# Chapter 3.8
# PROMISE:
## Product Lifecycle Management and Information Tracking Using Smart Embedded Systems

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## ABSTRACT

Product lifecycle management (PLM) processes can be greatly improved and extended if more information on the product and its use is available during the various lifecycle phases. The PROMISE project aims to close the information loop by employing product embedded information devices (PEIDs) in products. In this chapter, we present the goals and application scenarios of the project with special focus on the middleware that enables the communication between PEIDs and enterprise applications. Furthermore, we give details of the design and implementation of the middleware as well as the role of Universal Plug and Play (UPnP) as device-level protocol.

## INTRODUCTION

The PROMISE project (PROMISE Consortium, 2006) aims at improving business processes of product lifecycle management (PLM) by using the information loop across the various stages in a product's lifecycle, from beginning-of-life (design, production) to middle-of-life (use, maintenance) and end-of-life (recycling, disposal). The technological approach of the project is to use smart networked devices that are embedded into products to gather data on the product's status, properties, and working environment. The data is then made available to back-end systems to perform data analysis for decision support. Moreover, the information acquired is exchanged between the various interested parties, for example, manufacturer, customers, service and recycling companies.

The vision of closing the information loop for PLM has attracted the interest of a number of large companies, like *Infineon* (Germany), *Bombardier Transportation* (France), *Fiat/Iveco* (Italy), and *Caterpillar* (France/USA), in addition to SAP, to take part in the project. This emphasizes the relevance of the idea and also the commitment of industry in realizing it. In particular, *Infineon* is developing the hardware for PEIDs (product embedded information devices) to be installed in physical products.

## PROJECT GOALS

The goals of PROMISE fall into the categories of technical, business, and research goals:

### Technical Goals

- **Product Embedded Information Devices (PEIDs):** Suitable PEIDs have to be developed which turn products into smart items. PEIDs will provide data about the product to external applications. Using PEIDs will enable automatic data acquisition of high accuracy, which is less error-prone and more efficient than manual collection and entry of the data.
- **Integration of PEIDs with Backend Systems:** To enable the communication between PEIDs and backend applications, a middleware providing abstraction from device-level protocols and data transformation is required.
- **Product Data and Knowledge Management (PDKM):** Product-related data from PEIDs, field databases, and other sources have to be integrated to allow for sophisticated data analysis.
- **Decision Support:** Data from the PDKM has to be analyzed to transform the data into actionable knowledge for PLM decision support.
- **Cross-Company Information Flows**: A major hurdle for today's PLM applications is the inaccessibility of product-related data in other organizations. To overcome this, methods and software that allow sharing of data, information and knowledge among certified actors of the system have to be developed.

### Business Goals

- **Enable New Business Models:** Using technology developed in PROMISE, new business models, for example in the areas of product service and recycling, will be developed to increase the economic impact of results from applied research.
- **Improve Existing Business Processes:** Business processes related to PLM will be improved and extended, for example, by achieving lower operational cost, better quality and safety, reduction of errors, and better informed decisions.

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