

CoBIs: Collaborative Business Items

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1 Project Summary

Wireless Sensor Networks are seen as one of the most promising technologies that will bridge the physical and virtual worlds, enabling them to interact. Expectations go beyond the research visions, towards their deployment in real-world applications that would empower business processes and future business cases. This is achieved by delivering new innovative solutions that were not possible before, or enhancing old approaches.

The CoBIs project (CoBIs 2007a) has developed a radically new approach to business processes involving physical entities such as goods and tools in enterprise environments. Advances in networked embedded systems have been applied to embed business logic in the physical entities to create so-called Collaborative Business Items (CoBIs). Such items enable to relate more closely the state of an enterprise as represented in a business process with what is actually happening in the real world. Thereby, business processes can be extended to the “point of action” rather than via a centralized back-end system.

Application trials were conducted to show how the technology developed can be applied to a real-world setting and how it can help to manage chemical inventory, increase stock visibility, and reinforce storage and workers’ safety regulations in the domain of the oil and gas industry.

The project was funded by the European Commission under the identifier IST-004270, and ran from August 1, 2004 until January 31, 2007. The consortium consisted of SAP AG (D), Ambient Systems (NL), BP International Ltd. (UK), Infineon Technologies Austria AG (A), Lancaster University (UK), the University of Karlsruhe (D), and the University of Twente (NL).

2 Approach

The central concept of the CoBIs project was to use a common service paradigm throughout all layers, from the enterprise application down to the logic executed on sensor nodes. A middleware was built based on a service-oriented architecture (SOA). The middleware allows the deployment of business logic in the form of services to the edge of the network. CoBIs was focused on providing the basic SOA framework as well as the tools to monitor and manage the network. Using a service-oriented architecture in the context of distributed embedded devices as well as sensor and actuator networks solves several problems that are usually associated with such systems. Solutions concern, especially, the integration of sensors and actuators with enterprise systems as well as the management, monitoring and administration of a system with highly distributed logic.

In addition to the SOA framework, a set of reusable collaborative services has been defined and described in a newly developed service description language called CoBIL. A CoBIL service description includes a definition of the interface, which is based on the Web Service Definition Language (WSDL). Furthermore, it includes a textual description of the service as well as information about the composition of the service and technical constraints for the deployment.

Three different sensor network platforms, namely Particles, μ Nodes and Sindrion, were integrated with the middleware through a common abstraction layer to demonstrate the feasibility of connecting heterogeneous hardware to the system. The different platforms have different characteristics. Depending on the application scenario, one can thus choose the most suitable technology. Criteria have been developed that will help end users to make that choice, also comparing it to existing technology like RFID and wired sensors.

3 Results

At the outset of the project, wireless sensor network technology was mainly a field of academic research. Little consideration was devoted to industrial applications, business processes and the integration with enterprise systems. On the other hand, the business world was at that time just starting to learn about how to integrate RFID into their processes. One of the main achievements of the CoBIs project is to bring industry and research together and bridge the gap in understanding, as well as to show how the technology can be used in a real-world setting. Several possible application scenarios which are relevant to industry have been identified during the course of the project. Some of these scenarios were implemented and put into field trials in order to show operation in a real-world environment. In particular, the monitoring of storage regulations for hazardous chemicals was trialled at a chemical plant of BP in the UK, and a self-configuring RFID smart shelf was developed for the clothing industry.

CoBIs advanced the state of the art considerably with a service-oriented approach through all layers of the system and improved hardware. The middleware, service description language and system support tools developed could be the foundation of a widespread, multi-partner sensor network infrastructure, paving the way for interoperable, commercial, and integrated sensor networks (CoBIs 2007b).

References

COBIS (2007a) Collaborative Business Items. Project Web site, <http://www.cobis-online.de/> (visited 12.12.2007)

COBIS (2007b) CoBIs Final Project Report. Deliverable D104, Version 2.0, March 2007, http://www.cobis-online.de/files/Deliverable_D104V2.pdf (visited 12.12.2007)