

## Pilot Quality Controlled Logistics in Floricultural Supply Chains

### Aims and background

The management of product quality is of vital importance in supply chains of fresh produce such as flowers and plants. The floricultural industry currently uses data loggers that record sensor data of quality conditions such as temperature and humidity. However, these data are only tracked afterwards and not in real time. The combination of new technologies for tracking and tracing (e.g. RFID), quality monitoring (e.g. wireless sensor networks) and internet connectivity (e.g. cloud computing and web services) enables real-time management of product quality in a supply chain context.

This 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).

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.



Figure 1: Mock-ups Quality Monitoring and Quality Projection Screens

### Results and applications

The main results are i) a definition of the user requirements for quality controlled logistics in floricultural supply chains, ii) the design of an information systems architecture and iii) the development of a prototype system.

The user requirements are concerned with three scenarios:

- **Quality Monitoring:** real-time access to quality information including ambient conditions (e.g. temperature), early warning in case of deviations and prediction of remaining shelf life;
- **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.

These scenarios were elaborated in a detailed information systems architecture, which 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 the Quality Monitoring scenario. During the development, mock-ups were used to define the detailed specification in interaction with the stakeholders (see Figure 1). The architecture of the developed prototype is summarised in Figure 2.

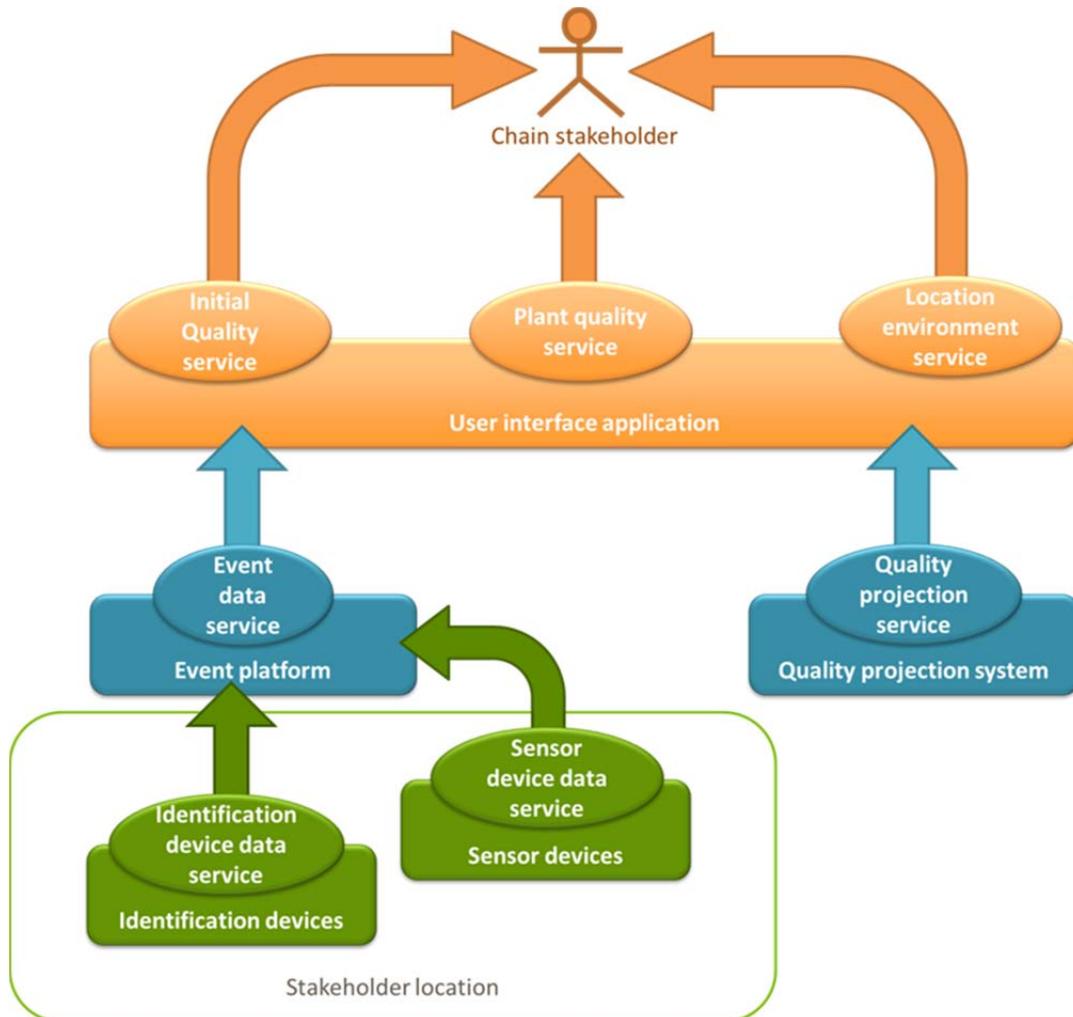


Figure 2: Technical Architecture of the Pilot Prototype

### **Significance and benefits**

The pilot has analysed and demonstrated the possibilities of Future Internet technologies for dynamic Quality Controlled Logistics in floricultural supply chains. The designed system provides practical functionalities for (i) sophisticated quality monitoring from producer to the market; (ii) dynamic and intelligent logistics management based on up-to-date quality information (including early warning, rapid scheduling, remote control and shelf life simulation); and (iii) seamless and secure interoperability. Implementation of these functionalities is expected to result in:

- significant reduction of product waste throughout the supply chain;
- shorter lead times;
- better capacity utilization;
- improvements in product quality for end-consumers.

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