific challenges, in particular:

- High supply uncertainty due to natural production: unpredictable variations in quality and quantity of supply, which demands for flexibility in logistic processes, planning, early warning and pro-active control mechanisms;
- High perishability of fresh food products, which demand for temperature-conditioned transportation and storage (cold chains) and very short order-to-delivery lead-times;
- Seasonable growing, which demands for global sourcing to ensure year-round availability;
- High demands on food safety, quality and (environmental) legislation, which demands for the ability to trace production information of products in transit;
- High flow complexities, due to a combination of continuous and discrete product flows, di-verging and converging processes and by-products; this demands for advanced tracking and tracing and logistic planning capabilities;
- Important role of import/export, including additional phytosanitary and veterinary inspections;
- Complex network structure where small and medium enterprises trade with huge multinationals in the input and retail sector.

These characteristics impose specific requirements on the future internet logistics in the agri-food domain. In particular, three basic features are addressed (see Figure):

1. *Real-time virtualization*: decoupling of the physical flows of products and logistics resources (objects), and the information flows for planning, control and coordination/orchestration;
2. *Logistics connectivity*: timely and error-free exchange of the information about (lots of) products and logistic resources with other organizations and additional services in order to enable quick response;
3. *Logistics intelligence*: intelligent analysis and reporting of the exchanged data to enable early warning and advanced forecasting.

Next, the specification for experimentation has been further elaborated based on the analysis of seven specific application scenarios in the agri-food industry.

Based on the identified application scenario, two pilots are set up to analyse and demonstrate the possibilities of future internet technologies into more detail. These pilots are conducted in two specific sectors, i.e. the Fresh Fruit and Vegetables (FFV) industry and the Plants and Flowers (PF) industry. They focus on complementary issues that i) on the one hand are considered to be a major business challenge in the sector and that ii) on the other hand are challenging from an information technology perspective.

1.3.4.3 Definition of user requirements

The application scenarios are used to define an initial set of functional and non-functional requirements for smart agri-food logistics. These requirements are later updated based on the stakeholder analysis in both pilots.

In total 55 functional requirements and 11 non-functional requirements are defined. The functional requirements are grouped into 14 functional blocks. Some 30% of the requirements are addressing blocks related to data analysis, collection and management. About 20% of the defined requirement are addressing the configuration and communication functionalities and some 15% are addressing service based architecture and loose coupling principles. Also requirements related to e.g. the Internet of Things (IoT), interoperability and immediate user notification are identified. Examples of the defined requirements include: access of advanced sensor data on-line via the internet, communication of quality alerts about products in transit, calculating the impact and consequences of incidents, easy configuration of a personalised supply chain cockpit profiles, search capabilities to find companies certified by the relevant standards and authentication of objects/actors for specific tasks.

1.3.4.4 Future Internet based architecture for Smart Agri-Food Logistics

The Smart Agri-Food Logistics Architecture builds on the Future Internet Core Platform that is being developed by the FI-PPP programme. The basic underlying approach is that the Core Platform will offer reusable and commonly shared capabilities and functionalities (Generic Enablers, GEs) which can be flexibly customized, used and combined for many different Usage Areas. Products implementing these GEs can be picked and plugged together with complementary products (Domain Specific Enablers, DSEs) in order to build domain-specific instances. Smart Agri-Food Logistics is one of those instances.

The overall architecture of Smart Agri-Food Logistics serves as a high-level common base for the detailed architectures of both pilots to achieve synergy effects. It is based on hybrid central and local approaches concerning:

1. *Location of data storage*: besides cloud storage, data are also stored on intermediary platforms or on the physical objects themselves, among others to ensure availability in case of communication breaks;
2. *Location of application services and/or intelligence*: can located in the cloud as well locally on local computers, mobile devices or physical object;
3. *Routing* of information: the architecture allows both centralized routing approaches and peer-to-peer (P2P) in which all clients are directly connected to each other.

The overall Smart Agri-Food architecture identifies the following basic modules Exception & Event Processing, Quality Monitoring & Rule-Based Expert System, External Connectivity, and a Web service Layer. These modules will build on a combination of GEs and DSEs. The following GEs are addressed: Mediator and Mashup GEs, Complex Event Processing GE, Publish / Subscribe Broker GE, Location GE, Identity Management GE and the GEs of the Internet of Things chapter. The addressed DSEs are twofold. First, the architecture utilises the DSEs of the Smart Agri-Food project that are common to the agri-food chain domains, namely Certification service, Product Information Service, Business Relations Service and Identification Service. Second, within the pilots specific DSEs have been developed.

1.3.4.5 Pilot Fresh Fruit & Vegetables (FFV) Supply Chain

The FFV pilot concentrates on the topics transparency and information exchange between agri-food enterprises which includes the management, tracking and tracing of the product and returnable packaging in order to enable the provision of product quality information from actors to

actors in a supply network It is based on a dual approach concentrating on the "management of product & information carrier" and the "provision of product quality information". Both use cases are elaborated with European-wide acting business partners from the sector. Domain specific enablers (DSEs) and generic enablers (GEs) are used in the pilot for prototype development. The main DSEs are a web service layer, to feed the user Interface (UI) and to communicate with the user; an external connectivity module, to connect with external system; a data management service, which provides an abstraction layer to handle different kind of data; and an exception propagation module, improving the reaction time and quality on possible harmful food problems. The GEs integrated in the application are the CEP (Complex Event Processing) and the Identity Management. Other GEs are envisaged to be used during Phase II.

1.3.4.6 Pilot Plants & Flowers (PF) Supply Chain

The PF pilot analyses and demonstrates the possibilities of Future Internet technologies for dynamic Quality Controlled Logistics in floricultural supply chains. In this approach, logistic processes throughout the supply chain are continuously monitored, planned and optimised based on real-time information of the relevant quality parameters (such as temperature, humidity, light, water). More specifically, three scenarios are defined and modelled:

- *Quality Monitoring*: real-time access to quality information including ambient conditions (e.g. temperature), early warning in case of deviations and shelve life prediction;
- *Quality Controlled Distribution*: flexible (re)planning and (re)scheduling of distribution based on real-time quality information;
- *Quality Controlled Vendor Managed Inventory (VMI)*: intelligent replenishment of retail stores by proactively balancing retailer demand and grower supply, concerning the availability and quality of flowers and plants.

The PF pilot has developed several domain specific enablers (DSEs) to realise a prototype for the Quality Monitoring scenario. The main DSEs are an Event Platform, in which the scanning events are stored and processed; an Expert System that predicts the quality decay of products related to the events in the platform; and a Cloud Dashboard, which is the User Interface and the related web services that integrates the event platform and the expert system. The pilot has tested the integration of the Complex Event Processing (CEP) generic enabler (GE) in the prototype. Other GEs are envisaged to be used during Phase II.

1.3.4.7 Standardisation Needs for Smart Agri-Food Logistics

The Work Package concluded with the analysis of standardisation needs for Smart Agri-Food Logistics. The standards classified into legal standards, organizational standards, semantic standards (i.e. document definition, vocabulary and identification), syntactic standards and technical standards. The analysis showed that especially semantic standards at the document level that apply across the full range of business functions in agri-food logistics are currently lacking. In particular, the alignment between specific standards for different business functions is needed for meaningful exchange of information. On levels of vocabulary, identification and syntax existing standards seems to be sufficient, although still specific challenges are addressed (e.g. concerning quality information standards). On the higher levels (organizational and legal) hardly any standards are found that can be applied.

1.3.4.8 Conclusions and discussion

The main contribution is that the Smart Agri-Logistics approach utilizes a generic and standardized internet platform to instantiate specific solutions for logistics information systems in the agri-food sector. As a result, it can overcome current bottlenecks and enables the development and operation of affordable solutions that independent from geographic locations and independ-

ent from specific implementation choices. This potentially will boost the application of intelligent information systems for logistics management in agri-food supply chains.

The main added value of such systems for the end users in the agri-food business is the improvement of the efficiency and responsiveness by the real-time management of logistic flows from farm to fork. More specific benefits include:

- Lead-time reduction;
- Better service levels;
- Less waste, better decay management;
- Lower inventory levels;
- Better utilization of logistics capacity;
- Reduction of GHG emissions and carbon footprint, e.g. decrease of transport kilometres or empty vehicles;
- Better competitive position of European agri-food industry;
- Surgical response in case of food alert, for quick and precise recall/withdrawal of products;
- Better security of food products, avoiding fake products, illicit traffic or threats using food as vector;
- Enhanced regulation enforcement control of non-European imported products.

1.3.5 Smart Food Awareness

1.3.5.1 Aims and background

Consumers' trust in food, food production, the origin of food, and the actors involved is a core requirement for the functioning of European food markets and the competitiveness of industry involved.

The baseline for the desired infrastructure is the ability to clearly identify products and the link between products and the transparency information. Thus, the aim of Smart Food Awareness scenarios is contributing to the following challenges:

- To create a highway for agri-food information from farm to fork and for agri-food related consumer demands from fork to farm.
- To design appropriate transparency systems, thanks to cooperation within the agri-food sector and a suitable IT infrastructure on which information can be collected, processed and made visible to all stakeholders.
- To increase food transparency in order to increase consumers' trust on food.
- To understand transparency as the product information that matches consumers' interests, is guaranteed to be truthful and is communicated accordingly in a rigorous and clear way.
- To communicate the quality status of a product.
- To reach out to the consumer in case of a recall.
- To retrieve information not only from direct supply chain partners but from other supply chain actors as well.

1.3.5.2 Integration with FI generic enablers

WP400 system development approach was based on several iterative cycles, where design, development and evaluation with real users were done. In the first steps of the design of the system no GEs were still available, hence, the integration of GEs was only theoretically explored by identifying which functional and technical components, that the system needed, could be provided by GEs based on their description in the HLD. The outcome of this study can be found in D400.2.

With the publication of FI-WARE's testbed, and taking into account the availability and completeness of the GEs and all the determining factors that involved their integration within the TIC solution, WP400 employs three specific GEs. A comprehensive description of these GE, and their implementation within the pilots can be found in SmartAgrifood Deliverable D500.2.

- IaaS Data Center Resource Management GE (DCRM)[5]. It provides the programming and also GUI framework to deploy and manage a Cloud infrastructure, offering provisioning and life-cycle management of virtualized resources associated with virtual machines. It is integrated in the TIC system in order to deploy the (server and mobile) services in a virtual cloud environment. Detailed description of these services can be found in Section 3.1.
- Identity Management GCP GE[6]. Allows the management of the user's registration and login lifecycle, based on the usage of the OpenID standard. Within the TIC system it is employed to manage users' information, preferences and the applied policies.
- Data Handling PPL GE[7]. Used to externalize the management of our user's data to a reliable entity using worldwide established security standards (XACLM-PPL). This enabler has been used, together with the GCP GE, in order to manage data from users. The detailed specification can be found in D500.2

Generic Enabler	Pilot	Status
IaaS Data Center Resource Management GE	TIC	Integrated and functional
Identity Management GCP GE	TIC	Integrated and functional
Data Handling PPL GE	TIC	Integrated and functional
Connected Devices Interface GE	TIC	Planned for Phase II
Publish/Subscribe Context Broker GE	TTAM	Planned for Phase II
Application Mashup - Wirecloud GE	TTAM	Planned for Phase II

[5] http://catalogue.fi-ware.eu/enablers/iaas-data-center-resource-management-ge-fi-ware-implementation
[6] http://catalogue.fi-ware.eu/enablers/identity-management-gcp
[7] http://catalogue.fi-ware.eu/enablers/data-handling-ppl

1.3.5.3 TTAM pilot

The scope of the pilot is the realisation of a transparency system for Tracking, Tracing and consumer Awareness of Meat (TTAM) in high-throughput meat supply chains. Using batchwise data for such dynamic processes on each stage of the processing means a very challenging operation for all participants in the meat chain.

In the first step of the TTAM conceptual prototype the work mainly focused on beef. That excluded sausage, minced and diced meat, as well as pork, chicken and others. In addition the general conditions were restricted to packaged beef emphasising on a group of five different types of information which are: general information, origin, quality, production and recipes. The gathering of data for the traceability and transparency information from all partners along the supply chain is executed by a centralized database which is maintained by a third party. Instead of building a completely new system, the TTAM pilot builds on an existing application called fTRACE.

During the first year of the SAF project, the TTAM team investigated the major challenges and opportunities in European meat supply chains in relation to traceability, awareness and EU policies. In particular, the current state of art of traceability in meat supply chains, EU regulation 1169/2011, the Digital Agenda of the EU (DAE), the results of the FI-WARE project and expectations about the Future Internet were discussed. The preliminary conclusions of these investigations pointed to several requirements that will impose important challenges for future internet support of certified traceability in meat supply chains as well as realization of bi-directional communication in meat supply chains. A pilot study on Tracking, Tracing and Awareness in Meat (TTAM) was defined to make a start in concretizing these challenges.

At the end of the second year, the new design of a transparency system based on the existing and proven technology of the fTRACE transparency system a mobile app had to demonstrate the novel approach of TTAM in querying, processing and presenting data from the meat chain (see Figure 5 below). In a physical test with 16 volunteers it was checked under realistic circumstances whether consumers like to scan their food products at a retail shop to get detailed information about the food item they are actually buying. Also the need and the applicability of such a modern transparency system in the meat sector had to be verified and discussed. The conclusion of the results obtained by the volunteers is positive. But not only to the single aspects of the survey have to be evaluated successful; the whole workshop resulted in a considerable achievement. Looking at the very few open issues stated by the volunteers, they are at the same time encouraging for the project team too. The recommendations and estimates made by the volunteers are valuable for the progress of pilots in the future.

In the first stage of testing, none of the generic enablers were found suitable for the TTAM. However, the pilot uses the following domain specific enablers:

- 2D barcode reader and the default browser of a device together with an inbuilt camera to send a query to the server
- Relational data base to store static and dynamic data of the products
- Server query cache to cache a large volume of query requests to answer quickly identical queries instead of making the same database queries again and again
- B2C query module to generate HTML5 documents from consumers to be sent to the mobile device
- B2B query module to generate an XML document from business partners to be sent to the web server of the partner

In the final release of the fTRACE evolution the core functionalities will be an EPCIS (based on global standards and perhaps further developed as a GE). It will be implemented into a Transpar-

ency System and can be used in many different domains for example in logistics, farming and warehouse management.

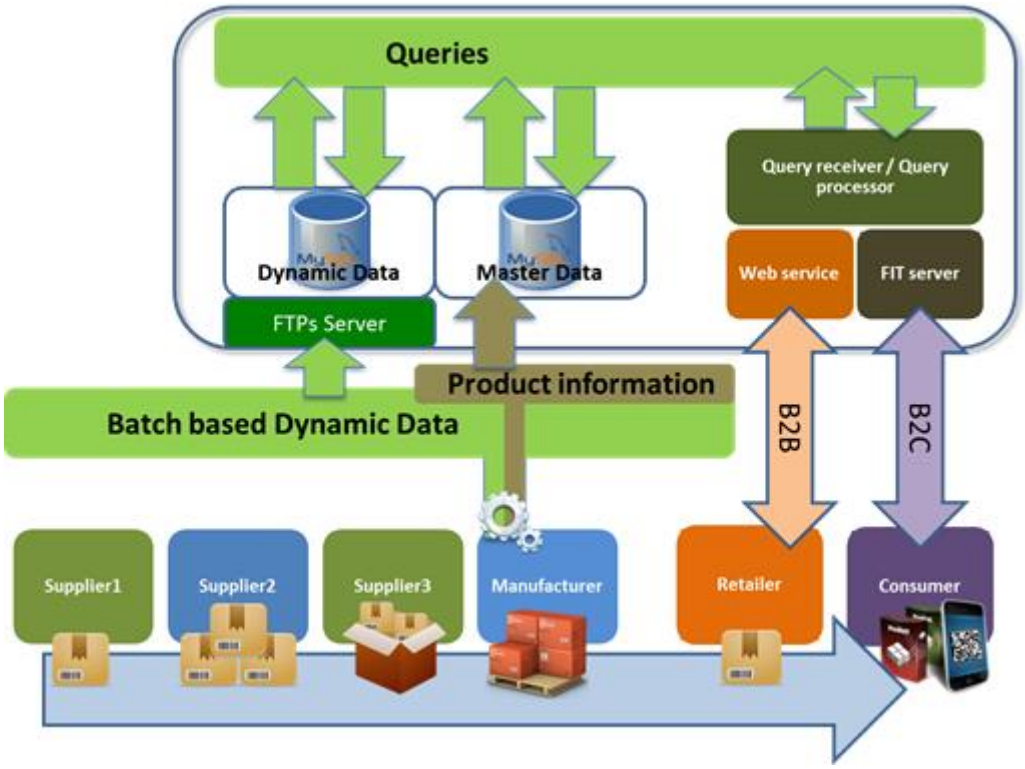


Figure 5: The architecture of fTRACE of the TTAM pilot.

