Business Collaboration in Food Networks: Incremental Solution Development

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Abstract

The paper will present an approach for an incremental solution development that is based on the usage of the currently developed *Internet based FIspace business collaboration platform*. Key element is the clear segmentation of infrastructures that are either internal or external to the collaborating business entity in the food network. On the one hand, the approach enables to differentiate between specific centralised as well as decentralised ways for data storage and hosting of IT based functionalities. The selection of specific data exchange protocols and data models is facilitated. On the other hand, the supported solution design and subsequent development is focusing on reusable "software Apps" that can be used on their own and are incorporating a clear added value for the business actors.

It will be outlined on how to push the development and introduction of Apps that do not require basic changes of the existing infrastructure. The paper will present an example that is based on the development of a set of Apps for the exchange of product quality related information in food networks, specifically addressing fresh fruits and vegetables. It combines workflow support for data exchange from farm to retail as well as to provide quality feedback information to facilitate the business process improvement. Finally, the latest status of the FIspace platform development will be outlined. Key features and potential ways for "*real users and software developers*" in using the FIspace platform that is initiated by science and industry will be outlined.

Keywords: Business Collaboration, Food Networks, App Development, FIspace, Future Internet, Fruits & Vegetables

1 Introduction

Food supply from farm to fork involves several business partners that are ranging from very small organisations up to large international players. On the one hand, those business partners are cooperating on long-term relationships with defined service level agreements. On the other, the nature of the food product asks for a dynamic interaction within complex chains to cope with the offer and demand, based on the great uncertainty regarding fresh product quality as well as available volumes in time on a specific place. Therefore, the sector is characterised by last-minute changes and rush-orders. As a consequence, the required prediction and planning concept and accompanying logistics system needs to be very flexible, enabling last minutes changes and reallocations, but also provide a robust planning. Verdouw et al. (2012) presented the related requirement towards a Future Internet (FI). We are assuming that this new type of technological enablers for an FI will offer a fundamental change on how to support and realise business interaction as well as to take advantage from collaboration opportunities and innovation potentials.

Our latest work was aiming at the improvement of business collaboration in food networks that will enable the different actors to timely exchange food related information as well as to make a proper use of it. Prerequisite is the development of IT-based solutions that are disburdening the actors from manual data exchange as well as to avoid the redundant data acquisition in the overall '*food network workflow*'. Key and classical challenge is the existence or even non-existence of so-called legacy systems at the different actors in the food network, since their ways of data storage and protocols for data exchange are highly individual. Hence, business collaboration is rather old fashioned or highly specific as well as costly for specific one-to-one connections that are individually built, while both situations are lacking enablers for realising an technological environment that will facilitate the business collaboration.

At the same time, organisations need to carefully manage changes within business processes and being able to handle the often complex ICT (information and communication technology) environments. To assure the realisation of effective solutions, such innovations need to be aligned with the organisation's business objectives and being fully integrated in daily operation. Initiatives and projects are often failing due to complexity, costs and efforts. Guiding approaches are required to manage projects from initial requirements analysis towards introduction of organisational and technological changes, while our previous research is highlighting the need for an evolutionary (step wise) but continuous business process improvement process that has to guarantee the achievement or at least to cope with a holistic company wide solution. According to Kirchhoff et al. (2004), this is specifically asking for a Component Based Business Re-engineering Approach that also facilitates to focus on the elimination of those weak points in the business processes, jeopardising the achievement of the competition critical company objectives.

Finally, those efforts are converging. The realisation of the Future Internet Public Private Partnership programme can offer a technological environment that is based on sufficient up-front investments to realise the required basic infrastructure, while the methodological approach is adapted to a new dimension for app based business collaboration. This paper is outlining both dimensions and their combined usage for realising an app-based solution environment that can facilitate the business collaboration in food networks.

2 Background

2.1 Coaching oriented Support for SMEs for an Incremental Solution Development

Business process innovation and the related introduction of innovative technologies cannot be considered as an everyday task for the employees. They need to be enabled to continuously drive the company's improvement processes. We elaborated on methodologies for a so-called coaching oriented support that shall specifically help Small and medium sized Enterprises (SME) type organisations to overcome their reluctance to introduce urgently required competition relevant technologies.

