

3 Periodic Report

3.1 Publishable summary

FOODIE is a co-funded research project within the Competitiveness and Innovation Framework Programme (CIP) programme of the EU's Seventh Framework Programme (FP7). The project is dedicated to the use and promotion of open data for agricultural applications.

FOODIE aims at enabling in an easy manner the (re)use of open data in the agricultural domain in order to create new applications that provide added value to different stakeholder groups.

FOODIE focuses on agricultural applications exemplified by three main application pilots:

- Pilot 1: Precision Viticulture (Spain)
- Pilot 2: Open Data for Strategic and Tactical planning (Czech Republic)
- Pilot 3: Technology allows integration of logistics via service providers and farm management including traceability (Germany)

These pilots, in collaboration with other stakeholder communities, will set the stage for large-scale trials in the agricultural domain with a perspective of achieving sustainable socio-economic progress in Europe.

The project has a duration of 36 months; it started on 1 March 2014 and ends on 28 February 2017.

FOODIE Context and Objectives

The agriculture sector is of strategic importance for European society and economy. Due to its complexity, agri-food operators have to manage many different and heterogeneous sources of information. Agriculture requires collection, storage, sharing and analysis of large quantities of spatially and non-spatially referenced data. These data flows currently present a hurdle to uptake of precision agriculture as the multitude of data models, formats, interfaces and reference systems in use result in incompatibilities. In order to plan and make economically and environmentally sound decisions a combination and management of information is needed.

The key point of FOODIE project is creating a platform hub on the cloud where spatial and non-spatial data related to agricultural sector are available for agri-food stakeholders groups and interoperable. It will offer an infrastructure for the building of an interacting and collaborative network; the integration of existing open datasets related to agriculture; data publication and data linking of external agriculture data sources, providing specific and high-value applications and services for the support of planning and decision-making processes.

FOODIE project is addressed to four basic groups of users:

1. Stakeholders from the agriculture sector as end-users of final applications, including: Farmers, Advisory services, Service organisations and Retail businesses
2. Public sector for communication with farmers about taxation, subsidies, regulations, etc.
3. Researchers for large scale experimentation on real data
4. ICT companies (including SME developers and IT integrators) for the development of new applications in the agriculture and food sectors

In order to realize FOODIE concept and the service platform hub, the project pursues the following objectives:

- building and open and interoperable agricultural specialized platform hub on the cloud for the management of spatial and non-spatial agriculture related data from heterogeneous sources;
- integrating of existing and valuable European open datasets related to agriculture (coming from different initiatives like INSPIRE, SISE, GMES/Copernicus, GNSS, GALILEO, GEOSS, GBIF, EUNIS, EEA, etc.);
- data publication and data linking of external agriculture data sources contributed by different public and private stakeholders, through an open and flexible lightweight Application Programming Interface (API),

allowing

- providing specific and high-value applications and services for the support in the planning an decision-making processes of different stakeholders groups related to the agricultural and environmental domains,
- providing a marketplace where data can be discovered and exchanged but also external companies can publish their own agricultural application based on the data, services and applications provided by FOODIE.

FOODIE Approach

FOODIE concepts and objectives will be realized by means of the resulting service platform hub, which will be demonstrated in three different pilots' scenarios across Europe, providing each of them thus a set of common and specific requirements:

- **Pilot 1: Precision Viticulture (Spain):** This pilot will focus on Precision Viticulture (PV), which is a key concept on the wine-growing sector. The main purposes of PV are the appropriate management of the inherent variability of crops, an increase in economic benefits and a reduction of environmental impact. Variable-rate application (VRA) of inputs and selective harvesting at parcel level are productive strategies which provide significant benefits for farmers in general.
- **Pilot 2: Open Data for Strategic and Tactical Planning (Czech Republic)** will focus on improving future management of agricultural companies (farms) by introducing new tools and management methods, which will follow the cost optimization path and reduction of environmental burden, improving the energy balance while maintaining the production level.
- **Pilot 3: Technology allows integration of logistics via service providers and farm management including traceability (Germany).** This pilot will focus on integrating the German machinery cooperatives systems with existing farm management and logistic systems as well as to develop and enlarge existing cooperation and business models with the different chain partners to create win-win situations for all of them with the help of IT solutions.

Work performed and main results achieved. Status at the end of the first year

The main objectives of the three project pilots for this period have been to further elaborate the pilot scenarios defined within the proposal and further broken down into the individual Use Cases required to clearly delineate their requirements of these scenarios, and based on the scenario Use Cases, to define additional Use Cases describing cross cutting functionality.

This has been reached through detailed analysis of the pilots stakeholders' requirements. This work has been documented in the report "Pilots description and stakeholder requirements elicitation", where a methodological procedure has been set-up for describing the scenarios use cases and afterwards identifying and collecting the requirements from the use cases. Due to the agile nature of development, this is an ongoing process, and it will continue as the actual Pilots are defined during the next periods.

The establishment of the initial "generic" use cases based on input by the three pilot scenarios served as a way to simplify the relationship between requirements and use cases, but also as a way to clearly indicate the services and components that will be required to build FOODIE service platform.