The design of the new TTAM conceptual prototype provides trustworthy and certified information and hereby addresses the needs of recent regulatory requirements by the EU (e.g. EU Reg. No. 1169/2011) and the increasing consumers' trust in meat. Moreover the TTAM pilot covers the whole meat supply chain from farm to retailer/ customer. Particularly, the pilot aims to demonstrate to all parties (B2B; B2C and even B2G) how to get easy access for acceptable costs to more information on the provenance of meat (place of breeding; feeding, slaughtering, deboning, etc.) and other attributes, such as recipes to improve consumers' awareness.

Actually, the TTAM pilot is based on existing and established technology in the meat supply chain in Germany. Finally, the whole system will be extended to the use of GS1 Standards, certified data and FI's generic enablers. In the end, the performance of the pilot design of TTAM led to the idea to propose it for larger experimentation in a trial in the follow up project called FIspace.

1.3.5.4 TIC pilot

The TIC pilot targets all the mechanisms (e.g. applications, infrastructure, data and communication models) that enable consumers to request information of a specific product using their Smartphone before/during and after their shopping process; so they only get the right product attributes of their interest according to their consumer shopping profile. This requires an infrastructure for managing consumer profile data (taking into account security and privacy issues) and for managing product attributes.

The data provision to the consumer is basically carried out by two ways:

- Providing tailored product information from selected products costumers will find in the supermarket.
- Showing hidden information from logos and signs which can be found in some products, usually processed products

Consumers were able to test two iterations of the TIC Web app. The first test allowed detecting some problems and improvements that were corrected for the second test. New functionalities were included to be tested in the 3rd workshop. Figure 6 and Figure 7 compares the technical evaluation of the pilot for each functionality.

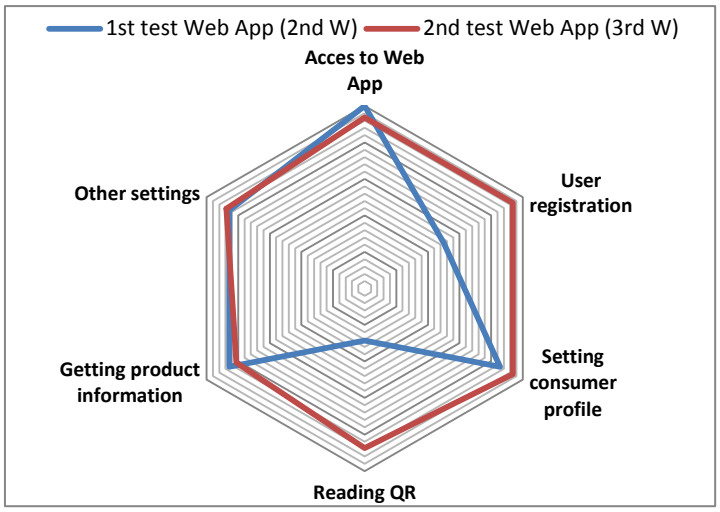


Figure 6: Comparison between first and second technical evaluation of the web app.

A global evaluation of the TIC Web app regarding conceptual value for consumers was done. Figure 6 shows the results of the two tests with consumers.

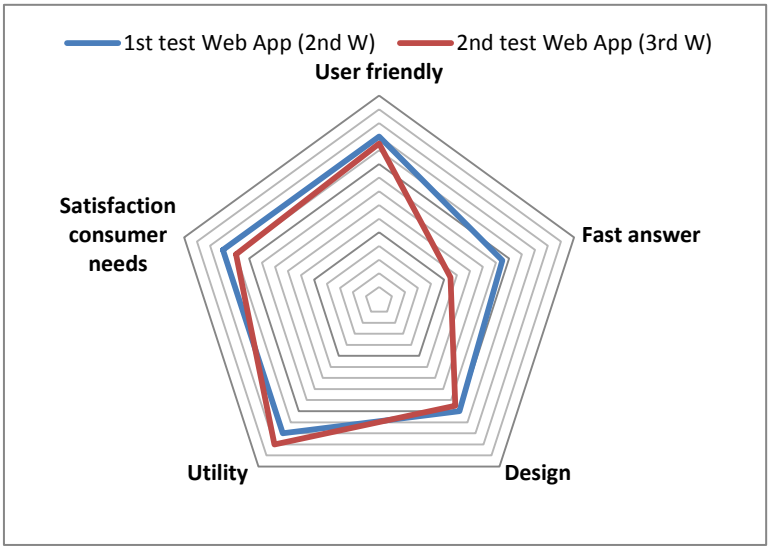


Figure 7: Comparison between first and second global evaluation of the web app.

As a conclusion, we can say that consumers participating in the process for pilot evaluation were very interested and motivated in the TIC pilot and are willing to use the TIC Web app

1.3.5.5 Conclusions and discussion

The extracted conclusions from the evaluation of the TIC pilot can be seen from different perspectives, depending on the food chain players:

- Consumers: along the three workshops in the supermarket the same group of people was involved in it, and these are their main conclusions:
  - There is a lack of information related to products for the costumer in the supermarket. And if the information is available it is difficult to understand it
  - Not all the currently provided information is useful or interesting for the consumer

  - The food awareness activity is useful and very interesting, and can help end-user to gather information that is interesting for them
  - But they disagree with raising the product price or paying any money to gather the tailored information
  - They are willing to start using a real market application with the same characteristics that the ones offered by the proofs of concept
  - They are receptive use the new technologies while shopping, and they prefer them to the classical supermarket communications, as SMS or old-fashion mailing.
- Food chain stakeholders:
  - There are many problems in the meat chain that hinder correct tracing and tracking of meat products nowadays
  - The project addresses those problems in the right way, and from a technical point of view it is possible to solve them
  - The reliability of the tracking & tracing information, which can only evolve from an intense usage of such systems, therefore cannot be guaranteed by the project itself
  - So it is necessary to better involve the stakeholders within the meat chain and a change of mind in the way these companies share their data is needed; and also from the side of the customers public stated requirements may support a development of increased transparency in food chains

We extract the following conclusions after finalizing the tasks covered by the TIC pilot:

- A significant increment in the benefits for the retailers and supermarkets would be achieved. But not only these companies will enhance their working methodologies, and therefore their revenues, but also farmers, producers and food-processors that will be able to produce better products based on the feedback got from different sources, and the logistics companies, improving the transport and maintenance of the products in the food chain. These actors also can improve their businesses using all the gathered information. Not only looking at higher turnover by increased sales and distributions, at the same time each participant in the value chain would be able to realize benefits on ameliorating his purchases and procurements.
- The modifications that would be necessary to be done in the structure of the food chain would imply an environmental improvement in the transport of the food products. It will provide an improvement of the consumer awareness about any product information and how it can affect the environment. Therefore, a consumer would be more sensitized about environmental impacts and more aware of how to act in their consumption habits in order to reduce them.
- From a technical point of view, the improvements to be done in the applications and their deployment into the real market would be easy to be performed. Mainly due to the cloud oriented definition of the architecture of the backend of the applications, and the service oriented definition of their functionalities, what boost the addition or modification of new functionalities in the software solutions to be deployed. Also, the use of new technologies, as HTML5, enables a more easy and general access for a consumer using any kind of gadget with access to the internet, as computers, tablets, smartphones, etc.

All these conclusions envisage an optimistic future for the Food Awareness products in the next years, helping to improve the buying of more health and less environmental-injurious products by the consumer.

1.3.6 Smart Agri-Food Conceptual Prototypes and GE Validation

On the one hand, the WP500 is in charge of the communication between the Core Platform (CP) and the SmartAgriFood. This involves the request/feedback of the requirements of the stakeholders and the handling of the Generic Enablers coming from the Core Platform. To manage the high quantity of requirements and their evolution, two actions needed to be done, handled by TNO, HWDU, ASI and ATOS:

1. A first requirement management plan, to define the characteristics of each functional requirement and how to collect them in common document. As explained in Figure 8, where a so-called "Horizontal group" (composed by both the business and technical partners of the pilots) are in charge of the management of the requirements and in interaction with the other projects that compose the FI-PPP program.

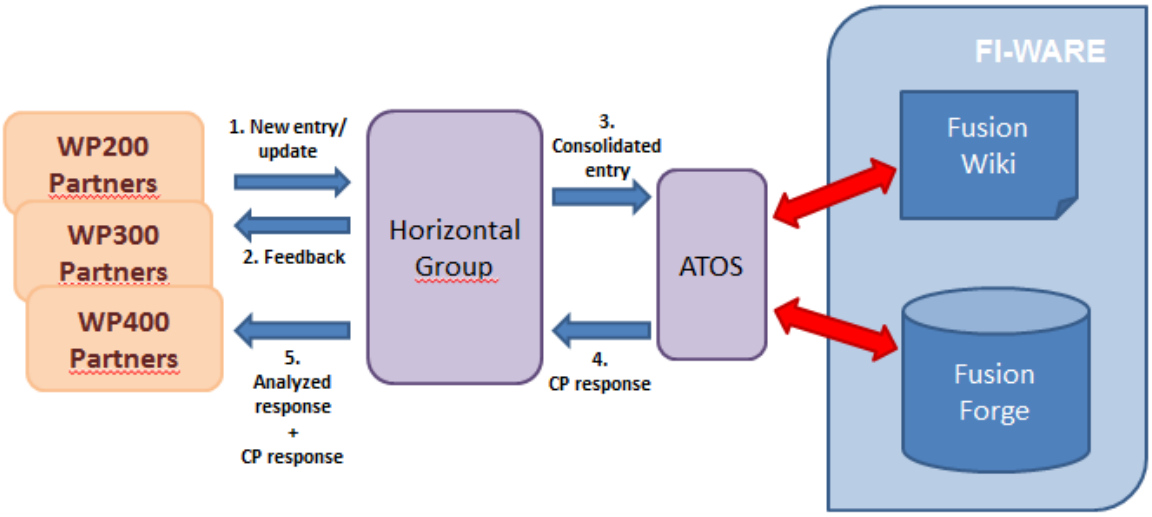


Figure 8: Management of the bidirectional requirement exchange between FI-WARE and the SmartAgriFood partners.

2. Several documents (templates) to store and harmonize the characteristics of the defined requirements, describing several characteristics of each requirement (Title, Description, Partner in charge, Priority, etc.) as described in the Figure 9.

ID	Partner	Title What is the requirement?	Description & Rationale What does it mean, why & when is it needed? You can define here if it requires more clarification or example.	Name Of Generic Enabler
284	CBHU, NKUA	Collecting and processing multimedia information for identifying significant events	The collection and processing of multimedia data (photos, videos) will be used in order to analyze specific patterns and identify possible problems (for example pattern recognition or color variation on leaves or fruits/vegetables can identify an infection or disease, the data from a thermal camera can inform a farmer if an animal is seek).	Multimedia Analysis GE (Data)
288	NKUA	Self-configuration mechanisms should take place	"Zero - configuration" techniques are proposed for people who are not familiar to ICT; in this way, every stakehold-	Resource Management GE (IoT)

ID	Partner	Title What is the requirement?	Description & Rationale What does it mean, why & when is it needed? You can define here if it requires more clarification or example.	Name Of Generic Enabler
			er can use every component of of the involved system efortessly.	
278	NKUA	Mechanisms should be developed for managing and controlling all up – coming services and applications	The cooperation of different services must be managed by a proper mechanism which will ensure the smooth operation of the overall system.	Service Composition GE (GEs for Composition and Mashup), Service Orchestration GE

Figure 9: Example of requirements gathering document.

On the other hand, the WP500 is in charge of the development of prototypes related to different scenarios (Farming, Logistics, Food Awareness), using different Generic Enablers provided by the Core Platform, having in mind the relations between them. Six Proofs of Concept (PoC) have been identified for implementation, covering the three subdomains composing the agri-food chain:

1. *Greenhouse management*: this prototype is a Future Internet compliant framework which takes into account real data (e.g. weather data) from sensors and provides 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.

2. *Smart Spraying*: targeted to investigate and demonstrate the requirements for Future Internet technologies from the point of view of Precision Agriculture and beyond. The scope of the pilot was to tackle the complexity related to precision spraying operation management and diversity of farms with different business goals and resource.

3. *Fresh Fruit and Vegetables (FFV)*: concentrates on the topics transparency and information exchange between agri-food enterprises which includes the management, tracking and tracing of the product and returnable packaging in order to enable the provision of product quality information from actors to actors in a supply network.

4. *Plants and Flowers (PF)*: it has analysed and demonstrated the possibilities of Future Internet technologies for dynamic Quality Controlled Logistics in floricultural supply chains. The purpose of this pilot is to improve flower quality for the consumer, reduce waste, improve transport capacity utilization and reduce lead-times in the supply chain.

5. *Tailored Information for Consumers (TIC)*: targets all the mechanisms that enable consumers to request information of a specific product using their Smartphone before/during and after their shopping process, so they only get the right product attributes of their interest according to their consumer shopping profile.

6. *Tracking, Tracing and consumer Awareness of Meat (TTAM)*: As end-consumers use Smartphones to scan product barcodes and get instantly detailed information while shop-

ping, the scope here is a transparency system for tracking and tracing in high-throughput meat supply chains using batch wise data on each stage of the processing.

These PoC are both user-and-technology-driven, merging the business and technical requirements needed in each subdomain. Finally nine Generic Enablers have been integrated into the applications, from most of the FI-WARE chapters, making the link with the Core Platform:

- Application Mash-up (DT)
- Mediator (Telecom Italia)
- Service Description Repository (SAP)
- IaaS DCRM (IBM)
- Publish / Subscribe Broker (Telecom Italia)
- Cloud Edge (Technicolor)
- Marketplace (SAP)
- Complex Event Processing (IBM)
- Identity Management (DT)
- Data handling (SAP)

A pilot website has been created just to share all the information related to the developments: http://www.smartagrifood.eu/pilots

Also an evaluation of GEs was sent to FI-WARE, following its request, in two documents :

- Testbed Questionnaire: spread sheet where an evaluation of the analysed and integrated GEs is available
- Validation process: document where a more elaborated evaluation is done, related to several explained scenarios

Table 1 summarizes the GE evaluation.

Table 1: Feasibility of GEs in the SmartAgriFood pilots, by FI-WARE chapter.

FI-WARE Chapter	Generic Enabler	Coverage	Pilot name
Cloud Hosting	Data Center Resource Management	*****	Greenhouse
		******	TIC
	Object Storage	**	Greenhouse
Data/Context Management	Complex Event Processing (CEP)	*****	Flowers and Plants
		****	FFV
	Publish/Subscribe SAMSON Broker	******	Greenhouse
Applications/Services Ecosystem and Delivery Framework	Repository	******	Greenhouse
	Marketplace	****	Spraying
	Service Composition & Application Mashup	****	Greenhouse
	Mediator	***	Greenhouse
IoT	Things Management	***	Spraying
		***	Greenhouse
Security	GCP IdM	******	Spraying

FI-WARE Chapter	Generic Enabler	Coverage	Pilot name
		******	FFV
		****	TIC
	Data Handling	****	TIC
I2ND	Cloud Edge	***	Greenhouse

Finally, a common architecture for a "super scenario" or "end-to-end scenario" had been created. A full description of this architecture has been described in the D500.3 and D500.4, identifying four generic services, namely Certification service, Product Information Service, Business Relations Service and Identification Service. These services are expected to communicate with the three SAF platforms and help them realize the end-to-end vision, as described in Figure 10.

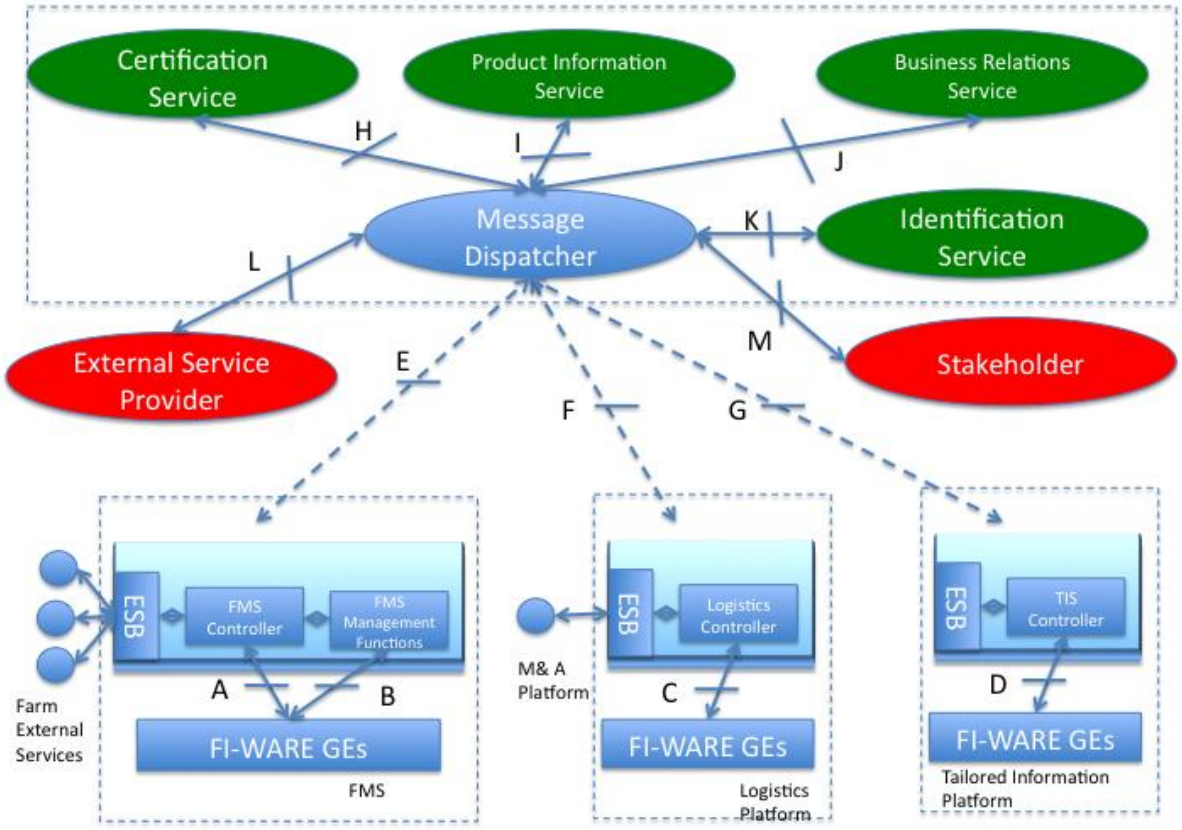


Figure 10: The overall architectural picture of SAF.