According to Kirchhoff et al. (2004), the basic idea is to facilitate the innovation in SMEs by reducing the complexity within one innovation cycle. At the same time, the elaborated methodology assures not to lose the relation to the identified business objectives. This enables the realisation of separate innovation and change cycles that are logically connected to a holistically planned and prioritised improvement/ innovation, while each cycle is combining changes within the business processes with the related ICT. Each innovation cycle is structured in three main life-cycle phases, the analysis & conception, the specification & selection and the implementation phase. At the end of each phase, the team needs to review the key decision points for being able to decide on continuing the planned innovation or to stop the related efforts. This needs to be based on a cost-/ benefits estimation of the envisaged improvement measures. After implementing a solution the need for corrective actions has to be analysed. This needs to be based on the benefit proof of the improvement measure. For a structured approach, the life-cycle phases are organised at additional sub-decision points that are required for being able to make the key decisions at the end of each life-cycle phase. Moreover, the sub-decision points also facilitate to stop an innovation cycle or to reiterate on identified issues.

Those innovation cycles can be considered as increments for solution development. Due to the systematic and structured approach, those increments can be realised in a sequential sequence as well as realised in parallel. The clear assignment to the identified weak points and the business objectives to be achieved are enabling to not to lose the innovation focus or to address different improvement measures at the same time. The innovation results shall be measured with related key performance indicators (KPI) to learn from successful as well as not successful measures. Moreover, there shall be KPI that can quantify gains w.r.t. savings and productivity increases. This will allow an assessment of the envisaged Return of Investment period, taking into account the efforts and costs for realising the improvement measures.

2.2 ICT Support for the Networked Enterprise

For being able to supply food from farm to fork, the related actors need to collaborate in a sequential supply chain or even in more complex network structures. Therefore, food chain SMEs can be characterised as kind of "*networked enterprises*". Those networked enterprises can benefit from interconnected ICT systems to reduce the effort for information exchange and interactively use ICT supported features for planning and control of interaction (e.g. order management, transport monitoring, tracking & tracing). According to Sundmaeker et al. (2010) such an ICT system support can be assigned to business processes as an intermediate support between a supplier and its customer in a supply chain, while the governance needs to be realised in relation to the processes. This support needs not, but from system efficiency view point, could be interconnected with business systems in the organisation (e.g. ERP, order management, FMIS – with ICT system governance in relation to the organisation). However, any interfacing with existing systems causes related efforts and costs as well as requires time for harmonising the individual environments. This triggered our previous work in aiming at the development of a so called "networked devices enabled intelligence" that is able to provide process related features, while implementing an ICT support that is working fully decentralised, leading to a governance model that is related to the networked device or a "thing".

The idea was to combine such digital networked devices (i.e. enhanced RFID-based systems) as physical object with the real product that is traveling along the supply chain. The networked device offers the capability to instantiate virtual representations of process related objects (e.g. product, returnable transport item, shipment, order). At the same time, the networked device can provide required functionality for e.g. an event-based operation, localisation, information acquisition and/or monitoring. Challenges remained specifically with respect to the interoperability of existing systems at the individual actors, costs of devices, and security constraints when trying to allow external systems to access available systems used at a specific organisation. It was considered specifically questionable, if the available multi-agent platforms can cope with requirements with respect to robustness, scalability and security compared to available service oriented architectural frameworks used within Internet based solutions.

However, a basic concept addressed was the usage of so-called "shared zones" for being able to exchange information between collaborating business entities as well as decouple internal systems from an external access. Especially the idea of distributed data storage is considered as key requirement for solutions that would be accepted by the business stakeholders. At the same time, the collaborating business partners need to be enabled to control the access rights in relation to the business interaction as well as triggered by exceptional events like emergencies that are due to situations when produce is e.g. contaminated with bacteria or pesticides at a hazardous level. Therefore, the basic idea was to separate the data fragments, functionality and related interfaces for being able to realise the concept towards a networked devices enabled intelligence that can provide added value features for collaborating business partners.

Separating the design of an ICT system in such fragments of functionality directly corresponds to the idea of realising increments of a larger solution and not an overall system straight forward. The SME will be enabled to select those technological increments for development that can directly contribute to the elimination of those weaknesses that were prioritised with highest importance and/or urgency. On top of that, the coaching oriented support for the elimination of weaknesses can only work properly, if such a focused and incremental realisation of ICT systems is possible, since the underlying ICT architecture needs to be able to facilitate compatibility of increments as well as their evolutionary combination.

2.3 Innovation Potentials of the Future Internet Public Private Partnership Initiative

The Future Internet Public Private Partnership (FI-PPP) is an initiative funded by the 7th Research Framework Programme organised by the European Commission. As further outlined by Sundmaeker (2013), it mobilises resources of some 500 mEuro public and private funds for realising a multi-disciplinary and integrated approach for being able to develop technological enablers that are representing a kind of up-front investment in the technological infrastructure that is paving the way towards the realisation of a Future Internet. This technological environment currently under elaboration is providing so called generic enablers that are required by different types of business related use cases (e.g. food chain, logistics, multi-media, manufacturing, health, energy). Moreover, the generic enablers are combined for business related purpose in the form of FI-enabled platforms that are providing the baseline functionality for the usage of innovative software applications (apps). For the first time, a large number of EC funded research projects are aiming at the realisation of a common technological environment, aiming at the provision of technologies that help to drastically reduce the development effort as well as providing a baseline for generating growth and jobs.