Besides, a methodological approach (documented in the report "Pilots execution methodology and evaluation plan") for the pilots' execution, which describes the different planning and execution phases of the pilots as well as how the progress will be evaluated.

The focus of the architectural work for this first period has been on creating an initial version of the FOODIE Architecture (which will be refined in an iterative manner during the next periods) as documented in the FOODIE Platform Specification Report. The architecture report, which takes as input the initial requirements collected from the pilots, has been described according to RM-ODP methodology, thus structuring its contents according

to the following viewpoints:

- The Enterprise Viewpoint reflects the policy context within FOODIE as well as the different use cases analysis conducted in the three project pilots in order to derive the necessary user and system requirements necessary to design and build FOODIE ICT platform.
- The Information Viewpoint specifies the modelling approach of all categories of information the FOODIE service platform deals with including their thematic, spatial, and temporal characteristics as well as their meta-information. As a remark, this viewpoint includes a) the core specification of FOODIE Data Model which based on the extension of INSPIRE data model for Agricultural and Aquaculture Facilities and b) definition of key aspects related to the securization of the information in the platform.
- The Components/Services Viewpoint provides a classification and high-level description of the components (and their interfaces) that are comprehended in the platform.
- The Technology Viewpoint specifies the choice of technology used to implement FOODIE services and applications
- The Engineering Viewpoint describes the lower level hardware and software components that support FOODIE platform, with special focus on the required underlying cloud infrastructure and security.

Once the initial pilot requirements were collected and the common reference architecture for FOODIE platform was established, during the second half of the period the project focused on the set up of the supporting technologies for software development, which included, among others, the selection of wiki, issue tracker, source code management, advanced source code browsing and continuous integration tools.

In parallel, the selection and deployment of the base technologies for the provision and maintenance of FOODIE cloud (based on OpenStack) and its services in a High Availability (HA) environment was performed, including the configuration of Virtual Machines (nine so far), and the installation and configuration of DBaaS underlying technologies: Postgres-XL, Virtuoso and Rasdaman.

Besides, an initial subset of the open and lightweight FOODIE APIs has been described and made available through the Swagger instance located in FOODIE cloud.

One important aspect of the project is related to the definition of a dissemination and exploitation strategy in order to disseminate the project results. The project has been very active producing dissemination material, publication of papers and posters and maintaining the project website.

A comprehensive database of relevant stakeholders (covering several EU and non-EU countries) has been compiled, and the task of contacting these for interaction with the FOODIE project will be carried out during the second period.

First concepts of the exploitation plan and business model have been produced, containing views of the exploitable results, the market situation and the project's positioning, a high-level SWOT analysis and a preliminary exploitation strategy (common strategy and also per individual partner) with the different marketing possibilities.

Finally, the project has successfully prepared and submitted a proposal under the GEOSS Architecture Implementation Pilot – Phase 8 in order to support the wide variety of demands that are primary aimed at agriculture and water pollution monitoring.

Conclusions and foresight

FOODIE has already made important steps towards implementing the vision of a cloud-based platform offering agricultural services based on open data. In its first year, the project has already achieved significant results toward the objectives of elaborating the three pilots scenarios and breaking them down into individual use cases and gathering from them a common set of requirements necessary for specifying FOODIE Architecture and identifying the services and components that build up FOODIE cloud platform. Due to the agile nature of FOODIE's development approach, this is an ongoing process, and it will continue as the actual pilots are refined during the upcoming periods.

At the time of writing, the project had already implemented and integrated some initial versions of the components of FOODIE service platform, including a data harvester for collecting periodically LANDSAT-8 imagery for

the three pilot areas, instantiation of the geodatabases and related access services, the marketplace, the semantic tagging service and a prototype of the dashboard for the farmers. This will enable FOODIE to significantly move ahead and implement further capabilities and services in the platform and start operating the three pilots in the next period.

The FOODIE Consortium

The FOODIE consortium comprises 13 organisations from 7 countries. Partners complement each other in terms of the skills and scope required to achieve the project objectives:

Industrial partners:

- ATOS (Spain) - Project Coordinator
- SERESCO (Spain)

Academia & Research:

- WIRELESSINFO (Czech Republic)
- CTIC - FUNDACION CTIC CENTRO TECNOLOGICO PARA EL DESARROLLO EN ASTURIAS DE LAS TECNOLOGIAS DE LA INFORMACION (Spain)
- PSNC - INSTYTUT CHEMII BIOORGANICZNEJ PAN (Poland)
- TDF - TEHNOLOGIJU ATTISTIBAS FORUMS (Latvia)

SMEs and End users:

- PROGIS (Austria)
- MJM LITOVEL (Czech Republic)
- BODEGAS TERRAS GAUDA (Spain)
- NETCAD - NETCAD YAZILIM ANONIM SIRKETI (Turkey)
- CONSORZIO BIM - CONSORZIO BIM PIAVE COMUNI DELLA PROVINCIA DI BELLUNO (Italy)
- ENCO (Italy)
- OZID - KUTAHYA IL OZEL IDARESİ (Kutahya Provincial Administration) (Turkey)

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