1.3.7 Large Scale Experimentation & Standardisation

The plan of the SmartAgriFood work package WP600 was to make a synthesis of the results from other activities within the SmartAgriFood project, ultimately resulting in a coherent plan that forms the basis for large-scale experimentation. First, a general specification of a required experimentation infrastructure was derived from the sub-use cases within WP200-400 (task 610). Second, the standardization needs for each sub use case were derived and analysed including standardization organisations that are involved (task 240/340/440 and 620). Third, the community that is currently involved through the pilots in the sub-use cases, partners in the consortium

and their network was described (task 630). Based on this network, a plan was made how this can be consolidated and extended in the next phase. All results were put together in an overall implementation plan (D600.4) 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).

Within task 610, different experimentation infrastructures in the sub use cases have been analysed according to a conceptual framework based upon the living lab approach. Based on the framework, templates were developed to collect information from pilots in each sub use case. Key features of existing experimentation infrastructure have been described in detail in D600.1. The inventory of the infrastructure was analysed to identify the challenges and requirements for large-scale experimentation. From these results, a specification of infrastructures for large-scale experimentation has been developed. The organisational infrastructure should support novel business models in the living lab setting which enables B2B collaboration among stakeholders. The technical infrastructure was specified according to FI-WARE outcomes. The key elements in the technical infrastructure are cloud services and an European backbone for traceability.

Complete results of standardisation needs analysis and activities towards standardisation are documented in D600.2 (Plan for standardisation for large scale experimentation). 34 domain specific standards and the GS1 standards family have been analysed with regard to their coverage and described according to a template worked out in the project. The focus has been set on standards for data, data exchange, identification schemes and information. Both public bodies and private associations are involved in the process of standardising formats that are required for the exchange of data. Some organisations have a rather broad scope (e.g. ISO, W3C), and there are a number of more specialised standardisation bodies focusing on agriculture, food, logistics or on topics that are of special relevance within these domains (GS1, UN/CEFACT).

An important aspect for standardisation and for guaranteeing sustainability of project results is interaction and cooperation with other stakeholders building similar systems, with future users of the technology and with standardisation initiatives, within the project but also external to the project. A number of cross-project events concerning standardisation has therefore been organized including a workshop in Munich in fall 2011 and one in summer 2012 in Darmstadt. Participation was broad involving also representatives of other initiatives and projects. Project members have also been actively participating in meetings of relevant standardisation body groups like e. g. PG 9, FMIS of the Agricultural Electronics Foundation (AEF) or project clusters concerned with standardisation like the Internet-of-Things European Research Cluster (IERC).

For each pilot, current and potential future usage of domain-specific standards has been analysed. This work was done in close cooperation with T240, T340 and T440. Existing domain-specific standards have been used wherever possible. Useful standards identified primarily in WP300 and WP400 include a number of GS1 standards (EPCIS, GPC, GLN, GTIN) which is to be expected as they are the most widely used standards in commerce. In WP200, the ISOBUS for agricultural machinery (ISO 11783), OGC geospatial standards and agroXML play a certain role as well. A number of others have been identified as relevant or usable, but have not been used in the current pilots (including e. g. AgroVoc, LanguaL, Edibulb).

Overlaps between standards exist e. g. for location data (geospatial coordinates) or for basic person/organization data like addresses etc.

Apart from that, the following gaps were found:

- Type of employee
- Interconnection between machines or devices like protocol capabilities
- Multimedia content such as images or videos

- Link to information concerning the food-chain and traceability
- Information on wind direction and air pressure, which are important parts of weather data

No standard is currently available for the communication between the Service Bus and the FMS controller (see D200.3, Table 9.1) and for the communication between the FMS and the GEs. In the communication within the GEs, the main issue are the missing semantics for the description of domain specific business services, e.g. spraying contracts.

The Smart Food Awareness Use Case revealed a large gap in the standardisation which exists in the retailer-consumer interaction, although the TTAM pilot makes use of the GS1 EPCIS technology.

A detailed description of product data which are relevant for consumer awareness has been developed in D400.3 and this has the potential to be formalised into an appropriate standard or ontology. Each of the attributes within this data model has to be analysed in detail and a standard vocabulary has to be worked out for a number of them. No standard is available for this type of product description.

The same gap in standardisation (no standard for retailer-consumer interaction) has also been found in the end-to-end Scenario. However, the recommendation is to avoid to create new standards but to expand and to complement the existing GS1 standards with other standards and vocabularies. Further details concerning the end-to-end Scenario can be found in D100.4.

Six recommendations for corrective measures have been made, that are described in more detail in D600.2:

- Encourage regulators to impose data standards for the whole agri-food sector from farm to fork.
- Base a core supply chain management infrastructure layer providing identification and event querying mechanisms around GS1 and complement it in a modular way with other standards providing new functionalities and data content.
- Provide a generic mapping layer based on the semantic technology stack that facilitates inter-standards interoperability and standards extensibility.
- Ensure active participation in relevant standardisation bodies and working groups.
- Setup communication facilitators between information technology experts and domain experts.
- Ensure orthogonality in specifications by staying up-to-date with regard to standards developed elsewhere.

Finally, D600.2 provides an action plan for standardisation activities which have to be performed during Phase 2 of the Future Internet Public Private Partnership. The work for this task involved mainly the partners TNO, GS 1, KTBL, and ASTON.

The key part of the implementation plan for large-scale experimentation (D600.4) is the development of an integrative Future Internet-based platform that will facilitate a) seamless cross-organizational B2B collaboration, b) unprecedented transparency, visibility and control of processes, c) rapid, easy, low cost development and deployment of customized solutions and d) agile formation of business networks and ecosystems.

The plan is aiming at establishing working experimentation infrastructures across Europe in phase 2 where pilot applications for selected real-world business scenarios from the Agri-Food and the Transport & Logistics sectors are developed and tested. In total, work in phase 2 aims at establishing eight use case trials, organized along 3 themes a) Farming in the Cloud, b) Intelligent Perishable Goods Logistics and c) Smart Distribution and Consumption. The conceptual prototypes that were developed in Phase 1 will be implemented within the platform environment

using FI-WARE Generic Enablers and domain-specific enablers. 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 Phase 3. The trials will involve the communities that were built up in Phase 1 for development and testing. These communities will be further extended through open collaboration and exploitation in order to prepare for large-scale expansion in phase 3.

The plan was assessed for its feasibility from a technological and organizational perspective. Technologically, there is a large dependency on the development of the FI-Ware generic enablers (GEs). Close interaction between the use case projects and FI-Ware is considered to be crucial for that. From the preliminary design of the B2B collaboration platform, it can be concluded that the right GEs will be available for implementation. For development of the domain-specific enablers (DSEs), we can rely on large, experienced software developing companies that are involved in phase 2. The exploitation plans from the partners in Phase 1 and the community that was established around the pilots indicate that the plan is also feasible from an organizational perspective.

We conclude that a good, solid overall implementation plan taking into account all aspects of community building, standardisation and infrastructure for large-scale experimentation was developed that fully exploits the results from Phase 1 of FI-PPP. The continuity and planned extension of the developed prototypes and supporting communities provide a basis for success in Phase 2 and beyond.

1.3.8 The FI-PPP programme – Interaction towards phase 2 and 3

The SmartAgriFood Use Case project was defined to identify the special needs of the Agricultural sector within the Future Internet and to examine how FI-WARE could cover these requirements with the Generic Enablers. Especially the Work Packages 200, 300 and 400, respectively addressing smart farming, agri-logistics and food awareness, identified their own needs and transmitted them to the Core Platform. This collaboration was continuously established and after setting up the appropriate communication channels the SmartAgriFood project was carefully validating the usage of the different Generic Enablers (see also section 1.3.6 and SAF Deliverable D500.6).

At the same time SmartAgriFood was collaborating with the other FI PPP use case projects on an individual level as well as in the scope of the different boards at programme level. However, the most intense collaboration was established with the team of the FInest project. Subsequently, both projects elaborated specific plans to combine their work within the second phase of the FI-PPP programme and finally in October 2012, a joint proposal for the FIspace project was submitted for Phase 2 of the FI-PPP programme as a merger of the phase 1 use case projects FInest and SmartAgriFood.

1.3.8.1 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, FIspace leverages the outcomes of the 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 FIspace 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?

1.3.8.2 Key concepts and approach

The ultimate aim of the FIspace project is to develop, validate, and establish a future business collaboration space (the FIspace) 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 FIspace 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 11 below depicts the overall vision for the FIspace service. The FIspace 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 FIspace 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 FIspace Store, from which the Apps can be consumed and new Apps can be developed by reusing 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 FIspace; 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 FIspace enables businesses to proactively act on issues or business opportunities without having to incur the overhead and cost that has plagued traditional monolithic applications.

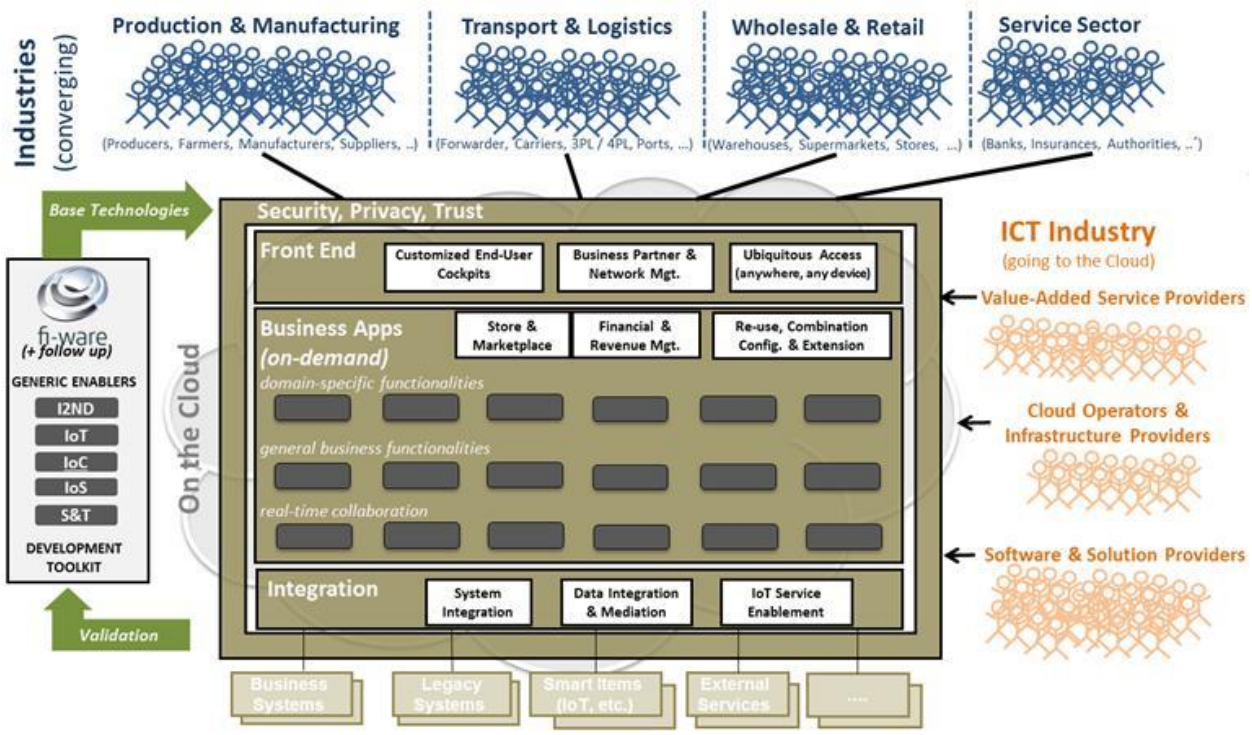


Figure 11: FIspace Overall Vision - A multi-domain Collaboration Space for Business Networks.

The idea behind the FIspace 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. The FIspace 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 FIspace.

1.3.8.3 Context in relation to the FI PPP programme dimension

In the context of the FI PPP, the envisaged FIspace 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 Internet" , the FIspace 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 FIspace 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.

Therefore as already outlined in the previous section 1.3.7 with respect to the large scale experimentation and standardisation the phase 2 related activities in the FIspace project will lay the foundation for realising the vision and also 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 FIspace 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 FIspace'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 FIspace will be the inclusion of stakeholder groups and providing guidelines, plans and recommendations for the large scale expansion of platform usage in Phase 3.

1.3.8.4 Availability of Envisaged Project Results

As explained above in sections 1.3.3, 1.3.4 and 1.3.5 the SmartAgriFood partners elaborated different pilot implementations combining domain specific and generic enablers. Those pilots will be further exploited in phase 2, aiming at the elaboration of the FIspace. Main foundations shall be established in the beginning of phase 2 (i.e. first 12 months) for being able to publish a first version at mid-term of the project that represents the starting date of phase 3.

A specific focus will be set on the involvement of the public developer community. The provision of a software development kit shall even facilitate the adoption of the FIspace and promote its usage. Finally, the FIspace will set up an open environment that shall combine the FI PPP programme community as well as any interested party.

1.4 Potential Impact and Main Dissemination Activities and Exploitation of Results

1.4.1 Potential Impact

Agri-Food sector is a pillar of the EU economy. Despite this solid base and stable but low growth in production, the EU food and drink sector growth is being outpaced by the performance of emerging economies. This is, among other things, due to: low levels of R&D in EU food and drink companies; uneven industry-retail relations within the EU food chain leading to unfair practices; currently stable but relatively high input prices for raw materials in the EU; and a highly-regulated business environment in the EU. At the same time, the EU food and drink industry remains the largest exporter globally, although its export market share on global markets is declining.

According to a CIAA (now Food Drink Europe) study, there are several quantitative indicators to consider: production value which shows slow increase in production but keeping pace with developed economies; the labour productivity, that is increasingly, but still behind other developed economies (USA, Canada, Australia…); export market share where EU is first exporter, but with a decreasing export share market; and R&D investment that is behind competitors and not growing.

Boosting the agri-food sector with FI ICTs has a large impact at global level and concerns various public issues. Because of its specific requirements, application to agri-food can also lead to new innovations for the FI. The SmartAgriFood project results have a unifying effect on as well the different agri-food subsectors (horticulture, animal production, etc.) as the research and ICT community resulting in interdisciplinary approaches, which will enhance innovation. Those effects have to be reached for the whole Europe as a market and cultural area, where the demand

for food and related agricultural production raises all kind of public concerns (environmental pollution, animal welfare, nature conservation, etc.).

The complexity of the agri-food supply chain networks involving global networks and requiring complex technical solutions involving different sectors (ICT, agriculture, biology, manufacturing etc.), demands the integration of European companies with European producers and distributions chains in order to define a global and complete solution. Finally due to the challengers of agri-food sector, it is required a close integration of all the stakeholders.

1.4.2 Main Dissemination Activities

This section outlines the updated detailed dissemination plan of the SmartAgriFood project, which contains the planned actions, the target audiences, the main messages, the communication channels and tools, the timing, the responsibilities etc. It is a tool for designing the actions systematically, monitoring the progress, implementing corrective actions at deviations and recording newly identified, emerging opportunities for communication. This communication plan is not a static but a flexible document that was updated regularly as new results become available and new potential communication actions and events are identified.

1.4.2.1 Expected/available results of the project

A list of expected results was prepared even if at the starting period of the project there was a risk that the outcome of the work will not bring the expected results. As the project progresses this list could be split into two parts – available results and expected results. When listing the expected/available results it is important to consider which type of information may be useful for different target groups.

Results typically of interest for the industry are:

- Solution to a problem;
- New opportunities which can be exploited by using research results of any origin;
- Assistance to find a solution to a problem (tools, methods, systems, established rules / relationships);
- Information or data that can be used for solving a problem;
- Timely identification of a problem before it becomes critical (breaking old beliefs, false trust).