Initial pilots and further trials of FI enabled ICT are realised in close cooperation with several business partners. Especially due to the nature of the technology and the architectural approach, the FI-PPP results and specifically the business collaboration platform that is currently being developed by the FIspace project is promising an easy adaptation to business needs and facilitating the incremental solution development that was difficult to achieve with other technological approaches. FIspace is specifically addressing the business collaboration in food networks as well as logistics and transport matters, aiming at the realisation of an app-based solution environment to facilitate business collaboration, to:

- Support dynamically changing interaction of business partners
- Facilitate exchange of data between stakeholders
- Assure a secure data storage and controlled ownership
- Limit effort and costs for system and process redesign

The following chapter is outlining the overall FIspace concept and related principles that can help to support SME type business partners to benefit from the Future Internet enablers.

3 Incremental Solution Development for Business Collaboration in Food Networks

The realisation of the FIspace platform aims at the development of supporting features for collaboration of business partners. The main focus of the ICT support is on features that can be used in the direct collaboration of different business actors. It is not focusing on the technological support of internal tasks within an organisation but all those activities that are in direct relation with e.g. suppliers, customers or consulting experts. Therefore, existing/ legacy systems in the organisations shall not be replaced by the FIspace concept, but being complemented with added-value functionality.

The platform combines basic capabilities to offer an entry point for trusted business collaboration, offering the related front-end and components that can take care for flexible workflow control and integration with existing systems. Business collaboration related features are provided by so called “Apps”. They can be selectively combined to provide specific functionality required in the inter-organisational workflow. The following Figure 1 is presenting this overall approach as baseline for the incremental solution development.

The FIspace platform is providing a complete set of components that allows an operation within a business to business context. All those features that are technically relevant for the direct interaction between the organisational ICT environments are located in the cloud, based on a secure and scalable infrastructure. It also provides a basic front-end that is also the representation layer for the basic settings and the related user and organisational interaction management. Due to the business context, this requires an additional consideration compared to social network type of platforms that do not need a hierarchical and profile based access and privileges management. It can facilitate the matchmaking of individuals as well as of businesses, just in accordance to the willingness of each business actor.

