Chapter 10

From the Farm to Fork: Information Security Accomplishment in a RFID Based Tracking Chain for Food Sector

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ABSTRACT

In this chapter the authors present their information model implemented for one pilot developed in the “RFID from Farm to Fork” (F2F) project which looks for the extension of RFID technologies throughout the complete food chain. They describe the privacy assessment proposed by the European Union that allows the evaluation of the privacy and security impact for a RFID application under study. The main privacy risks have been identified and described by the related EU Directives concerning RFID technology. The authors describe the questionnaire elaborated by the EU to assess the privacy robustness level of a RFID application, and they showcase a real wine pilot deployed in Spain. In this chapter, the authors also examine the privacy risks in the middleware communication with both RFID reader and back-end system. The EPCIS has been the Open Source middleware solution adopted in the F2F project. For the F2F pilot deployed in the wine sector, the authors describe the privacy impact assessment questionnaire designed for this case. Finally, they discuss the threads on the RFID tags, the advantages provided by the WISP technology in this regard and its repercussion on the risk questionnaire.
INTRODUCTION

The production and distribution of food is one of the largest and most important activities in each country all over the world. Because of this extension of food economy, different new proposals appear to improve the quality of the products and the information received by the consumers.

The RFID technology is largely suitable to ensure traceability along the complete production chain, enabling also to collect information from the final customer. As in other information systems, RFID is not exempt of security threats and vulnerabilities, then it is required to define and implement strategies to assure privacy, data and information protection, as well as security in applications, for all users along the production chain and final selling points.

Even that the specific security and privacy risks are strongly dependent on the RFID application, the main points susceptible of risks are the tag, the reader, the air interface, the middleware communication with the RFID reader and the back-end system. As we explain in this chapter, both regulations and assessment are required to prevent security and privacy risks.

This chapter presents the works regarding the privacy and information security developed along the project “RFID from Farm to Fork”, a CIP-Pilot action involved within the 7th Frame Work of the European Union. Our proposal looks for the extension of RFID technologies throughout the complete food chain from the farms where cows, fishes, sheep, grapes, etc. are grown to the final consumer at the supermarkets, including all intermediate stages: transports, factory, processes, and storage. The main objective is the use of only one system to perform the complete traceability, recording data at each stage. These data could be useful to determine the perfect condition of the final product, but also to control the process during the elaboration. Thus, both final consumers and producers would take advantage of such systems.

The final consumers could obtain different data above the whole process undergone by the product they are buying, just by moving the object (labeled with a RFID tag) in the surroundings of a RFID reader, which can be installed in the supermarket or even as an application developed for personal smart phones. The individual identification of the product allows the software to obtain a complete traceability report from a central database, and to bring the consumer this information. Each of the producers along the chain could use the identification by radio frequency to control his production and storage, and to know some previous information of his ingredient matters. The project involved both the design of the complete system and its tests at different stages of the chain: fishing companies, wine producers, food transporters, and final users, in order to define the actual interest of the system, its performance, and its advantages and disadvantages.

The project showcases the ability of RFID technologies to make a return on investment for small and medium sized enterprises (SMEs) in the food industry, as well to provide large information to the consumer. The opportunities for such a return on investment arise from the following:

• Opportunities to create markets for premium products (organic, etc.) if technology can address authentication, condition monitoring and quality control.
• New opportunities are created to increase quality, reduce wastage, reduce energy used for refrigeration, reduce chemical usage for preservatives, optimize carbon use, etc.
• Impact on competitiveness and productivity gains.
• Potential for new markets for food producers in the regions.
• Increased productivity through reduced wastage.
• Authentication of origin, process and transport of products.