Results typically of interest for policy makers and public authorities:

- Facts, data and the outcomes of analyses which can be used for identifying bottlenecks problems in time;
- Statements, facts, data, the outcomes of analyses, procedures and methods, which can be used for analysis of bottlenecks, problems, monitoring, evaluation and risk assessment;
- Recommendations, guidelines, studies such as visual documents, strategic research agenda, recommended strategies and implementation plans, which can be used for policy formulation;
- Expert opinions for all stages of formulation and implementation of policies and legislation;
- Tools for assessing alternative solutions and supporting decision making;
- Methods, including test methods, procedures, guidelines, training programs and training materials, which support the enforcement of legislation and implementation of policies;
- Facts, statements, messages, recommendations, studies, training courses, which can be used for convincing and educating other stakeholders;

- Tools, including benchmarking tools and methods, including testing methods, for assessing the impacts of legislation and policies;
- Data and information, which can be used for assessing the impact of legislation and policies at the design and implementation phases;
- Expert opinions, which can be used for assessing the impact of legislation and policies at design and implementation phases.

During the project the expected and the realised (achieved) results available for communication were monitored and documented and the exploitable results were identified as early as possible. Identification of exploitable results in time ensured that the communication activities did not compromise the protection of Intellectual Properties. The list of expected and already realised (achieved) results were made in an on-going way by the person in charge of project communication (dissemination manager), in close collaboration with the Lead Partner and the relevant Work Package leaders and all project partners. Where considerations on the confidentiality aspects were necessary this had to be indicated.

It is considered that for different user groups different aspects of the same results may be applicable and attractive. The list of expected/available results is provided in Table 2.

Table 2: Expected/available results

Expected	Available/ Achieved[1]	Results	Potential user group	Competitors	Confidentiality
	x	Smart Farming - Open specification for Farm Management Systems based on cross-vertical approach in FI-PPP	Telecom carriers, End-users, farmers, food chain members, food industry	Existing FMISs with extended Spaying/Tractor Management,	PP
	x	Smart Farming - Two harmonized pilots for greenhouse and machine/spraying management which can be handed over to a larger farmer community for validation and testing	Telecom carriers, End-users, farmers, food chain members, food industry	Existing FMISs with extended Spaying/Tractor Management	PP
	x	Smart Farming - Farm Management Information Systems (FMIS) system using the FI-PPP design principles with generic enablers / modules being adapted to domain specific needs	Telecom carriers, End-users, farmers, food chain members, food industry	Existing FMISs with extended Spaying/Tractor Management	PP
x		Smart Farming - Contribution to a cloud-based vertical industry approach for getting the large-scale momentum	Telecom carriers, End-users, farmers, food chain members, food industry	Existing FMISs with extended Spaying/Tractor Management	PP
	x	Smart Farming - Today's FMIS systems are closed solutions based on companies with local footprints. Further, FI-PPP principles are not used yet Smart Farming	Telecom carriers, End-users, farmers, food chain members, food industry	Existing FMISs with extended Spaying/Tractor Management	PP
	x	Smart Farming - Contributions to academic journals and panels	Telecom carriers, End-users, farmers, food chain members, food industry	Existing FMISs with extended Spaying/Tractor Management	PP

Expec-ted	Avail-able/ Achie ved[1]	Results	Potential user group	Competitors	Confi-dential-ity
	x	Smart Agri-Logistics - Open specification for Agri-Food Logistic Management Systems based on cross-vertical approach in FI-PPP	Traders, in particular wholesalers, exporters, and importers; producer organisations, including auctions; logistic service providers; suppliers of logistic assets; retailers; ICT companies; consultancy firms	Supply chain management software vendors; ERP-software for logistics management; suppliers of RFID and sensor solutions; vendors of agri-food specific supply chain software.	PU
	x	Smart Agri-Logistics - Two harmonized pilots for flowers and fruit & vegetables which can be extended to a larger agri-food logistics community for validation and testing	Traders, in particular wholesalers, exporters, and importers; producer organisations, including auctions; logistic service providers; suppliers of logistic assets; retailers; ICT companies; consultancy firms	Supply chain management software vendors; ERP-software for logistics management; suppliers of RFID and sensor solutions; vendors of agri-food specific supply chain software.	PP/PU
	x	Smart Agri-Logistics - Logistic Information Solutions for the Agri-Food domain, with a special emphasis on fresh products management and asset management by utilisation of Internet of Things and Internet of Services architectures	Traders, in particular wholesalers, exporters, and importers; producer organisations, including auctions; logistic service providers; suppliers of logistic assets; retailers; ICT companies; consultancy firms	Supply chain management software vendors; ERP-software for logistics management; suppliers of RFID and sensor solutions; vendors of agri-food specific supply chain software.	RE/PP
x		Smart Agri-Logistics - Definition of the specific standardisation needs for agri-food logistics	Traders, in particular wholesalers, exporters, and importers; producer organisations, including auctions; logistic service providers; suppliers of logistic assets; retailers; ICT companies; consultancy firms	Supply chain management software vendors; ERP-software for logistics management; suppliers of RFID and sensor solutions; vendors of agri-food specific supply chain software.	PU

Expec-ted	Avail-able/ Achie ved[1]	Results	Potential user group	Competitors	Confi-dential-ity
	x	Smart Agri-Logistics - Contribu-tions to academic journals and panels	Traders, in particu-lar wholesalers, exporters, and im-porters; producer organisations, in-cluding auctions; logistic service providers; suppliers of logistic assets; retailers; ICT com-panies; consultancy firms	Supply chain management software vendors; ERP-software for logistics man-agement; suppli-ers of RFID and sensor solutions; vendors of agri-food specific sup-ply chain soft-ware.	PP/PU
	x	Smart Food Awareness	Retail sector, final consumers, ICT companies, Other supply chain stake-holders, Certifica-tion companies,	Mobile application developers, tools for information management and exchange, data certification.	PP/PU
	x	Smart Food Awareness - Two harmonized pilots for Smart Food Awareness which can be handed over to a large experi-ment for testing and validation. TIC pilot that could be deployed on other retailers. TTAM pilot. TTAM pilot that could be ex-tended to other food supply chains.	Retail sector, final consumers, ICT companies, other supply chain stake-holders, certifica-tion companies	Mobile applica-tions developers, tools for infor-mation manage-ment and ex-change, data certification.	PP/PU
	x	Smart Food Awareness - Con-sumer pull scenario framework. TIC pilot using the FI-PPP de-sign principles with generic ena-blers adapted to domain specific needs: consumer profile man-agement, data management and handling.	Retail sector, final consumers, ICT companies, other supply chain stake-holders, certifica-tion companies	Mobile application developers, tools for information management and exchange, data certification	PP/PU
	x	Smart Food Awareness – Consumer pull scenario frame-work. TIC pilot using the FI-PPP design principles with generic enablers adapted to domain specific needs: certification re-pository platform, training, de-tection and feedback of logos.	Retail sector, final consumers, ICT companies, other supply chain stake-holders, certifica-tion companies	Mobile application developers, tools for information management and exchange, data certification.	PP/PU
	x	Smart Food Awareness - Con-sumer push scenario framework	Retail sector, final consumers, ICT companies, other supply chain stake-holders, certifica-tion companies	Mobile application developers, tools for information management and exchange, data certification.	PP/PU

Expec-ted	Avail-able/ Achie ved[1]	Results	Potential user group	Competitors	Confi-dential-ity
	x	Smart Food Awareness – Con-sumer pull scenario framework. TTAM pilot using the FI-PPP design principles with generic enablers adapted to domain specific needs - Certification repository platform	Retail sector, final consumers, ICT companies, other supply chain stake-holders, certifica-tion companies	Mobile application developers, tools for information management and exchange, data certification.	PP/PU
	x	Smart Food Awareness - Con-tributions to academic journals and panels	Retail sector, final consumers, ICT companies, other supply chain stake-holders, certifica-tion companies	Mobile application developers, tools for information management and exchange, data certification.	PP/PU
x		Validation of GEs and DSEs	ICT community	ICT researches	FI-PPP
x		Understanding, description and categorization of the food supply chain from the retailer and end-users' point of view.	ICT community	ICT researches	PP

1.4.2.2 Summary of dissemination activities

The project dealt with the complete agri-food supply chain ('from farm to fork') so the end users and the target audience were are the consumers, retailers, logistic service providers, farmers, input suppliers, etc. Beside the supply chain stakeholders the project also distinguished stake-holders that provide hard- and software and ICT infrastructures.

During the project 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.

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

- A project web-site was established (**www.smartagrifood.eu);** public dissemination infor-mation 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 lan-guages 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,
- 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 devel-oped prototypes.
- 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
- 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. These pilots offered perfect environments for testing FI-Ware features to address complex requirements and related challenges for agri-food companies.
- The pilots were used as a dissemination method and helped to involve more stakeholders. During the project an inventory of the involved stakeholders per pilot was made. The following table contains the overview of the stakeholders.

Table 3: 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 operate	> 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.

Section 2 provides the detailed records of communication/dissemination and the lists the scientific publications planned, under preparation and completed.

1.4.3 Pilot Exploitation Plans

The SmartAgriFood consortium was developing detailed strategies for exploitation on individual partner level as well as on the pilot level. Those plans are presented in detail in the confidential exploitation plan. However, the summarised exploitation plans for the different SmartAgriFood pilots are presented in the following sections. They are based on Business Model Canvas that were elaborated in detail for each of the different pilots.

1.4.3.1 Greenhouse Management

Different approach should be followed in order to exploit the results of the Greenhouse pilot to the different user groups. Though farmers and other stakeholders have expressed their interest for the pilot and are willing to try it they are worried for the cost, the effort needed to install it and other issues. Thus, a number of activities could take place:

Farmers: A number of presentations, workshops and demonstrations need to take place. The simple user interface, the clear view of actions that should be taken in order to complete a process, the low cost procedure to install the FMS and the number of services provided are some of the issues that should be presented. Some farmers have already experienced to use similar systems or they have invested some money to buy sensors etc. Thus, the question to be answered is "what is the added value of the current system and why to buy it". Finally the presentation of best practises and other paradigms of European farmers that use similar systems will encourage them to use systems to help them improve their daily work.

Stakeholders: The involvement of various stakeholders is crucial so that the system provides more services. The organisation of national workshops, presentations and seminars can reach stakeholders that are interested to participate. The provision of services brings together the end users ensuring visibility without geographic restrictions.

IT Service Providers: IT Service Providers include both research institutions that are interested in participating in the Greenhouse pilot providing ideas but also to businesses that are willing to develop new services and upload it in the system. The provision of such services with low cost can ensure big penetration and usage of the system users. The FIWARE concept and the presentation of already developed services that can be used as the basis to build new services are needed. The presence at conferences or thematic exhibitions of different sectors and the demonstration of the way to create new services can be another effective way to attract new users.

1.4.3.2 Smart Spraying

The stakeholder reactions from national panels and other stakeholder events have been positive and encouraging to continue towards further development of the system. The next natural step in the development of Smart Spraying pilot is to build an FI enabled "ecosystem" pilot. This pilot would include:

- New FI enabled solutions:
  - pilot Marketplaces
  - pilot Global Customer Platforms with Identity Management
  - pilot Service Frameworks
- Joining stakeholders from existing ecosystem
  - real third party service providers offering their services to be utilized by the Service Frameworks
  - real farms testing the system with tailored Service Framework and IoT enablers within their farm machinery, devices and sensors
  - real industry (supply and processing), retail and consumers as farm collaborators through the pilot system.

The pilot should have regional actors as well as farm type specific actors, which can be regional or multinational. In this point it is important to specify the FI-WARE GE-based platforms to meet the critical needs of the participating actors, especially the diversity of participating SMEs. Well specified and tested platforms will then boost the further development towards productizing and ecosystem evolution.

So, the further work will focus on building business ecosystems using FI-WARE enablers to serve farming and especially different PA solutions and services. The FI-WARE GEs will be utilized and further tested in different research and development projects in international and national levels. Especially, further research on service interaction protocols introduced in the service framework architecture to support Smart Spraying Pilot exploitation is needed. The service interaction in this project built Smart Spraying prototype is implemented using proprietary protocols developed to demonstrate advanced Service Framework enabled functionalities: automatic data source and functionality discovery/exchange, and user interface exchange and embedding between third party services. Standardized solution is needed to enhance the exchange protocols and make them more easily adaptable. Related to FI-WARE utilization, more experimentation with IoT enablers are needed. Further, FI-WARE Security chapter introduces Data Handling GE that provides the data owner with the mechanism to give the access and usage control to the stored data by imposing obligations on the data and restrictions. This Data Handling GE is interesting for the Smart Spraying Pilot due to data tracking issues in distributed systems following SOA approach. Especially, in the situations where third party services are utilizing farm data, which is separated from the applications.

1.4.3.3 Flower Supply Chain

The scope of the pilot is a supply chain from production to retail. The focal company is a Dutch trader with the role of supply chain orchestrator. Via this trader, also a grower, transporter and auction are incorporated. The pilot is leveraging the trader's logistic tracking system, which is based on the ultrahigh frequency RFID tags that are attached to the complete pool of plant trolleys.

The results that potentially could be exploited are the design of an information systems architecture and the development of a prototype for demonstration purposes. This designed architecture comprises four layers of abstraction: business layer, data/application layer, technology layer and Future Internet Enablers layer. The latter links the technology layer to the Generic Enablers of the core technology platform of the Future Internet PPP (FI-WARE).

The prototype system focuses on Quality Monitoring. During the development, mock-ups were used to define the detailed specification in interaction with the stakeholders. The main developed components of the pilot are the User Interface Application (Cloud Dashboard), Event Database Web Service, Cloud Application Service, Expert System Web Service, Expert System, and the Expert Algorithms. However, it should be noticed that for this phase the prototype can only be used for demonstration purposes. It cannot yet be implemented for practical usage, which implies that it is not yet ready for exploitation. In the next phase we planned to upgrade the prototype to exploitable software as part of FIspace.

1.4.3.4 Fruits and vegetables chain

The engagement of business and IT systems research is crucial for the successful realization of the objectives of the FI-WARE initiative. Any concepts and system developments that should find acceptance with stakeholders in the FFV chain depend not only on the involvement of stakeholders and system development groups as discussed above but on an interdisciplinary activity involving in addition research based business process and system expertise.

Such combinations should be best suited for transferring project results into real world business applications envisaged for phase 3 of the FI-WARE initiative.

The research community is primarily reached through presentations at conferences and publications in journals. Presentations at conferences are already going on or are specified for coming conferences. Examples include the workshop at the 'International Forum on System Dynamics

and Innovation in Food Networks' some weeks ago but also presentations (including keynote addresses) at the World Conference on 'Computers in Agriculture, Food and the Environment' in June this year, a keynote presentation at an international logistics conference in the UK or a keynote presentation at the conference of the International Farm Management Association on Warscaw. A presentation at the international conference of the 'Asian Federation for Information Technology in Agriculture, Food, and the Environment' is envisaged for 2014 in Australia.

Several publications in international journals evolved from the project. Publications in the international journal on 'Computers in Agriculture' addressed primarily system development research. Envisaged is a special issue in the 'International Journal on Food System Dynamics' which should reach business oriented research.

1.4.3.5 Tracking & Tracing for Meat Awareness

Looking especially at the supply chain of meat, the Smart Agri-Food Project aims not only to improve awareness for consumers but focuses also on enhanced B2B logistics and transparency for all meat chain partners. Therefore the opportunities for exploitation are wide, as long as many products, processes, producers and food-sectors are still looking for similar improvements. The four main directions of exploitation and commercialization are:

- including processed products and not only meat itself
- extension to other meat sectors like poultry and pork, which are in relation to beef processes more complex and in larger quantities
- increase of representativeness along the supply chain including steps before breeding as well as better granularity on each step
- boost of consumers' trust by integrating certificates for information level and trustworthiness of data

Reaching a market with a certain volume is a challenge to be mastered together with the three groups of stakeholders for meat as follows: the retailers, the suppliers and the consumers:

a) Retailers stay in direct contact with their suppliers as well as with the end-consumers. Therefore the above mentioned four factors have to be carried out with the full market power of supermarkets and discounters.
b) Suppliers of meat are obliged to deliver high quality not only of product but also for contextual information (EU regulations, contracts with retailers and customer relationship management)
c) End-consumers have the right to better information and transparency along the meat chain, provided by new tools and databases at very low cost for them e.g. by smartphones

The TTAM pilot is totally aware of this triangle of interest and tries to offer an appropriate product or format to each of them.

1.4.3.6 Tailored Information for Consumers

The pilot Tailored Information for Consumers involves various actors that will create benefit in different degrees. The main actors that could add the TIC pilot within their business creating an added value to their products or services are the food producers, the retail companies, the certification and standardization bodies, the ICT companies. Of course, consumers will benefit strongly from the pilot with a better of food products transparency that will increase consumer awareness and trust in the agri-food supply chain.

The benefits provided by TIC pilot to the consumers, the last actor of the supply chain, will have a backward effect on all supply chain.

For the exploitation plan of the pilot, the following main issues must be taken into account: (i) information ownership (product information and consumer profile), (ii) Web app ownership, (iii) Use of Generic Enablers.