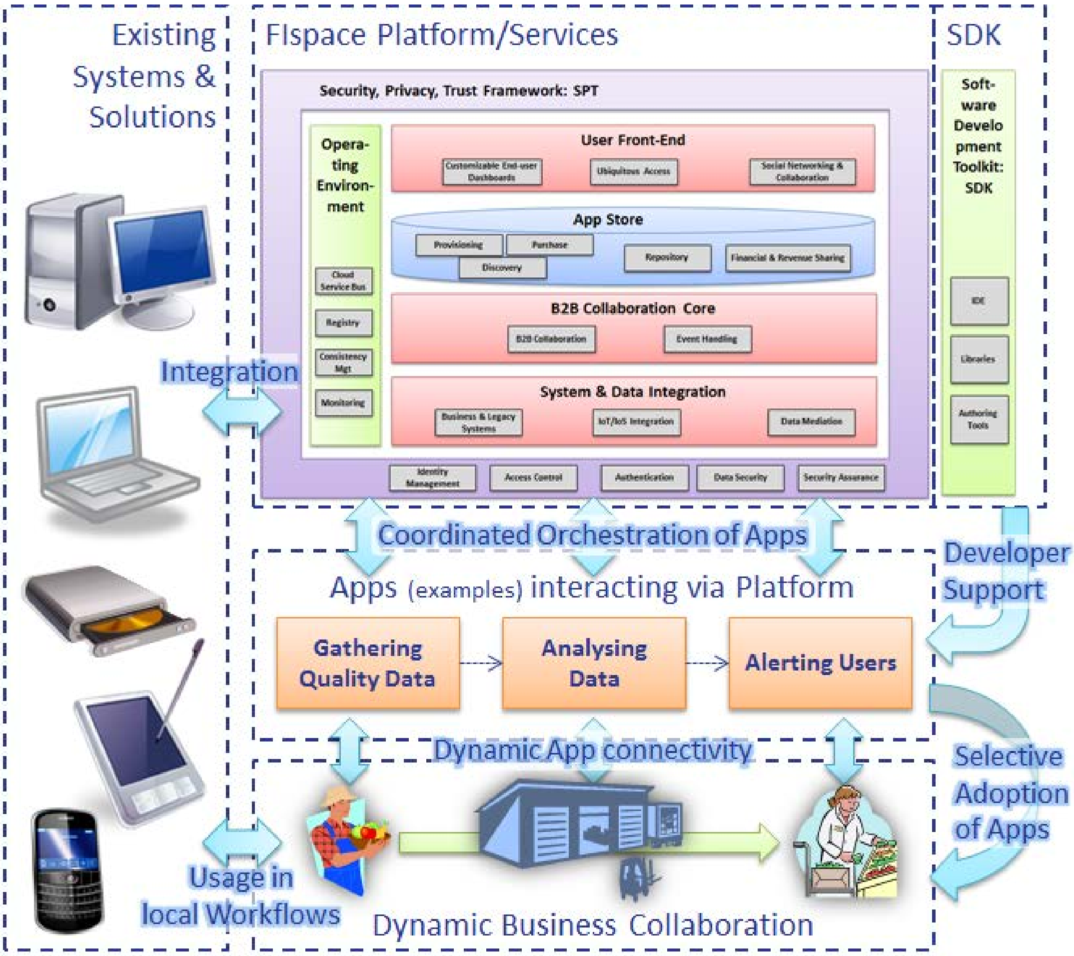

Figure 1. FIspace platform and app model for dynamic business collaboration and incremental solution development.

At the same time, the platform provides an app store that provides the basis to motivate developers to provide their services to a large professional target audience, while the collaborating business partners can easily trigger the uptake of certain functionalities by the business partners. Therefore, in the core of the platform, it also contains a business to business collaboration core that enables a business architect to specify the workflow, logically combine the usage of different Apps and collaboratively design the steps of interactions between different business actors.

The critical mass in using such a platform is of utmost importance. On the one hand, users need to get acquainted with the benefits in using the platform. On the other, as a kind of hen and egg problem, developers need to be involved to develop such Apps that are required for optimally supporting the business interaction and underlying workflow. A software development kit is provided that will provide the required guidelines and APIs for usage of the FIspace platform functionalities as well as the toolkit for configuring and customising the Apps and the platform.

As a baseline, the first version of the FIspace platform will also be equipped with a number of “Initial Apps”. These initial apps are representing basic functionalities that can be used by different business actors. The development of initial apps targeted at such kind of features that are likely to be reused by different types of actors as well as of different business sectors. Furthermore, it was searched for apps that cover a series of interaction in the business chain. This allows for an orchestration of apps, while workflow events are triggering the interaction between organisations and in between the related apps.

The business architect can carefully decide in close collaboration with the business actors on which functionality shall be made available in the workflow. The integrated approach of the platform allows but does not immediately ask for an interfacing with legacy systems before an App can be used. The selective approach allows to experience the App based features before being able or having the time, resource and budget to allow for a full integration with existing systems. A business actor might even decide to use certain app based functionality with some additional manual effort, but being able to immediately and dynamically interact with numerous business partners in its large professional business added-value network.

An App based flexible approach for exchanging product quality related data within a collaborative food network is presented in the next section, outlining key features and the flexibility with respect to reuse, data models and functionality.

4 Product Information Exchange within Collaborative Food Networks

4.1 Product Information Exchange in Food Networks

A set of pilots active within food networks was analysed in the scope of the SmartAgriFood project that served as input for the FIspace initiative. The following Figure 2 is presenting the different products and steps in the chain that were considered.

A so called Product Information App (PIA) was designed and is currently under development. The main goal of the PIA is to enable product information exchange between the stakeholders of a supply chain, based on the B2B collaborative and system integration capacities offered by the FIspace platform. The PIA enables the exchange of product related characteristics along the workflow/product flow specifically focusing on a food chain, and finally allowing access to information that flows via several nodes in complex supply networks. This includes the information flow from farm to fork as well as vice versa. On the one hand, actors in the chain as well as the consumers are interested in the product characteristics to check for certain quality characteristics as well as to properly control the flow of produce (i.e. also enabling the withdrawal of harmful produce). On the other, also the suppliers of food are interested in the feedback from their customers and the customers of their customers to get an understanding on how to improve their offerings and process design.

