Available online at www.fooddynamics.org

Int. J. Food System Dynamics 4 (4), 2013, 246-247

INTERNATIONAL JOURNAL ON FOOD SYSTEM DYNAMICS

Future Internet for Safe and Healthy Food from Farm to Fork

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Received February 2014, accepted February 2014, available online March 2014

Editorial

At the present time, we are facing an emerging problem which will become even more urgent and critical in the coming decades: the Food and Agricultural Organization of the United Nations (FAO) estimates an increase of the world population from the current 6 billion people to 9-11 billion people by 2050 leading to a doubling of world-wide food demand (FAO 2009). In the meantime, we have already exceeded the carrying capacity of planet Earth with the current methods of agricultural production. Further globalization, climate change, growing welfare in emerging economies, a shift from a fuel-based towards a bio-based economy in the industrialized countries and competing claims on land, fresh water and labor will complicate the challenge to feed the world within the carrying capacity of planet Earth without further pollution or overexploitation. In industrialized countries, it is expected that novel technologies will decrease the gap between actual and attainable yields based on agro-ecological endowments under rain-fed high-input farming which will lead to an increase in food supply, locally up to a potential of 60% (Bruinsma 2003). Beside food security and sustainability, food safety has increasingly become a very important issue driven by scandals such as polluted baby milk powder in China or contamination of horse meat in Europe. These might be isolated incidents, but they have a huge impact on the overall perception of the integrity of food production. In relation to these issues, transparency in food networks is an important challenge, which will be explained and documented by Schiefer and Reiche in this issue.

It is generally believed that that smart, data-rich ICT-services and applications, in combination with advanced hardware (in tractors, greenhouses, etc.), can provide the much needed breakthroughs to producing enough good quality food in a safe and environmental-sound way. Therefore, the EU's Future Internet Public-Private Partnership (FI-PPP) program (www.fi-ppp.eu) aims to make service infrastructures and business processes more intelligent, more efficient and more sustainable through tighter integration with Future Internet (FI) technologies. Figure 1 gives an overview of the FI-PPP programme.

The basic idea of the FI-PPP program is to build a Core Platform for the Future Internet that functions as a common basis for various sectors. In the first phase, requirements from various sectors are handled in the FI-WARE project that builds the Core Platform. FI-WARE defines and specifies this functionality as a set of 'generic enablers' (i.e., appropriate software modules), which are common to all future Internet applications. They include: cloud hosting, data/context management, service delivery, Internet of Things, interfaces to networks and devices and security.

The SmartAgriFood project (www.smartagrifood.eu) identified the needs from the agri-food sector for Future Internet and, based on developments within the FI-Ware project on the Generic Enablers, the capabilities of FI-ICT were described by potential use case scenarios in the agri-food sector. These use case scenarios were further elaborated in pilots that developed conceptual prototypes of applications, showcasing how it could work. This was done for three subdomains: smart farming, smart agri-logistics and smart food awareness. At the end of the project a conceptual architecture that was common for all subdomains was developed. In this architecture 'things' (e.g. food products, carriers, etc.) are virtualized into the cloud and connected to other sources (data, user interfaces, etc.) after which intelligence through business rules can be applied. In this issue, Verdouw *et al*. will demonstrate how this can work for the agri-logistics domain in particular. Tröger *et al.* will highlight the use of service-oriented architectures

(SOA) and the Electronic Product Code (EPC) network in this architecture.

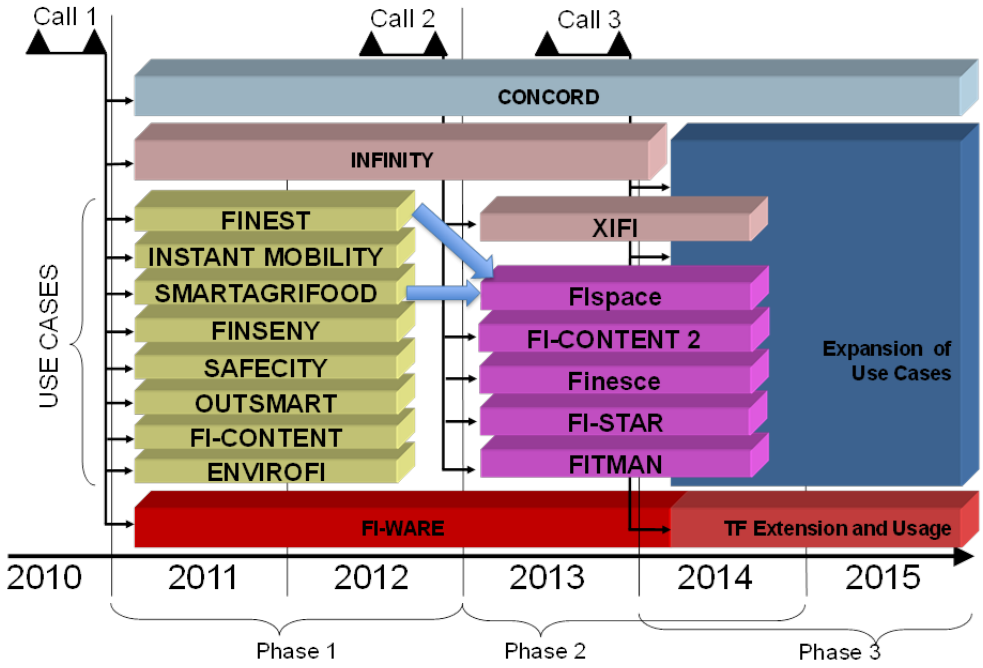

Figure 1. Overview of the European Union's Future Internet Public-Private Partnership programme. The EU's public investments are 300 M€, which are complemented by a similar amount from private companies. The programme consists of three phases 1) identifying FI needs and capabilities into conceptual architectures 2) building service delivery platforms based on FI-Ware Generic Enablers and 3) expansion of use cases based on the previous two phases. The phase 1 projects FInest and SmartAgriFood were merged into the FIspace project in phase 2.

In phase 2 of the FI-PPP program, SmartAgriFood was merged with the FInest project, which focused on the Transport & Logistics sector, but ended up with a very similar conceptual architecture than the one in SmartAgriFood. This phase 2 project is called FIspace (www.FIspace.eu) and is still on-going. FIspace's objective is to implement the conceptual architecture from phase 1 into a Future Internet–based platform for business collaboration. A specific App store will be one of the main features of this platform through which intelligent Future Internet services can be offered to end-user in their business collaboration process. Although the platform can be used by all kind of sectors, it is initially tested by trials in the agri-food, transport & logistics domain.

One of the aims of the European Commission of the FI-PPP is to include more SMEs instead of large multinationals that tend to dominate these R&D-type of projects. Therefore in the FIspace project an open call was launched for App developers, especially attracting SMEs. At the same time SMEs from the end-users side are already involved in the trials. In this issue, Sundmaeker will present a hierarchy of needs of food chain SMEs that can serve as a baseline when aiming at the usage of FI-PPP results in an SME environment.

The third phase of the FI-PPP will be dedicated to expansion of use cases through a number of projects that will also launch open calls for software developers to build Future Internet applications based on the FI-Ware generic enablers and results from the use case projects in the previous phases. This third phase is still to be started (mid 2014) and the EC expects to have up to 20 projects of which several are also expected to be in the area of agri-food business.

References

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