The GEs are a keystone in the development and functionality of any pilot of the SAF project, and therefore in its business model. Within the TIC pilot, the DCRM GE, Identity Management (GCP) GE and the Data Handling GE have been integrated, providing important and easy-to-use functionalities, basic in the final behaviour of the TIC application to be used by the supermarket consumer.

These GEs have been developed, and belong, to different companies involved in the FI-WARE project. Each GE has its own "Terms and conditions" [ref to http://catalogue.fi-ware.eu/] to be exploited by third companies on projects, as in SmartAgriFood.

In a large scale implementation of the TIC pilot, several scenarios can be established depending on the role of the actors involved. These scenarios consider the different business models of the gathering, storage, management and control of the information about agri-food products along all the supply chain.

1.5 Project Public Website and Contact Details

Everybody is highly welcome to access more information via the SmartAgriFood website (http://www.smartagrifood.eu), join us in Twitter (http://twitter.com/#!/SmartAgriFood) and facebook (http://www.facebook.com/pages/SmartAgriFood/201411716577654), as well as participate our public discussions in LinkedIn (http://www.linkedin.com/groups/SmartAgriFood-3996825).

A direct contact can be established via the project coordinator:

Dr. Sjaak Wolfert (Coordinator)	e-mail:	sjaak.wolfert@wur.nl
LEI Wageningen UR	phone:	+31 317 485 939
P.O. Box 35	mobile:	+31 624 135 790
6700 AA Wageningen	website:	http://www.smartagrifood.eu

2 Use and Dissemination of Foreground

2.1 Section A (public) – Listing of Dissemination Activities

This section includes two tables:

- List of all scientific (peer reviewed) publications relating to the foreground of the project that were carried out in the scope of the project or are currently prepared and upcoming.
- List of all dissemination activities (publications, conferences, workshops, web sites/applications, press releases, flyers, articles published in the popular press, videos, media briefings, presentations, exhibitions, thesis, interviews, films, TV clips, posters).

These tables are cumulative, which means that they should always show all publications and activities from the beginning until after the end of the project.

Table 4 – List of Scientific Publications

NO.	Title	Main Author	Title of the periodical or the series	Number, date or frequency	Publisher	Place of publication	Year	Relevant Pages	Permanent identifiers (if available)	Open access?[8]
1	Future Internet and the Agri-Food Sector: State-of-the-Art in Literature and Research	Richard J. Lehmann Robert Reiche, Gerhard Schiefer	Computers and Electronics in Agriculture	June 2012			2012		http://dx.doi.org/10.1016/j.compag.2012.09.005	yes
2	Opportunities of application of FI capabilities to current trends on food transparency and awareness issues	Gerhard Schiefer Richard J. Lehmann, Robert Reiche	Computers and Electronics in Agriculture				upcoming		upcoming	upcoming
3	Activity-centred design in FI based smart farming systems	Leena Norros Liisa Personen, Frederick Teye,Hanna Koskinen, Pasi Suomi	HCI International, Las Vegas 2013				2013		upcoming	upcoming
4	Benefits through Utilizing EPC Network Components in Service-Oriented Environments – an Analysis using the Example of the Food Industry	Ralph Tröger Robert Reiche, Gerhard Schiefer	International Journal on Food System Dynamics	n.a. (to be published 2013)	CentMA	Bonn	2013		http://centmapress.ilb.uni-bonn.de/ojs/index.php/proceedings/index	yes
5	Activity-centred design in FI based smart farming systems	Hanna Koskinen Leena Norros	European Conf on Computer Supported Collaborative Work,Cyprus September 2013				February 2013		upcoming	upcoming

[8] Is/Will open access provided to this publication? - Open Access is defined as free of charge access for anyone via Internet. Please answer "yes" if the open access to the publication is already established and also if the embargo period for open access is not yet over but you intend to establish open access afterwards.

NO.	Title	Main Author	Title of the periodical or the series	Number, date or frequency	Publisher	Place of publication	Year	Relevant Pages	Permanent identifiers (if available)	Open access?[8]
6	Representing possibilities of Future Internet to improve food chain awareness in farming work	Hanna Koskinen Leena Norros, Liisa Pesonen, Pasi Suomi	Design studies			Special Issue of the Int. Journal of Human-Computer Studies – Perspectives on participatory HCI research: Beginnings, middles and endings.	2013		upcoming	no
7	Smart Agri-Food Logistics: Requirements for the Future Internet	Cor Verdouw Harald Sundmaeker, F. Meyer, J. Wolfert, J. Verhoosel	3rd International Conference on Dynamics in Logistics (LDIC 2012) Bremen, Germany, February 27 – March 1, 2012;http://www.ldic-conference.org				2011-10-31		smart_agri-logis-tics_paper_2012-01-16-submit-ted_revision_final2.pdf	yes
8	Future Internet and the Agri-Food Sector – State of the Art of Future Internet Research	Richard J. Lehmann Robert Reiche, Gerhard Schiefer	Proceedings of the 32nd annual conference of the "Gesellschaft für Informatik in der Landwirtschaft (GIL)", February 29 - March 1, 2012, Freising, Germany	2012			2012		http://subs.emis.de/LNI/Proceedings/Proceed-ings194/183.pdf	yes
9	Visions for creating food awareness with future internet technologies	Robert Reiche Richard J. Lehmann, Gerhard Schiefer	Proceedings of the 32nd annual conference of the "Gesellschaft für Informatik in der Landwirtschaft (GIL)", February 29 - March 1, 2012, Freising, Germany				2012-01-12		upcoming	2012-02-29

NO.	Title	Main Author	Title of the periodical or the series	Number, date or frequency	Publisher	Place of publication	Year	Relevant Pages	Permanent identifiers (if available)	Open access?[8]
10	How Edible is Social Media: Characterising agri-food user generated content	Elizabeth York Christopher Brewster	http://www.icwsm.org/				2012-01-18		http://www.icwsm.org/	no
11	The Challenge of Food Awareness a draft paper for discussion	Richard J. Lehmann Jivka Deiters, Robert Reiche, Gerhard Schiefer	Proceedings of the 6th International European Forum (Igls-Forum) on System Dynamics and Innovation in Food Networks				2012-02-15		upcoming	upcoming
12	Improving consumer awareness: Utilization of Hidden Information in Consumer Communication	Robert Reiche Richard J. Lehmann, Gerhard Schiefer	Proceedings of the 6th International European Forum (Igls-Forum) on System Dynamics and Innovation in Food Networks				2012-02-15		http://gil-net.de/Publikation en/24_243.pdf	published
13	Moving the farm management information systems into the future Internet era	Alexandros Kaloxylos Robert Eigenmann, Frederick Teye, Zoi Politopoulou, Sjaak Wolfert, Claudia Shrank, Markus Dillinger, Ioanna Lampropoulou, Eleni Antoniou, Liisa Pesonen, Huether Nicole,Floerchinger Thomas, Nancy Alonistioti, George Kormentzas	Computers and Electronics in Agriculture				2012-02-16		http://dev.smartagrifood.eu/webdav/Work-Packages/WP200/Submitted%20Papers/WP200paper.zip	Yes

NO.	Title	Main Author	Title of the periodical or the series	Number, date or frequency	Publisher	Place of publication	Year	Relevant Pages	Permanent identifiers (if available)	Open access?[8]
14	Food awareness and transparency: current practices and future tools	András Sebők Adrienn Hegyi; Katalin Viola; István Gábor, Fruzsina Homolka	Proceedings in System Dynamics and Innovation in Food Networks 2012		Centmapress - University of Bonn		2012	638-652	http://centmapress.ilb.uni-bonn.de/ojs/index.php/proceedings/search/results	yes
15	Resolving Coordination Challenges in Cooperative Mobile Services	Ramon Alcarria Tomas Robles, Augusto Morales, Edwin Cedeño	The Sixth International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing. IMIS 2012	4-6 July 2012		Palermo, Italy	2012	pp.823, 828	http://gisai.dit.upm.es/index.php?option=com_jresearch&view=publication&task=show&id=25&Itemid=5 doi: 10.1109/IMIS.2012.131	no
16	Web browser HTML5 enabled for FI services	Tomas Robles Ramon Alcarria, Sergio Miranda, Augusto Morales	6th International Conference on Ubiquitous Computing and Ambient Inteligence (UCAmI)	December 3-5th, 2012	Lecture Notes in Computer Science	Vitoria-Gasteiz, Spain	2012	pp 181-184	http://dx.doi.org/10.1007/978-3-642-35377-2_25	no
17	The Use of Future Internet Technologies in the Agriculture and Food Sectors: Integrating the Supply Chain	Christopher Brewster Alexandros Kaloxylos, Jack Verhoosel, Tim Verwaart, Sjaak Wolfert, Harald Sundmaeker, and Robert Eigenmann	FIA Bookhttp://www.future-internet.eu/fiabook-2012				2012-02-24		saf_fia_2012.pdf	No
18	A Hot topic based Distribution and Notification of Events in Pub/Sub Mobile Brokers	Augusto Morales Tomas Robles, Ramon Alcarria,Edwin Cedeño Publication	Network Protocols and Algorithms	2013	Macrothink institute ISSN 1943-3581		2013	pending	pending	yes

NO.	Title	Main Author	Title of the periodical or the series	Number, date or frequency	Publisher	Place of publication	Year	Relevant Pages	Permanent identifiers (if available)	Open access?[8]
19	The Challenge of Food Awareness	Richard J. Lehmann Jivka Deiters, Robert Reiche, Gerhard Schiefer	International Journal of Production Economics				2012-03-21		upcoming	upcoming
20	Identifying the ICT challenges of the Agri-Food sector to define the Architectural Requirements for a Future Internet Core Platform	Christopher Brewster Harald Sundmaeker, Sjaak Wolfert	Proceeding of the eChallenges Conference (17-19 October 2012), Lisbon, Portugal	2012	IIMC International Information Management Corporation		2012		http://windermere.aston.ac.uk/~kiffer/papers/Brewster_echallenges12.pdf	yes
21	Enhancing sustainability of agri-food supply chains with future internet technologies	Sjaak Wolfert Cor Verdouw, Adrie Beulens, Krijn Poppe, Tim Verwaart	Computers and Industry, Special Issue "ICT for Sustainability in Industry"				2012-04-06		upcoming	No
22	The Challenge of Food Awareness	Richard J. Lehmann Jivka Deiters, Robert Reiche, Gerhard Schiefer	RAUSP special issue 'Relations between Agriculture and Society: Impacts on Organizations and Agriculture-Based Systems'				2012-05-26		upcoming	no
23	Sustainability of food supply chain through integration: A Literature Review	Christopher Brewster Liisa Pesonen Frederick Teye, Ari Ronkainen, Markku Koistinen, Jere Kaivosoja, Pasi Suomi, Raimo Linkolehto	International Journal of Production Economics				2012.11.30		Upcoming	Yes
24	Internet-based networked production infrastructure for future farms		Biosystems Engineering				08-01-2013		upcoming	upcoming

NO.	Title	Main Author	Title of the periodical or the series	Number, date or frequency	Publisher	Place of publication	Year	Relevant Pages	Permanent identifiers (if available)	Open access?[8]
26	Transparency in food supply chains: A design of an information systems for tracking, tracing and food awareness for the meat sector	Kassahun, A. R. Hartog, T. Sadowski, T. Bartram, S. Kläser and H. Scholten	7 th International European Forum (Igls-Forum)				2013.02.18-22.		Upcoming	No
27	Network approach for enhancing interdisciplinary innovation	András Sebők István Gábor, Katalin Viola	7 th International European Forum (Igls-Forum)				2013.02.18-22.		Upcoming	No
28	Innovative solutions of the Future Internet: needs of the food chain users	Katalin Viola István Gábor, András Sebők	7 th International European Forum (Igls-Forum)				2013.02.18-22.		Upcoming	No
29	The representation of Food in Social Media Forum Twitter	Elizabeth York and Christopher Brewster	Proceedings of the European Federation for Information Technology in Agriculture Conference	23-27 June, 2013	EFITA	Turin, Italy	2013		http://www.efita2013.org/web/	yes
30	From Syntatic Standards to Semantic Standards in the Agri-Food Logistics Domain	Michael Van Bekkum, Linda Oosterheert, Jack Verhoosel and Christopher Brewster	Proceedings of the European Federation for Information Technology in Agriculture Conference	23-27 June, 2013	EFITA	Turin, Italy	2013			yes

Table 5 – List of Dissemination Activities

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
1.	Networking	DLO	Several messages on LinkedIn and Twitter	On-going	www.linkedin.com www.twitter.com	Agri-food and ICT industry, scientific community, policy makers	>1000	international
2.	Interview	DLO	Representatives Dutch Digital Agenda	various	The Hague	Ministry of Economic Affairs, Agriculture and Innovation	15	NL
3.	Interview	DLO	Users pilots flowers, fruit/veg and meat	Various	Various places in The Netherlands	Horticulture and animal community	25	NL
4.	article	DLO	Contributed to several scientific publications	On-going	Wageningen	Scientific community	>1000	international
5.	Networking	ATOS	Manage and exploitation of the project's web.	On-going	Madrid	Agri-food and ICT industry, scientific community, policy makers	>1000	International
6.	Networking	ATOS	Manage and exploitation of the twitter account.	On-going	Madrid	Agri-food and ICT industry, scientific community, policy makers	>1000	International
7.	press releases in a blog	OPEKEPE – NKUA	The updated portal of OPEKEPE and the announcement of the new project: SmartAgriFood	1st January 2011	http://cottonfarsala.blogspot.com/2011/04/blog-post_9802.html Blog with News about Cotton in Farsala	Civil Society	At least the Greek Civil Society	At least in Greece
8.	Net-	DLO	Various presenta-	Jan-Jun	various	Agri-food and ICT in-	>50	NZ

9 Dissemination activity: publications, conferences, workshops, web, press releases, flyers, articles published in the popular press, videos, media

10 Industry, Scientific Community (higher education, Research), Policy makers, Civil Society, Medias

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
	working		tions during sabbatical in New Zealand	2011		dustry, scientific community, policy makers		
9.	press releases in AGROTYPOS site	OPEKEPE – NKUA	The updated portal of OPEKEPE and the announcement of the new project: SmartAgriFood	2nd April 2011	http://www.agrotypos.gr/index.asp?mod=articles&id=63677 Site for news about agriculture	Civil Society	At least the Greek Civil Society	At least in Greece
10.	press releases in ALIARTOS blog	OPEKEPE – NKUA	The updated portal of OPEKEPE and the announcement of the new project: SmartAgriFood	2nd April 2011	http://aliartos-boiotias.blogspot.com/2011/04/blog-post_399.html Blog of the area Aliartos in Central Greece	Civil Society	At least the Greek Civil Society	At least in Greece
11.	press releases in PASEGES site	OPEKEPE – NKUA	The updated portal of OPEKEPE and the announcement of the new project: SmartAgriFood	3rd April 2011	http://www.paseges.gr/portal/cl/co/e166e53d-a41c-4946-856b-9793302977a9	Civil Society	At least the Greek Civil Society	At least in Greece
12.	press releases in a blog	OPEKEPE – NKUA	The updated portal of OPEKEPE and the announcement of the new project: SmartAgriFood	4th April 2011	http://agrotopos.blogspot.com/2011/04/blog-post_04.html Blog for agriculture news in Arta	Civil Society	At least the Greek Civil Society	At least in Greece
13.	press releases in a blog	OPEKEPE – NKUA	The updated portal of OPEKEPE and the announcement of the new project: SmartAgriFood	4th April 2011	http://newsmessinia.blogspot.com/2011/04/blog-post_4167.html Blog of the area Messinia in Peloponis	Civil Society	At least the Greek Civil Society	At least in Greece
14.	press releases	OPEKEPE –	The updated portal of OPEKEPE and the announcement	6th April 2011	http://kthnotrofia.pblogs.gr/2011/04/anabathmish-diadiktyakoy-topoy-opekepe-kai-parohh-	Civil Society	At least the Greek	At least in

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
	in a blog	NKUA	of the new project: SmartAgriFood		yphresias-ekty.html Blog for livestock and other issues		Civil Society	Greece
15.	articles published in the popular press	OPEKEPE – NKUA	The updated portal of OPEKEPE and the announcement of the new project: SmartAgriFood	7th April 2011	http://www.agronews.gr/index2.php?option=com_docman&task=doc_view&gid=1396&Itemid=100 Page 9 of newspaper AGRENDA	Civil Society	At least the Greek Farmers	Greece
16.	Web	DLO	News item	May 2011	The Hague	Professionals agri-food industry, research	>1000	NL
17.	Interview	DLO	Meeting with Joyce Nuys, GD	30 May 2011	Wageningen	Animal Health	1	NL
18.	Press conference	CBHU	SmartAgriFood Press conference	9th June 2011	Budapest, Hungary	Agri-food businesses, policy makers, journalist	30	Hungary
19.	Presentation	CBHU	CAMPDEN BRI Day	9th June 2011	Chipping Campden, UK	Agri-food businesses, other food chain members, policy makers	450-500	European, World wide
20.	press releases in a blog	OPEKEPE – NKUA	Online opportunities for those involved in the food chain	23rd June 2011	http://cottonfarsala.blogspot.com/2011/06/blog-post_5405.html Blog with News about Cotton in Farsala	Civil Society	At least the Greek Civil Society	At least in Greece
21.	press releases in a blog	OPEKEPE-NKUA	Cooperation of OPEKEPE - National University of Athens in the research project «SmartAgriFood	23rd June 2011	http://www.palo.gr/cluster/articles/agrotika-nea/652/?clid=2577344	Civil Society	At least the Greek Civil Society	At least in Greece