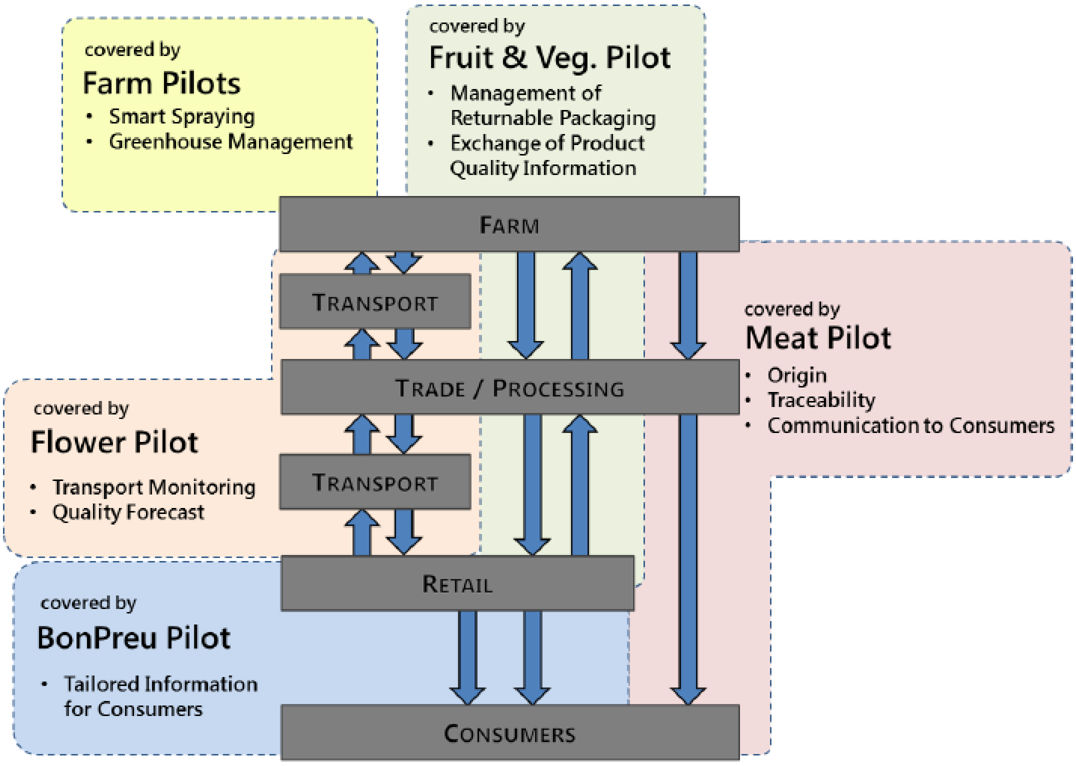

Figure 2. Reference pilots as defined in the FI PPP phase 1 project SmartAgriFood, outlining the business collaboration of stakeholders in food networks, described in Deliverable D800.4.2 (Public Final Project Report) of the SmartAgriFood project.

The basic objective for developing a PIA is to provide support to the different stakeholders and stages in a supply chain/network. The product information app cannot be considered as a single solution that would fit all needs in the chain. Instead, it needs to be configurable for being able to address the specific needs of different supply chain actors. Each related app configuration includes specific features that are assigned to business stakeholders in the food chain/network. To accomplish this objective the following strategies were applied:

- Identifying specific features that are either used by one stakeholder or are reusable features so as to avoid redundant implementation effort.
- Focus on specific pilots for prototyping efforts to enable the gathering of feedback from real end-users (i.e. specifically involving the fruit and vegetable and tailored information pilots for the functional features; involving the flower, meat and greenhouse pilots for working on the product information model).
- Splitting app development into two main functional bundles; forwarding and feedback of information in the chain (i.e. focusing on provision of data in a raw way along the chain) and the transformation of data into knowledge based on preferences and rule settings (i.e. with a first focus on the provision of knowledge from retailers to consumers).

In the following, especially the app with respect to the business to business related forwarding and feedback of information in the chain is outlined. It is designed to allow capturing of, and access to, product quality related information that flows via several nodes in complex supply networks. The main features of the PIA-App include:

- Easy and secure exchange of product quality related information between supply chain partners, while avoiding centralized storage of information. This is to ensure the PIA-App ability to store data decentralised to facilitate an acceptance of business stakeholders. Nevertheless, it would also be possible to store data in centralised databases reachable via an Internet connection.
- Access control over own product data by supporting private data sources per stakeholder with access management.
- Provisioning of product information from trusted sources (business relations established via FIspace).
- Access to information that is published by the supplier(s).
- Enabling bi-directional communication through the supply chain, especially with a focus on product quality related feedback with respect to shipments forwarded in the chain.

