



WP2: Quality and integrity in food: a challenge for chain communication and transparency research



D2.2: European tracking and tracing backbone solution feasibility study

One of the objectives of the Transparent Food project is to create a blueprint proposal for a European Backbone Solution that provides basic and simple functionalities to enable integration of tracking and tracing systems across system boundaries and chains. After an initial requirements analysis, methods and technologies that can be used to build such a solution have been gathered, analyzed and evaluated. Reuse of existing standards and leveraging the capabilities and networks of existing organizations is a crucial factor in facilitating build-up and uptake of the envisioned backbone.

Organizational resources

Various organizations provide standards and directions for data and information management in supply chains and in the food and agricultural sector. Both public and governmental bodies (e.g. UN/CEFACT and UNECE on a global level, EFSA on a European level, limited term projects such as EuroFIR, various national governmental bodies) and private associations (e.g. GS1, EPCglobal, OASIS) are involved in this work. There are also a number of organizations providing basic and generic information technology standards (e.g. W3C, IETF, ISO JTC1).

Protocol

Protocols providing data exchange mechanisms in the eBusiness, supply chain and food sector include EDIFACT, the newer standard ebXML and EPCIS as a standard for the exchange of data on product movement. Most of the protocols currently available are based on the design paradigm of remote procedure calls using the SOAP technology. Considering the scalability, flexibility and extensibility requirements given by the number of stakeholders involved and their different interests and the simplicity necessary to be able to also integrate small enterprises, these mechanisms are only suited in part for a backbone. Backbone services should rather follow a RESTful paradigm, that allows for easier global scalability and facilitated reuse of data in different contexts. RESTful web services are already in use by some of the system providers, and the method calls of HTTP upon which they are based are simple to implement and well understood.

Syntax

The most common syntax for data structuring is currently XML, used for example in ebXML, EPCIS or agroXML (in agriculture). An alternative to be considered is JSON, which is less verbose and more compact and thus allows for more efficient bulk transfer.

Semantics

Successful data exchange among anonymous partners on a global scale requires the use of controlled vocabularies. The most promising standards to build vocabularies are currently RDF, RDF Schema and SKOS. They provide methods to describe terms and relations among them and to build statements describing certain resources (objects, documents, processes etc.). Tools and programming libraries for these standards are readily available. Two main types of classification systems have been established in the food sector: hierarchical classifications as used by the EFSA, and faceted classification such as LanguaL. The AGROVOC thesaurus by the FAO is nowadays the most comprehensive multilingual thesaurus and vocabulary for agriculture.

Identification

To identify real-world objects, they can be marked using RFID, human readable numbers, bar codes or two dimensional barcodes like the DataMatrix code. The information stored in the tag most commonly is the Electronic Product Code (EPC), the Global Trade Item Number (GTIN) or a Uniform Resource Identifier (URI). Dereferencing mechanisms allow these identifiers to be used as addresses to execute service calls to request further information upon certain objects. 2D-Codes also allow for the encoding of further information such as expiration date, serial number etc.

State-of-the-art in other industries

In the pharmaceutical industry, unique serial numbering of single smallest sales units is increasingly common to prevent fraud and counterfeiting. High efforts caused by this approach are justified by the benefits created in this sector and the high risk to human injury or death in case of problems with pharmaceuticals. Electronic tracking of wastes is now mandatory in Germany. This includes a sophisticated system for electronic signatures of XML documents to ensure authenticity, non-repudiation and identification of responsible handlers.

Outlook

To achieve flexible and dynamic information exchange the problem that various data dictionaries, thesauri and encoding systems within the food and agricultural sector exist which can not easily interoperate with each other has to be tackled. Another issue is management of unique identifiers for objects that are usable, accessible and affordable to small and medium sized enterprises in the food sector.

To gain a clearer understanding of processes, a number of example tracking and tracing scenarios involving the special characteristics of food sector processes and products will be described and consequences, advantages and disadvantages of applying the technologies and methods mentioned above will be analyzed. From the experiences and knowledge gained, the backbone solution proposal specification can then be put together.

More information

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