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
22.	press releases in a blog	OPEKEPE – NKUA	Online opportunities for those involved in the food chain	23rd June 2011	http://www.paseges.gr/portal/cl/tn/RuralPolicy/co/9c2a460b-1b6d-4d9d-8c08-6d3858b37be3 Greek Confederation of Unions of Agricultural Cooperatives: PASEGES site	Civil Society	At least the Greek Civil Society	At least in Greece
23.	press releases in a blog	OPEKEPE-NKUA	Cooperation of OPEKEPE - National University of Athens in the research project «SmartAgriFood	24th June 2011	http://www.agrotypos.gr/index.asp?mod=articles&ID=65500 Site for news about agriculture	Civil Society	At least the Greek Civil Society	At least in Greece
24.	press releases in a blog	OPEKEPE-NKUA	SmartAgriFood Technology	24th June 2011	Site for fresh meat and food	Civil Society	At least the Greek Civil Society	At least in Greece
25.	press releases in a blog	OPEKEPE-NKUA	Cooperation of OPEKEPE - National University of Athens in the research project «SmartAgriFood	24th June 2011	http://www.naro.gr.html	Civil Society	At least the Greek Civil Society	At least in Greece
26.	press releases in a blog	OPEKEPE – NKUA	What can future internet offer to those who participate in the food chain and consumers	24th June 2011	http://agrotopos.blogspot.com/2011/06/blog-post_8280.html Blog for agriculture news in Arta	Civil Society	At least the Greek Civil Society	At least in Greece
27.	press releases in a site	OPEKEPE-NKUA	The future internet	27th June 2011	http://www.webvistas.org/topic/832 Site for the future internet	Civil Society	At least the Greek Civil	At least in Greece

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
							Society	
28.	Press release in Greek newspapers	OPEK EPE-NKUA	Newspapers	June 2011	Bionews, CityPress, Press Time, Real news, Agronews/Agrenda, Agrotikos Khrukas, Adesmeutos Tupos, Axia, Apogeumatinh, Augh, Aurianh, Vima, Dhmoths antapokriths, Ethnos, Ethnos ths Kuriakhs, Eleutherh ora, Eleutherh ora (Larisa), Eleutheros, Eleutheros Tupos, Eleutherotupia, Ellhnismos ths Amerikhs, Estia, Hmerhsia, Isotimia, Kathhmerinh, Karfi, Kerdos, Kuriakatikh Eleutherotupia, Logos, Makedonia, Nautemporikh, Nea, Nikh, O kosmos tou ependuth, Oikonomia, Paron, Prin, Prwto Thema, Rizospastis, To Ampelotopi, To paraskhnio, PASEGES	Civil Society	At least the Greek Civil Society	Greece
29.	Article	DLO	NESSI	July 2011	Wageningen	industry and academia Active in information and Communication Technologies	>300	international
30.	Presentation	CBHU	Hungarian National Technology Platform on Future Internet	5th July	Budapest, Hungary	ICT community, researchers	15	Hungary
31.	Presentation	CBHU	Board meeting of the ETP Food for Life	7th July 2011	Brussels, Belgium	Agrifood businesses, other food chain members, policy makers	15	Hungary
32.	conference	DLO	EFITA/WCCA conference, Prague	11-14 Jul 2011	Praha	ICT and agri-food industry, scientific community, policy makers	>300	CZ
33.	EC Infoday, brokerage with	ATOS	KBBE Infoday	15th July 2011	Brussels, Belgium	Industry, Scientific Community (higher education, Research)	500	European, World wide

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
	other stakeholders							
34.	conference	DLO	Teleconference with Whole Chain Traceability Centre	3 Aug 2011	Wageningen/US	ICT industry, scientific community	6	US
35.	Interview	DLO	Meeting with Alexander Ellebrecht	8 Aug 2011	Wageningen	ICT industry	2	NL
36.	interview	DLO	Meeting with Teun Sleurink	9 Aug 2011	Wageningen	ICT industry	2	NL
37.	interview	DLO	Meeting with Cornell Heutink	10 Aug 2011	Wageningen	ICT industry	2	NL
38.	interview	DLO	Meeting with Stephan Verveen	11 Aug 2011	Wageningen	ICT industry	2	NL
39.	interview	DLO	Meeting with Henk de Man	12 Aug 2011	Wageningen	ICT industry	2	NL
40.	interview	DLO	Meeting with Marlène van Benthem	17 Aug 2011	The Hague	Policy makers	2	NL
41.	interview	DLO	Meeting with Ramon Rentmeester en Wolfgang Tostmann (National Contact Points)	17 Aug 2011	The Hague	Policy makers	3	NL
42.	Interview	DLO	Meeting with Nur America	25 Aug 2011	Wageningen	industry	2	NL
43.	networking	DLO	Networking event of ICT Valley	25 Aug 2011	Veenendaal	ICT industry, regional policy makers	40	NL
44.	Presen-	CBHU	Hungarian Freezing	9th Sep-	Mezőkövesd, Hungary	Agrifood businesses,	35-40	Hungary

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
	tation		and Canning Industry Association	tember 2011		other food chain members		
45.	Conference	ATOS	What's for lunch? - FP6 traceability projects	20th September 2011	Brussels, Belgium	Industry, Scientific Community (higher education, Research), Policy makers, Civil Society, Media	100	European
46.	Presentation	UBO, KTBL, CBHU	Stakeholders Event of the Transparent_Food project	26th September 2011	Brussels, Belgium	Agrifood businesses, logistic service providers, other food chain members, researchers	50	European
47.	interview	DLO	Meeting with Marco Verloop (town council Veenendaal)	30th Sep 2011	Veenendaal	Local policy makers	3	NL
48.	Cross-compliance Conference	OPEKEPE	Cross-compliance Conference	02-06 October 2011	Vienna	Workshop for good agricultural and environmental conditions	around 100	European
49.	Workshops	Bon Preu	Pre-Workshops with consumers on Agri-food Awareness: discussion about the future way of consumption, Spain	November 2011	Barcelona, Spain	Civil Society	15-20	Spain
50.	Presentation	CBHU	European Food Cluster Initiative	13-14th October 2011	Brussels, Belgium	Agrifood businesses, other food chain members, researchers, policy makers, EU comis-	70	European

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
						sion		
51.	Presentation	CBHU	CIBUSTEC 2011 Technology and solutions for the Food Industry Fair, EFI Forum	19th October 2011	Parma, Italy	Agrifood businesses, other food chain members	60	European
52.	Journal Article	DLO	Future Internet for safe and healthy food (Public Service Review)	November 2011	Newcastle, UK	Policy Makers	>1000	EU
53.	Presentation	CBHU	ETP Food for Life	2nd November 2011	Bonn, Germany	Agrifood businesses, other food chain members	20	14 European countries
54.	Conference	UBO, KTBL, CBHU	Final Conference of the Transparent_Food project	3rd November 2011	Bonn, Germany	Agrifood businesses, logistics service providers, consumer organizations, other food chain members, researchers, policy makers, EU comission	30	European
55.	interview	DLO	Meeting with Conny Graumans (Agro-Connect)	3 Nov 2011	Wageningen	Standardisation organisation	2	NL
56.	workshop	DLO	Presentation for AgCIO Roundtable	8 Nov 2011	Las Vegas	Agri-food industry	30	US
57.	conference	DLO	Presentation at AgGateway conference	9 Nov 2011	Las Vegas	Agri-food and ICT industry, scientific community	>200	US
58.	Presentation	CBHU	CAMPDEN BRI Open Day	16th November	Budapest, Hungary	Agrifood businesses, consumer organiza-	35-40	Hungary

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
				2011		tions, other food chain members, policy makers		
59.	lecture	DLO	Guest lecture at CAH Dronten	17 Nov 2011	Dronten	Agri-food business students	5	International
60.	seminar	DLO	AgroConnect Seminar	23 Nov 2011	Ede	ICT and agri-food industry, scientific community	200	NL
61.	interview	DLO	Meeting with Ordina	23 Nov 2011	Ede	ICT Industry	3	NL
62.	GEOCAP Annual Conference	OPEK EPE	GEOCAP Annual Conference	26-21 November 2011	Talin	The full conference title is: 'Geomatics in support of the CAP: towards a sound management of rural land areas'	around 280	European
63.	Workshop	CBHU	Discussion panel, FoodDrinkEurope Innovation Day	23th November 2011	Brussels, Belgium	Food industry, policy makers, EU commission, journalist, researchers	70	European
64.	Workshop	CBHU	EUREKA Academy Workshop 1	24th November 2011	Brussels. Belgium	Agrifood businesses, researchers	50	European
65.	Conference/ Exhibition	Bon Preu	Introduction of the concept of Smart Agrifood project at Smart City Expo&World Congress	29th November 2011	Barcelona, Spain	Industry, Policy makers and Civil society	250	Industry, Policy makers and Civil society
66.	Bro-	ATOS	ARI_Smart_Cities_ Brochure in Atos	29th November	Barcelona	Industry, Policy makers	6,160 profes-	Europe-

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
	chure in: Smart Cities Expo 2011 - BCN		stand see Annex 2	2011- 2nd December 2012	http://www.smartcityexpo.com/	and Civil society	sionals, 118 companies and 290 speakers	an
67.	Journal article	DLO	Slimme voedselproductie met ICT 2011	December 2011	Wageningen	Policy makers, Researchers	>100	The Netherlands
68.	Oral presentation and poster	MTT	Introducing the project under the titel Information management in agricultural systems.	1st of Dec 2011	Vihti, Vakola Day	End users in agrotechnology companies and societies, farms, government and education.	54	Finland
69.	interview	DLO	Meeting with The Sustainability Consortium and Sustainable Agriculture Initiative	13 Dec 2011	The Hague	Industry, Scientific community	3	NL
70.	Interview	DLO	Board meeting Tuinbouw Digitaal	15 Dec 2011 and 14 Feb 2012	Zoetermeer	Horticulture community	10	NL
71.	workshop	DLO	Workshop at OrgaInvent	16 Dec 2011	Bonn	Agri-food Industry, scientific community	30	NL, DE
72.	interview	DLO	Meeting with European Network of Living Labs/FI-PPP Concord	20th Dec 2011	The Hague	Scientific community	3	EU
73.	Poster	MTT	SmartAgriFood -	Jan 2012	Helsinki, Biannual Agricultural Sciences meeting	Scientific community	600 (po-	Finland

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
	presentation & working paper		Tulevaisuuden Internet elintarvikkeiden tuotannon ja kuljetuksen tehostajana ja tuotetiedon välittäjänä. (/Future Internet in enhancing food production, transportation and passing product information.)			and end users from agrifood sector, in particular farming	tential, number of seminar attendants)	
74.	Interview - article	OPEKEPE	Monthly newspaper of PASEGES	January 2012	Interview of OPEKEPE's president Mr. Athanasios Kaprelis „Agro-business: The answer to the economic crisis"	Farmers community	Farmers	Greece
75.	Workshop	DLO	European EPC Competence Centre	9 Jan 2012	Neuss	Agri-food and ICT industry	20	DE
76.	Workshop	DLO	Product Coding Horticulture of Florecom/GS1	10 Jan 2012	Amsterdam	Horticulture community		NL
77.	Presentation	ATOS	Food and Health (Alimentación y Salud) working group of the Food4Life Spain technological platform	15 Jan 2012	Madrid	Organisations related to meat, food, research centers, drinks, the CDTI (Spanish research funding organisation)	40	European
78.	Workshop	CBHU	EUREKA Academy Workshop 2	19th January 2012	Brussels. Belgium	Agrifood businesses, researchers	75	European

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
79.	Interview	DLO	VIAS Board meeting	19 Jan 2012	Wageningen	Information scientists in agriculture, food and green space	5	NL
80.	Conference	CBHU	EUREKA NPC meeting	24th January 2012	Sopron, Hungary	Policy makers, networks organizers	50	Hungary,
81.	workshop	DLO	FI-PPP use case meeting	25-26 Jan 2012	Brussels	Scientific community, policy makers	20	EU
82.	Workshop	ATB	FI PPP Use case overview on SMART Food and Agribusiness addressing Activity Chain 01 - «Architecture approaches and models» at the European Research Cluster on the Internet of Things Cluster Meeting	15th Feb 2012	Trento, Italy	Industry, Academia, Research	20	European
83.	Presentation and paper	DLO	LDIC 2012	27 Feb – 1 Mar 2012	Bremen	3rd International Conference on Dynamics in Logistics (LDIC 2012)	500	DE
84.	Workshop	CBHU	EUREKA Hungarian National Workshop	29th February 2012	Budapest, Hungary	Agrifood businesses, ICT, researchers, logistics service providers, EU commission	80	Hungary
85.	workshop	DLO	Meeting with precision farming scientists	1 Mar 2012	Wageningen	Scientific community	5	NL

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
86.	Conference	CBHU	EUREKA Regional Conference	8th March 2012	Pécs, Hungary	Policy makers, industry, networks organizers	60	Hungary
87.	Presentation	DLO	Symposium Tuinbouw Digitaal	19 Mar 2012	Zoetermeer	Horticulture community	50	NL
88.	Organizing and carrying out the 1st round of discussion panels	OPEK EPE – NKUA	Follow the National discussion panels methodology	23rd March 2012	Athens	end-users: relatively equally mixed chain members relevant to the different use cases ICT: solution providers working on product/service developments, offering new software, sensor, system solutions etc.	Maximum 50	In Greece
89.	Workshop	ATB	Presenting experience from SAF of participating in the FP7 and more specifically in the FI-PPP programme in the scope of a 3 days Seminar on the EU Research environment	26th March 2012	KoWi; Wissenschaftszentrum Bonn	Academia, Research	25	Germany
90.	Workshop	OPEK EPE	Control Methods Workshop	27-28 March 2012	Milan	Scientific community	200	European
91.	Workshop	MTT	1st national SAF panel and national workshop	29th of March 2012	Vihti, Finland	Agrifood businesses, Farmers, Logistics service providers, Consumer organisations, Other food chain members, ICT community,	12	FI

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
						Researchers/higher education		
92.	press releases in OPEKEPE and NKUA site	OPEKEPE – NKUA	Update the OPEKEPE portal & NKUA portal with one page summary sheets of the main results of the project until then	2012	http://www.opekepe.gr/smartagrifood.asp http://www.uoa.gr/	Civil Society	At least the Greek Civil Society	At least in Greece
93.	Networking	DLO	Meeting at TILS (meet processor) with several other business partners on the TTAM pilot	3 Apr 2012	Köln, Germany	Agri-food business, scientific community	15	Germany, The Netherlands
94.	Interview	DLO	Meeting with Bart Schanssema, Ijkakker	8 April 2011	Wageningen	Arable sensortechnology	1	NL
95.	Workshops	Bonpreu	1st Workshop with consumers for pilot involvement: food information requirements.	25 April March 2012	Barcelona, Spain	Civil Society	15-20	Spain
96.	Panta Rhei Conference	OPEKEPE – NKUA	Short presentation of the project and the main results of the project until then	02-04 May 2012	Lithuania	Conference of European Paying Agencies		European
97.	Workshop	ATB	Presenting the latest status of the SmartAgriFood Project with respect to the Activity Chain	9th May 2012	Aalborg, Denmark	Industry, Academia, Research	15	European

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
			02 on «Naming, addressing, search, discovery» of the IERC cluster. Workshop during the FIA event.					
98.	Interview	NKUA	National Radio Station „Athens984"	15 May 2012	Greece	Civil Society	At least the Greek Civil Society	At least in Greece
99.	Networking	DLO	Meeting with 'top sector' High-Tech\ICT to discuss matching with national research funding	21 May 2012	Wageningen, The Netherlands	Policy makers, scientific community	6	The Netherlands
100	Conference	VTT	Rural at the Edge – the 2nd Nordic conference FOR RURAL RESEARCH	21st to 23rd of May 2012	University of Eastern Finland, Joensuu	Researchers and dodmain experts	200	International
101	Project description on Homepage	GS1 Germany	Smart Agri-Food	June 2012	http://www.gs1-germany.de/service/ueberuns/foerderprojekte/smartagrifood/	GS1 Germany clients, organisations interested in identification and communication standards	German industry/farmers and retailers	Germany
102	Oral presentation	MTT	Tridentcom 2012 INFINITY workshop	June 2012	Thessaloniki, Greece	ICT community, infrastructures	> 20	International
103	Presentation at	DLO	Smart Food and Agribusiness: Fu-	6 Jun 2012	http://iotevent.eu/home/seminar-2012/	ICT industry, policy makers, scientific	30	The Nether-