4.2 Information Model Development of the PIA-App

Products and related information do not stand for themselves – there is always a context. In FIspace this context is the business collaboration between different actors within a supply network. To structure the exchange of product-related information between supply chain actors, three main stages were identified:

1. Initial supply of goods and capturing of initial product information.
2. Aggregation, disaggregation and processing of goods, adding and forwarding of associated product information, baseline for traceability by linking incoming and outgoing goods and
3. Receiving product information (accumulated along the supply chain) of incoming goods and establishing the basis for providing product information to customers.

Products are exchanged between actors in the supply chain. Related shipments are forecasted, planned, ordered, announced, aggregated, transported, delivered, checked and paid. In combination with those shipments, the stakeholders in the food chain need to forward information with respect to product quality related characteristics. Therefore, for the food-supply chain the shipment has been identified as business entity between actors. The PIA-App deals with the virtualization of shipments between supply-chain actors using FIspace. In these virtualized deliveries, process and product related information is included. In the following we refer to the combination of product name, product quality information, and quantity as well as packaging information as “item” in a virtualized shipment.

The first release of the PIA-App includes three different configurations. Each of them is addressing a specific stage in the supply/information chain described above. However, the main purpose of this first PIA-App release is to validate the app functionality and elaborate business requirements together with trial partners. This iterative process of validation and app refinement is ongoing and will lead to more specific requirements and more mature functionality in the second release of the PIA-App.

To facilitate a first test, master data records of the PIA-App were designed in the scope of the Intelligent Perishable Goods Logistics domain and focused on the Fresh Fruit and Vegetables Quality Assurance Trial. Within this trial the three stages of the supply chain are represented by following types of actors: farmers, traders and retailers. For each actor type there is a special configuration of the PIA-App. The “Trader App” (incoming and outgoing goods) covers the complete bandwidth of functionalities offered by the PIA-App. The “Farmer App” (outgoing goods) and the “Retailer App” (incoming goods) only provide a subset of the functionality. For simplicity we refer to these three configurations as “PIA-App” and only use the terms “Farmer App”, “Trader App” and “Retailer App” where the distinction is necessary.

Shipments have domain-independent information attached such as customer, supplier, delivery number, date and location. Domain-specific information concerns the type of products, their packaging, and possible product information attributes (e.g. country of origin, date of harvest, GTIN, or quality certificates). Such domain-specific information could be provided in the form of data records describing products and associated attributes to adjust the PIA-App to various domains. The requirements regarding products and associated product information attributes have been collected from different trials. After a first consolidation round and taking the shipment-centric view into account, a first version of the data model for the PIA-App has been developed (see Figure 3).

The PIA-App data model is separating the data in a process and product related part. The basic idea in terms of reusability was as follows:

- ***Process related data:*** This data needs to be generally considered when exchanging a product within a chain. It is also used to uniquely identify a shipment and the related stakeholders.
- ***Product related data:*** The focus was on designing a reusable data model. To achieve this objective the “information item” is representing a kind of template for storing all the required information items that can be somehow put in relation to the product quality. Such a data base can be dynamically extended and is not limited to a predefined set of items that are selected at design time. On top of that, the data model can be used for different product types.

Moreover, this approach is not determining/predefining the usage of a certain standard, but to allow the usage of the most appropriate standard for data exchange in accordance to the needs of the stakeholders. Therefore, the development of the PIA-App is not driving standardisation tasks, but aiming to use available standards and the related master data for being able to populate the data base. The usage of such standardised master data shall also be promoted to facilitate the interoperability within the food chain, while the data model and the app themselves shall not limit its usage to a specific numbering scheme. It shall be specifically compatible to diverse identification schemes (used by different actors on also different levels of packaging and transport) as well as to allow adding, deletion, replacing or extension of product information that shall be exchanged within the supply chain/ network.