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
	conference		ture Internet for Safe and Healthy Food from Farm to Fork			community		lands
104	Presentation at seminar	WU	ICT Architecture and Infrastructure: Remarks and ideas on the Future Internet	7 Jun 2012	http://www.agroconnect.nl/Default.aspx?tabid=1865&ListItemId=116	ICT industry, policy makers, scientific community	100	The Netherlands
105	Presentation	CBHU	Future Internet Workshop, Budapest	7th June 2012	http://www.jovointernet.hu/hu/node/79	ICT community, researchers	30	Hungary
106	Presentation	CBHU	Presentation on the NTP meeting in Istanbul	11th June 2012		Industry, Scientific Community (higher education, Research), Policy makers, Civil Society	40	International
107	Presentations		Smart Agrimatics 2012	13-14 June 2012	Paris http://smartagrimatics.eu/ConferenceInformation/Program.aspx Detailed program: http://smartagrimatics.eu/Portals/66/Final%20Programme%20Smart%20AgriMatics%20conference.pdf	Industry, Scientific Community (higher education, Research), Policy makers, Civil Society, Medias		International
108	Workshop	ATB	Project Presentation “Smart Food and Agribusiness: Future Internet for Safe and Healthy Food from Farm to Fork” at the Future	19th June 2012	Brussels, Belgium	Industry, Academia, Research	20	European

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
			Internet Public-Private Partnership Programme Road Show Kick-off					
109	Workshop	MTT	**2nd national SAF panel and national workshop**	19th of June 2012	Helsinki, Finland	Agrifood businesses, Farmers, Logistics service providers, Consumer organisations, Other food chain members, ICT community, Researchers/higher education	11	FI
110	Presentation	ATOS	Work Team Food and Consumers from Food for Life's Spanish Platform	21 June 2012	Madrid	Agri-food sector		Spain
111	Workshop	ATB	Presenting the experience of participating in the FP7 and more specifically in the FI-PPP programme at an event of the regional innovation office and the national EC contact point	3rd July 2012	Bremen, Germany	Industry, Academia, Research	30	Germany
112	Networking	DLO	Presentation for group from CRV (Animal Genetics Institute	3 Jul 2012	Wageningen	Agri-food business	3	The Netherlands
113	Presen-	DLO	Smart Food and	11 Jul 2012	Valencia	Agricultual machinery	60	Interna-

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
	tation at conference		Agribusiness: Future Internet for Safe and Healthy Food from Farm to Fork			industry, ICT industry, scientific community		tional
114	Workshop	Cent Ma	Workshop FFV Pilot	August 2012	Klein-Altendorf (Germany)	Associated Business Partners, interested stakeholders from IT and Food Sector, Project Partners	participants	GER
115	Interview	Cent Ma	EDEKA	August 2012	Hamburg (Ger)	Interview with largest german retailer	FFV Pilot team	Project
116	Interview	Cent Ma	Van Wylick	August 2012	Köln	Interview Fruit & Vegetable Trader	FFV Pilot team	Project
117	Poster presentation	MTT	Potato research field Day, Petla	Aug 2012	Ylistaro, Finland	Farmers, agricultural advisors, students	120	FI
118	Seminar	Cent Ma	Quality and Food Chain Management	Summer 2012	Bonn (Ger)	Master Students (Food and Resource Economics) learning from FP7 Projects and prepare ideas and new concepts on their own	Students	Local
119	Brainstorm sesssion	DLO	Brainstorm session about future app-development for the Ministry of Economic Affairs, Agriculture and Innovation	28 Aug 2012	Utrecht	Policy makers, ICT industry	8	The Netherlands
120	Article	OPEK EPE-	Newspapers	September 2012	Bionews, CityPress, Press Time, Real news, Agronews/Agrenda, Agrotikos Khrukas,	Civil Society	At least the	Greece

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
		NKUA			Adesmeutos Tupos, Axia, Apogeumatinh, Augh, Aurianh, Vima, Dhmoths antapokriths, Ethnos, Ethnos ths Kuriakhs, Eleutherh ora, Eleutherh ora (Larisa), Eleutheros, Eleutheros Tupos, Eleutherotupia, Ellhnismos ths Amerikhs, Estia, Hmerhsia, Isotimia, Kathhmerinh, Karfi, Kerdos, Kuriakatikh Eleutherotupia, Logos, Makedonia, Nautemporikh, Nea, Nikh, O kosmos tou ependuth, Oikonomia, Paron, Prin, Prwto Thema, Rizospastis, To Ampelotopi, To paraskhnio, PASEGES		Greek Civil Society	
121	Article in blog site	OPEKEPE – NKUA	Blog for horticulture in Greece	September 2012	http://piperies-agiou-georgiou.blogspot.gr/2012/09/smartagrifood.html	Horticulture and animal community	At least Greek Civil Society	Greece
122	Article	OPEKEPE – NKUA	Web site of Greek Confederation of Unions of Agricultural Cooperatives	September 2012	http://www.paseges.gr/el/news/Sto-eyrwpaiko-programma-SmartAgriFood-symmetehei-o-OPEKEPE	Farmers community, greek audience	At least Greek Civil Society	Greece
123	Interview	Cent Ma	Eurofins	Sept 2012	Bonn (Ger)	Interview with largest lab analysis service provider	FFV Pilot team	Project
124	Presentation on ECR Tag 2012	GS1 Germany / HUA WEI	Presentation on FI and SAF	September 2012		GS1 Germany clients, organisations interested in co-operations with other supply chain partners, focus FMCG	60	Germany
125	Workshop	OPEKEPE – NKUA	Presentation of the main results of the project until then	Sep 2012	Thessaloniki	International Society	International Society	International Exibition of Thes-

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
								saloniki
126	Presentation	HUA WEI	Presentation on ECR Tag	5th September 2012	Wiesbaden	International		Germany
127	Networking	DLO	Meeting with Crop-r (crop registration system in the cloud)	10 Sep 2012	Wageningen	ICT industry	2	The Netherlands
128	Networking	DLO	Meeting with Hubway, cloud platform for logistic data in the Flower and Plants business	17 Sep 2012	Wageningen	Agri-food business	2	The Netherlands
129	Presentation	CBHU	Agricultural Informatics 2012 International Conference	21th September 2012	Debrecen, Hungary	ICT community, agri-food businesses, researchers, students	100	International
130	Workshop	VTT	**3rd national SAF panel and national workshop**	24thof October 2012	Espoo, Finland	Agrifood businesses, Farmers, Logistics service providers, Consumer organisations, Other food chain members, ICT community, Researchers/higher education	18	FI
131	Workshop	OPEK EPE	Workshop "Rural Entrepreneurship ... as a way of life " that was organized by the region of Sterea Ellada and	25 October 2012	Istiea, Greece	Agrifood businesses,Civil Society, Medias		

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
			the municipality of Istiea. Presentation with subject "SmartAgriFood ... the innovated services in agri-food chain".					
132	Poster presentation	MTT	KoneAgria	25th -27th of October 2012	Jyväskylä, Finland	Farmers, machine contractors, advisors, retail, journalist, research	> 1000	FI
133	Interviews	VTT	KoneAgria	25th -27th of October 2012	Jyväskylä, Finland	Farmers, machine contractors, advisors, retail, journalist, research	15	FI
134	Workshop	OPEK EPE	Workshop "Rural Entrepreneurship ... as a way of life " that was organized by the region of Sterea Ellada and the municipality of Kimi. Presentation with subject "SmartAgriFood ... the innovated services in agri-food chain".	03 December 2012	Kimi, Greece	Agrifood businesses,Civil Society, Medias		
135	Workshop	VTT	ICT ecosystems' revolution in agriculture and food networks	4th of December 2012	Espoo, Finland	Agrifood businesses, Farmers, Logistics service providers, Consumer organisations, Other food chain members, ICT community, Researchers/higher	18	FI

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
						education		
136	Workshop	Cent Ma, GS1	Workshop of Pilots	4.-5. Dec 2012	European EPC Competence Center, Neuss (Ger)	Associated Business Partners, interested stakeholders from IT and Food Sector, Project Partners	participants	GER
137	Presentation	ATOS	Food and Health working group of the Food4Life Spain TP Workshop	15th January 2013	Madrid, Spain	Organisations related to meat, food, drinks research centers, , the CDTI (Spanish research funding organisation	40	SP
138	Networking	ATOS	SMARTAGRIFOOD application to retail	8th february 2013	CAPRABO Main office (Hospitalet de Llobregat, Barcelona, SPAIN)	Responsible of Customer Care and IT departments	2	SP
139	Presentation	CBHU	7 th International European Forum (Igls-Forum), Austria	18th February 2013	Igls-Innsbruck, Austria	ICT community, agrifood businesses, researchers, students,	40	International
140	Presentation	CBHU	7 th International European Forum (Igls-Forum), Austria	22th February 2013	Igls-Innsbruck, Austria	ICT community, agrifood businesses, researchers, students,	30	International
141	Presentation	WUR	7 th International European Forum (Igls-Forum), Austria	22th February 2013	Igls-Innsbruck, Austria	ICT community, agrifood businesses, researchers, students,	30	International
142	Presentation	CBHU	4th MoniQA International Conference in Budapest, Hungary	26th February 2013	Budapest, Hungary	agrifood businesses, researchers, students,	30	International

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
143	Workshop	VTT	4th national SAF panel and national workshop	28th of February 2013	Espoo, Finland	Agrifood businesses, Farmers, Logistics service providers, Consumer organisations, Other food chain members, ICT community, Researchers/higher education	15	FI
144	Stakeholder event	CBHU	European event of the stakeholders of the ETP food For Life	5th, March 2013	Brussels, Belgium	agrifood businesses, researchers, students,ICT industry	35	International
145	Training	CBHU, GS1 Germany, WUR	Demonstration training in Europe	6th March 2013	Brussels, Belgium	agrifood businesses, researchers, students,ICT industry	20	International
146	Workshop	CBHU	Open Day of Campden BRI Hungary	12th March 2013	Budapest, Hungary	agrifood businesses, researchers, students,ICT industry	80	Hungary
147	Training	CBHU	Training course in Hungary	13th March 2013	Budapest, Hungary	agrifood businesses, researchers, students,ICT industry	20	Hungary
148	FI PPP CONCORD policy workshop	VTT	Key policy issues identified in Smart Agrifood	13th March 2013	Brussels	Fi PPP Use case representatitves, Phase I and II, other partici-patns of various EU policy groups	25	Belgium
149	Workshop	CBHU	Natinal workshop and 4th round of national discussion	18th March 2013	Budapest, Hungary	agrifood businesses, researchers, stu-	40	Hungary

No.	Type of activities[9]	Main leader	Title	Date	Place	Type of audience[10]	Size of audience	Countries addresses
			panel in Hungary			dents,ICT industry		
150	Oral Presentation in Smart Agro seminar	MTT	Results of Smart Spraying pilot and FI-WARE	19th of March 2013	Seinäjoki, Finland	Machine manufacturers, IT developers, government, education, farmers	87	FI

3 Section B – Confidential Information

3.1 Part B1 – Applications for Patents, Trademarks, Registered Designs etc.

In the scope of the SmartAgriFood project there were no applications for patents, trademarks, registered designs, etc..

3.2 Part B2 – Exploitable Foreground of the SmartAgriFood Project

The exploitable foreground of the SmartAgriFood project is presented in this section. It is specifically listing all the different results were produced in the phase 1 of the FI PPP programme and that will also be further analysed for usage within the phase 2, specifically as input of the FIspace project.

Table 6 – List of Exploitable Foregrounds

Type of Exploitable Foreground[11]	Description of exploitable foreground	Confidential Click on YES/NO	Foreseen embargo date dd/mm/yyyy	Exploitable product(s) or measure(s)	Sector(s) of application[12]	Timetable, commercial or any other use	Patents or other IPR exploitation (licences)	Owner & Other Beneficiary(s) involved
Exploitation of results through EU policies	GUI that enables access to the facilities provided by the FMS.	Yes*	From project end	GUI frontend of the FMS	J63.1.2 - Web portals J62.0.1- Computer programming activities	From project end	Free Licensed Closed-Source	NKUA
Exploitation of results through EU policies	Implementation of the Data Collector module in the Greenhouse	Yes*	From project end	FMS Controller's Data Collector	J63 - Information service activities J62.0.1- Computer programming activities	From project end	Free Licensed Closed-Source	NKUA
Exploitation of results through EU policies	Implementation of the Data Analyzer module in the Greenhouse management architecture	Yes*	From project end	FMS Controller's Data Analyzer	J63 - Information service activities J62.0.1- Computer programming activities	From project end	Free Licensed Closed-Source	NKUA
Exploitation of results through EU policies	Implementation of the Statistical Analyzer module in the Greenhouse	Yes*	From project end	FMS Controller's Statistical Analyzer	J63 - Information service activities J62.0.1-	From project end	Free Licensed Closed-Source	NKUA

[11] Choose the type of foreground: General advancement of knowledge, Commercial exploitation of R&D results, Exploitation of R&D results via standards, exploitation of results through EU policies, exploitation of results through (social) innovation.

[12] Choose the type sector (NACE nomenclature) : http://ec.europa.eu/competition/mergers/cases/index/nace_all.html

Type of Exploitable Foreground[11]	Description of exploitable foreground	Confidential Click on YES/NO	Foreseen embargo date dd/mm/yyyy	Exploitable product(s) or measure(s)	Sector(s) of application[12]	Timetable, commercial or any other use	Patents or other IPR exploitation (licences)	Owner & Other Beneficiary(s) involved
	management architecture				Computer programming activities			
Exploitation of results through EU policies	Implementation of the Coordination module in the Greenhouse management architecture	Yes*	From project end	FMS Controller's Coordination Module	J63 - Information service activities J62.0.1-Computer programming activities	From project end	Free Licensed Closed-Source	NKUA
Exploitation of results through EU policies	Implementation of the Notifier module in the Greenhouse management architecture	Yes*	From project end	FMS Controller's Notifier Module	J63 - Information service activities J62.0.1-Computer programming activities	From project end	Free Licensed Closed-Source	NKUA
Exploitation of results through EU policies	Implementation of the Execution module in the Greenhouse management architecture	Yes*	From project end	FMS Controller's Execution Module	J63 - Information service activities J62.0.1-Computer programming activities	From project end	Free Licensed Closed-Source	NKUA
Exploitation of results through EU policies	Implementation of the Configuration Communication module in the Greenhouse management architec-	Yes*	From project end	FMS Controller's Configuration Communication	J63 - Information service activities J62.0.1-Computer programming	From project end	Free Licensed Closed-Source	NKUA

Type of Exploitable Foreground[11]	Description of exploitable foreground	Confidential Click on YES/NO	Foreseen embargo date dd/mm/yyyy	Exploitable product(s) or measure(s)	Sector(s) of application[12]	Timetable, commercial or any other use	Patents or other IPR exploitation (licences)	Owner & Other Beneficiary(s) involved
	ture				activities			
Exploitation of results through EU policies	Implementation of the FMS Registry module in the Greenhouse	Yes*	From project end	FMS Registry	J63 - Information service activities J62.0.1-Computer programming activities	From project end	Free Licensed Closed-Source	NKUA
Exploitation of results through EU policies	Implementation of the modules operating near the farm managed by an FMS.(Configuration Communication, Data Collector, Execution Module)	Yes*	From project end	Local FMS of Greenhouse Management Pilot	J63 - Information service activities J62.0.1-Computer programming activities	From project end	Free Licensed Closed-Source	NKUA
Commercial exploitation of R&D results	Expert System for Giving Recommendations for the Greenhouse Management			Expert System	J63 – Information Service activities J62.0.1 - Computer programming activities	From project end and onwards	BSD	HWDU
General advancement of knowledge	High-level definition for designing and implementing framework compliant services	No	From project end	Service framework high-level specification	J63 - Information service activities J62.0.1-Computer programming activities	From project end	BSD	MTT

Type of Exploitable Foreground[11]	Description of exploitable foreground	Confidential Click on YES/NO	Foreseen embargo date dd/mm/yyyy	Exploitable product(s) or measure(s)	Sector(s) of application[12]	Timetable, commercial or any other use	Patents or other IPR exploitation (licences)	Owner & Other Beneficiary(s) involved
Exploitation of results through (social) innovation Exploitation of results through EU policies	Tool for providing alerts and solutions for repairing in addition to task rescheduling in case of machine malfunction or breakdown.	Yes	From project end	Machine Breakdown Service Tool	J63 - Information service activities J62.0.1-Computer programming activities	From project end and onwards	Needs to be defined	JD
Exploitation of results through (social) innovation	Graphical user interface, which is based on HTML5, javascript and CSS3 stylesheets.	NO	From project end and onwards	User Interface Application (Cloud Dashboard)	A - Agriculture, forestry and fishing G46.2.2 - Wholesale of flowers and plants G47.7 - Retail sale of other goods in specialised stores H - Transporting and storage J63 - Information service activities	From project end and onwards	Free Licensed Closed-Source	DLO
Commercial exploitation of R&D results	Manages the communication between the User Interface and the Event Database.	YES*	From project end and onwards	Event Database Web Service	J63 - Information service activities	From project end and onwards	Terms and Conditions for external availability have yet to be determined	DLO
Commercial exploitation of	Manages the communication	YES*	From project end	Cloud Application Service	J63 - Information service	From project end and on-	Terms and Conditions for	DLO

Type of Exploitable Foreground[11]	Description of exploitable foreground	Confidential Click on YES/NO	Foreseen embargo date dd/mm/yyyy	Exploitable product(s) or measure(s)	Sector(s) of application[12]	Timetable, commercial or any other use	Patents or other IPR exploitation (licences)	Owner & Other Beneficiary(s) involved
R&D results	between the User Interface and the Cloud Data Storage.		and onwards		activities	wards	external availability have yet to be determined.	
Commercial exploitation of R&D results	Manages the communication between the User Interface and the Event Database	YES*	From project end and onwards	Expert System Web Service	J63 - Information service activities	From project end and onwards	Terms and Conditions for external availability have yet to be determined.	DLO
Commercial exploitation of R&D results	Predicts the quality decay of a plant of interest based on the history of its environment and expert algorithms			Expert System	J63 – Information Service activities J62.0.1 - Computer programming activities	From project end and onwards	Terms and Conditions for external availability have yet to be determined.	HWDU
Commercial exploitation of R&D results	The web service layer propagates the functionality of the backend modules to the different types of GUIs (e.g. smartphone, tablet, workstation, etc.) and offering a central connection point of the SAF platform.	YES	From project end and onwards	Web Service Layer	J63 – Information Service activities J62.0.1 - Computer programming activities	From project end and onwards	Terms and Conditions for external availability have yet to be determined	ATB
Commercial exploitation of R&D results	Reference implementation to use and present the functionalities of	YES	From project end and on-	Web UI	J63 – Information Service activi-	From project end and onwards	Terms and Conditions for external availability have yet to	ATB

Type of Exploitable Foreground[11]	Description of exploitable foreground	Confidential Click on YES/NO	Foreseen embargo date dd/mm/yyyy	Exploitable product(s) or measure(s)	Sector(s) of application[12]	Timetable, commercial or any other use	Patents or other IPR exploitation (licences)	Owner & Other Beneficiary(s) involved
	the underlying SAF platform		wards		ties J62.0.1 - Computer programming activities		be determined	
Commercial exploitation of R&D results	Reference implementation to show the tracking and product information services of the platform			Android UI	J63 – Information Service activities J62.0.1 - Computer programming activities	From project end and onwards	Terms and Conditions for external availability have yet to be determined	HWDU
Commercial exploitation of R&D results	Module in charge to abstract the lower layer and composed by a NoSQL storage system in order to be able to manage heterogeneous information based on multiple data formats.	Yes*	From project end and onwards	Data Management	J63 – Information service activities	From project end and onwards	FRAND	ATOS
Commercial exploitation of R&D results	The responsibilities of this module are handling all requests about product related information. Directly connected to the Identity Management and Security module, it	Yes *	From project end and onwards	Request Handler	J63 – Information Service activities	From project end and onwards	Apache 2.0.	ATOS

Type of Exploitable Foreground[11]	Description of exploitable foreground	Confidential Click on YES/NO	Foreseen embargo date dd/mm/yyyy	Exploitable product(s) or measure(s)	Sector(s) of application[12]	Timetable, commercial or any other use	Patents or other IPR exploitation (licences)	Owner & Other Beneficiary(s) involved
	prevents the misuse and unintended disclosure of information.							
Commercial exploitation of R&D results	Its main responsibility is propagating information caused by anomalies in products or processes.	YES	From project end and onwards	Exception Propagation	J62.0 - Computer programming, consultancy and related activities	From project end and onwards	FRAND	ATB
Commercial exploitation of R&D results	In charge to propagate manual notifications launched directly by users when irregularities are detected in the products.	YES	From project end and onwards	User Notification	J62.0 - Computer programming, consultancy and related activities	From project end and onwards	FRAND	ATB
Commercial exploitation of R&D results	Closely connected with the Identity Management GE, it is responsible to manage both specific and anonymous sessions.	Yes*	From project end and onwards	Session Management	J63 – Information Service activities	From project end and onwards	To be determine once the license of the Identity Management G.E is available	ATOS
Commercial exploitation of R&D results	Module in charge to connect different systems involved in the FFV Pilot and manage connections among the different providers in-	YES	From project end and onwards	Ext. Communication Handling	J62.0 - Computer programming, consultancy and related activities	From project end and onwards	Free Licensed Closed-Source	ATB

Type of Exploitable Foreground[11]	Description of exploitable foreground	Confidential Click on YES/NO	Foreseen embargo date dd/mm/yyyy	Exploitable product(s) or measure(s)	Sector(s) of application[12]	Timetable, commercial or any other use	Patents or other IPR exploitation (licences)	Owner & Other Beneficiary(s) involved
	volved in the Pilot.							
Commercial exploitation of R&D results	fTRACE - Output channel for traceability data	Yes	From project end and onwards	Mobile app	J63 – Information Service activities	From project end and onwards	Mobile App: Freeware App Source: Proprietary	GS1
Commercial exploitation of R&D results	Access to tailored information is achieved using the web browser and the in order to deal with both user preferences and complex access methods to scattered data.	Yes*	From project end and onwards	Tailored information for consumers application	J63 – Information Service activities	From project end and onwards	FRAND	ATOS,UPM, BP,ASI, ATB,GS1

The consortium has identified the foreground information separately per pilot into the activity IPR management.

IPR management activities are aimed to identify the final IPR of each asset developed in the pilots to guarantee that no problems are going to arise when using the assets and to clearly define the ownership or joint ownership of each asset.

Some results of the project are based on FI-WARE Generic Enables with FRAND license, the type of licences selected in the pilot assets could vary in the next phases of the FI-PPP, subject to possible changes in the FI-WARE Generic Enablers licenses.

Because the pilots are private examples of business processes that shows usage of GEs, and because they depend on the GEs they are using, the initial source app and other background that cover some needed functionalities, we can find many options about the openness of the final results, from completely open and available to some proprietary, and also FRAND. Clearly Phase II results will have more information about final licenses and usage terms of each GE and therefore a clearer business usage perspective

4 Report on societal implications

A General Information *(completed automatically when **Grant Agreement number** is entered.*

Grant Agreement Number:	285 326
Title of Project:	Smart Food and Agribusiness: Future Internet for Safe and Healthy Food from Farm to Fork
Name and Title of Coordinator:	Dr. Sjaak Wolfert

B Ethics	
1. Did your project undergo an Ethics Review (and/or Screening)? • If Yes: have you described the progress of compliance with the relevant Ethics Review/Screening Requirements in the frame of the periodic/final project reports? Special Reminder: the progress of compliance with the Ethics Review/Screening Requirements should be described in the Period/Final Project Reports under the Section 3.2.2 *'Work Progress and Achievements'*	**No**
2. Please indicate whether your project involved any of the following issues (tick box) :	
Research on Humans	
• Did the project involve children?	**No**
• Did the project involve patients?	**No**
• Did the project involve persons not able to give consent?	**No**
• Did the project involve adult healthy volunteers?	**No**
• Did the project involve Human genetic material?	**No**
• Did the project involve Human biological samples?	**No**
• Did the project involve Human data collection?	**No**
Research on Human embryo/foetus	
• Did the project involve Human Embryos?	**No**
• Did the project involve Human Foetal Tissue / Cells?	**No**
• Did the project involve Human Embryonic Stem Cells (hESCs)?	**No**
• Did the project on human Embryonic Stem Cells involve cells in culture?	**No**
• Did the project on human Embryonic Stem Cells involve the derivation of cells from Embryos?	**No**
Privacy	
• Did the project involve processing of genetic information or personal data (eg. health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)?	**No**

• Did the project involve tracking the location or observation of people?	**No**
Research on Animals	
• Did the project involve research on animals?	**No**
• Were those animals transgenic small laboratory animals?	**No**
• Were those animals transgenic farm animals?	**No**
• Were those animals cloned farm animals?	**No**
• Were those animals non-human primates?	**No**
Research Involving Developing Countries	
• Did the project involve the use of local resources (genetic, animal, plant etc)?	**No**
• Was the project of benefit to local community (capacity building, access to healthcare, education etc)?	**No**
Dual Use	
• Research having direct military use	**No**
• Research having the potential for terrorist abuse	**No**

C Workforce Statistics

3. Workforce statistics for the project: Please indicate in the table below the number of people who worked on the project (on a headcount basis).

Type of Position	Number of Women	Number of Men
Scientific Coordinator		1
Work package leaders		8
Experienced researchers (i.e. PhD holders)	10	28
PhD Students	6	19
Other	18	32

4. How many additional researchers (in companies and universities) were recruited specifically for this project?	**10**
Of which, indicate the number of men:	5

D Gender Aspects

5. Did you carry out specific Gender Equality Actions under the project?	**X** **O**	**Yes** **No**

6. Which of the following actions did you carry out and how effective were they?

		Not at all effective				Very effective
X	Design and implement an equal opportunity policy	○	○	○	○	X
X	Set targets to achieve a gender balance in the workforce	○	○	X	○	○
❑	Organise conferences and workshops on gender	○	○	○	○	○
X	Actions to improve work-life balance	○	○	○	X	○
○	Other:					

7. Was there a gender dimension associated with the research content – i.e. wherever people were the focus of the research as, for example, consumers, users, patients or in trials, was the issue of gender considered and addressed?

○ Yes- please specify

X No

E Synergies with Science Education

8. Did your project involve working with students and/or school pupils (e.g. open days, participation in science festivals and events, prizes/competitions or joint projects)?

○ Yes- please specify

X No

9. Did the project generate any science education material (e.g. kits, websites, explanatory booklets, DVDs)?

X Yes- please specify

Website, Webinar, Demos, Videos

○ No

F Interdisciplinarity

10. Which disciplines (see list below) are involved in your project?

X Main discipline[13]: 1.1

X Associated discipline13: 4.1

○ Associated discipline13:

G Engaging with Civil society and policy makers

11a Did your project engage with societal actors beyond the research community? ***(if 'No', go to Question 14)***	**X** / **○**	**Yes** / **No**

11b If yes, did you engage with citizens (citizens' panels / juries) or organised civil society (NGOs, patients' groups etc.)?

○ No

○ Yes- in determining what research should be performed

X Yes - in implementing the research

X Yes, in communicating /disseminating / using the results of the project

11c In doing so, did your project involve actors whose role is mainly to organise the dialogue with citizens and organised civil society (e.g. professional mediator; communication company, science museums)?	**○** / **X**	**Yes** / **No**

[13] Insert number from list below (Frascati Manual).

12. Did you engage with government / public bodies or policy makers (including international organisations)	
○	No
○	Yes- in framing the research agenda
○	Yes - in implementing the research agenda
X	Yes, in communicating /disseminating / using the results of the project

13a Will the project generate outputs (expertise or scientific advice) which could be used by policy makers?

○	Yes – as a **primary** objective (please indicate areas below- multiple answers possible)
X	Yes – as a **secondary** objective (please indicate areas below - multiple answer possible)
○	No

13b If Yes, in which fields?

Agriculture		Enterprise		Information Society	
Consumers		Environment		Transport	
		Food Safety			

13c If Yes, at which level?

○	Local / regional levels
○	National level
X	European level
○	International level

H Use and dissemination	
14. How many Articles were published/accepted for publication in peer-reviewed journals?	**12**
To how many of these is open access[14] provided?	
How many of these are published in open access journals?	**4**
How many of these are published in open repositories?	
To how many of these is open access not provided?	**8**
Please check all applicable reasons for not providing open access:	
X publisher's licensing agreement would not permit publishing in a repository ❑ no suitable repository available ❑ no suitable open access journal available ❑ no funds available to publish in an open access journal ❑ lack of time and resources ❑ **lack of information on open access** ❑ **other[15]: ……**	

[14] Open Access is defined as free of charge access for anyone via Internet.

[15] For instance: classification for security project.

15. How many new patent applications ('priority filings') have been made? ("Technologically unique": multiple applications for the same invention in different jurisdictions should be counted as just one application of grant).		**-/-**
16. Indicate how many of the following Intellectual Property Rights were applied for (give number in each box).	**Trademark**	**-/-**
	Registered design	**-/-**
	Other	**-/-**
17. How many spin-off companies were created / are planned as a direct result of the project?		-/-
Indicate the approximate number of additional jobs in these companies:		

18. Please indicate whether your project has a potential impact on employment, in comparison with the situation before your project:

❑	Increase in employment, or	X	In small & medium-sized enterprises
X	Safeguard employment, or	❑	In large companies
❑	Decrease in employment,	❑	None of the above / not relevant to the project
❑	Difficult to estimate / not possible to quantify		

19. For your project partnership please estimate the employment effect resulting directly from your participation in Full Time Equivalent (*FTE = one person working fulltime for a year*) jobs:	Indicate figure:
Difficult to estimate	X

I Media and Communication to the general public

20. As part of the project, were any of the beneficiaries professionals in communication or media relations?

○ **Yes** **X** **No**

21. As part of the project, have any beneficiaries received professional media / communication training / advice to improve communication with the general public?

○ **Yes** **X** **No**

22 Which of the following have been used to communicate information about your project to the general public, or have resulted from your project?

X	Press Release	X	Coverage in specialist press
❑	Media briefing	❑	Coverage in general (non-specialist) press
❑	TV coverage / report	X	Coverage in national press
X	Radio coverage / report	❑	Coverage in international press
X	Brochures /posters / flyers	X	Website for the general public / internet
X	DVD /Film /Multimedia	X	Event targeting general public (festival, conference, exhibition, science café)

23 In which languages are the information products for the general public produced?

❑	Language of the coordinator	X	English
❑	Other language(s)		

***Question F-10*:** Classification of Scientific Disciplines according to the Frascati Manual 2002 (Proposed Standard Practice for Surveys on Research and Experimental Development, OECD 2002):

FIELDS OF SCIENCE AND TECHNOLOGY

1. NATURAL SCIENCES

1.1 Mathematics and computer sciences [mathematics and other allied fields: computer sciences and other allied subjects (software development only; hardware development should be classified in the engineering fields)]

1.2 Physical sciences (astronomy and space sciences, physics and other allied subjects)

1.3 Chemical sciences (chemistry, other allied subjects)

1.4 Earth and related environmental sciences (geology, geophysics, mineralogy, physical geography and other geosciences, meteorology and other atmospheric sciences including climatic research, oceanography, vulcanology, palaeoecology, other allied sciences)

1.5 Biological sciences (biology, botany, bacteriology, microbiology, zoology, entomology, genetics, biochemistry, biophysics, other allied sciences, excluding clinical and veterinary sciences)

2 ENGINEERING AND TECHNOLOGY

2.1 Civil engineering (architecture engineering, building science and engineering, construction engineering, municipal and structural engineering and other allied subjects)

2.2 Electrical engineering, electronics [electrical engineering, electronics, communication engineering and systems, computer engineering (hardware only) and other allied subjects]

2.3. Other engineering sciences (such as chemical, aeronautical and space, mechanical, metallurgical and materials engineering, and their specialised subdivisions; forest products; applied sciences such as geodesy, industrial chemistry, etc.; the science and technology of food production; specialised technologies of interdisciplinary fields, e.g. systems analysis, metallurgy, mining, textile technology and other applied subjects)

3. MEDICAL SCIENCES

3.1 Basic medicine (anatomy, cytology, physiology, genetics, pharmacy, pharmacology, toxicology, immunology and immunohaematology, clinical chemistry, clinical microbiology, pathology)

3.2 Clinical medicine (anaesthesiology, paediatrics, obstetrics and gynaecology, internal medicine, surgery, dentistry, neurology, psychiatry, radiology, therapeutics, otorhinolaryngology, ophthalmology)

3.3 Health sciences (public health services, social medicine, hygiene, nursing, epidemiology)

4. AGRICULTURAL SCIENCES

4.1 Agriculture, forestry, fisheries and allied sciences (agronomy, animal husbandry, fisheries, forestry, horticulture, other allied subjects)

4.2 Veterinary medicine

5. SOCIAL SCIENCES

5.1 Psychology

5.2 Economics

5.3 Educational sciences (education and training and other allied subjects)

5.4 Other social sciences [anthropology (social and cultural) and ethnology, demography, geography (human, economic and social), town and country planning, management, law, linguistics, political sciences, sociology, organisation and methods, miscellaneous social sciences and interdisciplinary , methodological and historical S1T activities relating to subjects in this group. Physical anthropology, physical geography and psychophysiology should normally be classified with the natural sciences].

6. HUMANITIES

6.1 History (history, prehistory and history, together with auxiliary historical disciplines such as archaeology, numismatics, palaeography, genealogy, etc.)

6.2 Languages and literature (ancient and modern)

6.3 Other humanities [philosophy (including the history of science and technology) arts, history of art, art criticism, painting, sculpture, musicology, dramatic art excluding artistic "research" of any kind, religion, theology, other fields and subjects pertaining to the humanities, methodological, historical and other S1T activities relating to the subjects in this group]