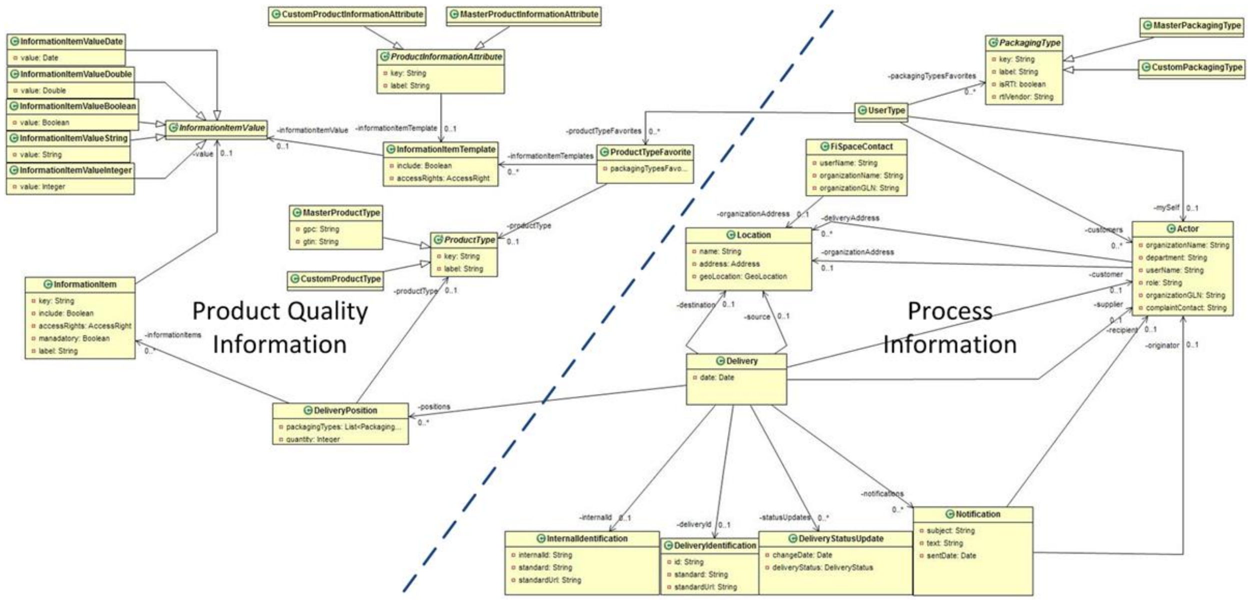

Figure 3. PIA-App Data Model.

Therefore, it is envisaged that trials addressing the forwarding of different products can use the PIA-App, while the underlying master data need to be individually compiles and imported as configuration in the data base. The basic functionalities for gathering, compilation, forwarding and reception of information can be generally used. The specialisation of the PIA-App is realised with respect to two dimensions:

- Stakeholder related configuration – the PIA-App is configured with respect to the type of stakeholders. There were three main types identified:
  - Farmers as initial actors in the chain gathering the initial data that is relevant in the subsequent food chain stages.
  - Traders or manufacturers that are receiving products from their suppliers and are forwarding products to their customers. Within their organisation, they are aggregating and disaggregating deliveries received before. Therefore, they need to track such internal activities for being able to support the identification of which of their inputs are matching with the outputs of their organisation.
  - Retailers that are finally receiving batches of products and are providing individual food products to final consumers that are interested in diverse quality characteristics.
- Product type related configuration:
  - It is assumed that specifically the process and entity related information can be used in different business sectors. The need for specific product related information is varying in accordance to product types to be forwarded in the chain.
  - It is possible to configure products that the organisation supplies. This could be done manually what would impose a large effort and could cause many differences in wording and spelling of same types of products. Therefore, the PIA-App can be configured with master data in relation to the products handled in the chain.

4.3 Implemented features of the PIA-App

For the first release of the PIA-App the following features have been implemented in form of frontend prototypes and a rudimentary backend with simulated platform functionality:

- Overview of the history and current status of incoming and outgoing shipments.
- Composition of outgoing shipments of products.
- Assign product information to products of an outgoing shipment.
- Set access rights for product information.
- View and edit the details of an outgoing shipment (products, packaging, and product information).
- Announce deliveries to customers.
- Accept or reject incoming goods and give product quality feedback to suppliers.
- Establish traceability of products by linking outgoing to incoming products.
- Configuration of the app
- Load and save templates of (re-occurring) shipments.

Finally, the PIA-App consists of frontend, backend and data storage. The paragraphs below describe the current status of development and envisaged functionality for each of the three components, while the presented setting was developed for the integrated test along the platform development, simulating certain functionality finally located in the platform itself.

- Frontend:
  It contains the GUI for user interaction, and input validation as well as display logic that is mainly concerned with enabling, disabling and dynamically adding/removing GUI elements depending on the current state of the shipment and on actions of the user. The frontend is provided in the form of a W3C widget using HTML, CSS, and JavaScript. For the communication with the backend the frontend uses AJAX.
- Backend
  The backend connects to the FIspace Platform and to interface with the app data storage. Currently it serves as connector between the data storage and the frontend and simulates aspects of missing platform modules (e.g. accessing FIspace business contacts). In further releases an API will be exposed that makes parts of the app's functionality accessible to other apps via the FIspace Platform. The backend prototype is implemented in Java and provides RESTful web services to the frontend to perform CRUD operations on the App data storage.
- Data storage:
  To store data (to be) exchanged between stakeholders in the food chain, the app requires a data storage accordingly. Currently, it is realized in the form of a MongoDB database utilizing the Spring framework. It is connected to the backend where requests of the frontend are translated into queries to the database. The results of these queries are sent back to the frontend in the form of JSON data structures from which information items can be read and directly used by JavaScript.

The following Figure 4 is presenting one screenshot out of the different GUIs of the PIA-App, presenting the user interface to assign the specific produce to a shipment. Every new shipment that is being composed starts with the status "In Work". Once the user has finished working on the shipment with the app, he can announce the delivery to his customer, which is accompanied by a status change from "In Work" to "Announced". In the case of the farmer, the customer would be a trader (or possibly a retailer). The app – by means of the FIspace platform business to business collaboration core – sends the information about the announced delivery to the customer (trader or retailer) app. From that point in time, the customer can also view the details of the shipment. When the user ships the physical goods represented by the announced delivery, the status shall be set from "Announced" to "In Transport". In the case of farmer and trader, the Farmer App relays the status change to the Trader App.

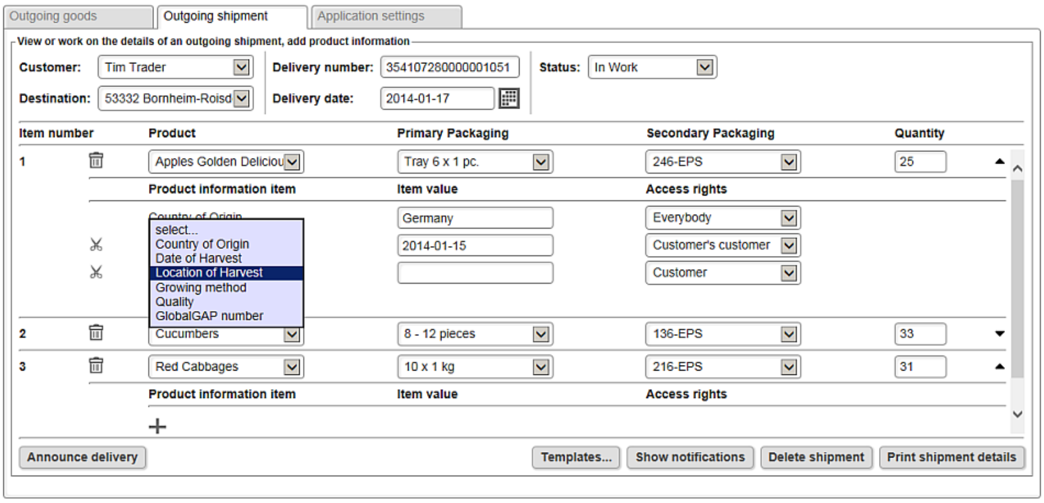

Figure 4. Composition of an outgoing shipment and assigning product information.

Finally, via the platform based orchestration, the app can be combined with diverse app in the overall food chain workflow. Each app used for a specific purpose at a business actor can be considered as a kind of increment that represents one element of the overall solution. The decoupled realisation and adoption of apps by the different actors limits the risk and need for investment with respect to business process analysis & design as well as for the implementation and configuration within the organisation.

5 Conclusions

The business collaboration in food networks is characterised by a high number of interacting SMEs with a large variety in using ICT support. Generally, solution development for eliminating weaknesses and increasing the competitiveness in food networks is asking for the realisation of innovation cycles as kind of increments for solution development to be realised in a sequential sequence as well as in parallel. The FIspace platform and the approach of providing apps that can be orchestrated according to the demands identified in the workflow enables a new dimension for saving efforts, time and costs. The platform provides the related up-front investment that needs not and cannot be tackled by individual SMEs, but by a joint European effort realised in the FI-PPP programme.

We were outlining the basic features of the FIspace platform and on how to use its key features within the scope of realising an integrated workflow support in food networks. In combination with this, we were presenting the latest status in developing an app for exchanging product quality related data within food networks. It is a configurable app that can be used in different steps of the food chain as well as for different types of products. It can be used just as an app within the workflow (configured in three specific apps to provide the appropriate features to the different types of stakeholders – farmers, traders and retailers), while also offering the opportunity to interface with legacy systems via the FIspace platform components. The PIA-App is focusing on the exchange of product quality related information. The app is enabling to collect and to forward information as well as to make information sources accessible. To facilitate the unique identification of products as well as to enable the realisation of traceability, the information is combined with the unique identification of related shipments.

The first release of the PIA-App was developed and is currently under test. Further involvement of business end-users is currently being organised and managed to validate the usability and flexibility of the app as well as to identify additional functionalities that can generally improve the business collaboration between business actors in collaborating food networks.

6 Acknowledgement

The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement number 604 123.

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