SmartProducts

Overview

Large-Scale Integrated Project

No. 231204

Challenge 4.4

SmartProducts in a Nutshell

Targeting industrial-production:
- product&smartness co-design
- mature targeted methods, tools&platform, processes
- efficient: re-usable, measurable
- effective wrt. flexibility & simplicity

You user:
assembler, technician, end user ..
You peer:
other products & environment

Smart Products are

Products that talk to you

In the sense of: ‚smart interaction'

based on:
- proactive…: product-push, not user-pull (≠ manuals…)
- knowledge-(self): workflows & capabilities, history
- knowledge-(user): ID, role, experience, acquaintance
- knowledge-(peers): resources in/out, ‚opportunities'
- knowledge-(situation): context + semantics/reasoning
- user interaction: dynamic multimodal federation

SmartProducts: Our Definition and Concept

- **Smart Product :== A product that embodies *proactive knowledge***
  - **about itself: features & functions, dependencies & history …**
  - **about embedding: adaptation & cooperation potentials "↗ ↘"**
  - **about users: designers → → end users; individuals!**
  - **each time: concerns "data" and "functions"**

- **Properties of Smart Products**
  - **Interaction, communication and sensing capabilities**
  - **Self-organised embedding in different environments during the product lifecycle**
  - **Self-, situational- and context-awareness**
  - **Ability to engage in multimodal interaction with the user and semantic communication with other smart products and environments**
  - **Support for product-centred knowledge management**

Background

Trend 1: Increased Sophistication & Innovation Rate of Products

- Humans overwhelmed
  - Everyone along the product lifecycle
  - E.g. car manufacturing:
    assembly line →
    service technician →
    end user (driver, passenger) etc.
- Need better guidance

→ Better Product-to-Human Communication

→ Embedding of „Proactive Knowledge“ in Products

Trend 2: Increased Openness of Complex Products and Solutions

- Less top-down, more bottom-up integration
- faster switch of supplier (delivery/quality problems …)
- more customized products (car with your choice of DVDkit, seat, aircon, …)

→ Better Product-to-Product Communication

→ Open Communication & Self-Organization

Combination

- replace component by human: in case of fault, inspection …
- replace human by component: for increased degree of automation

→ Unified Communication

Challenges & Objectives

Challenges

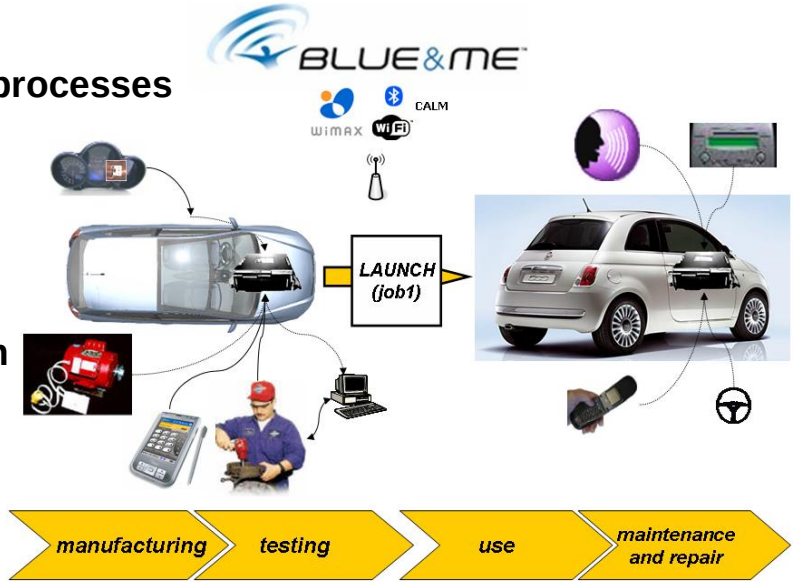
- **Challenge 1: Product lifecycle centred knowledge management**
- **Challenge 2: Context-aware, proactive human-product interaction**
- **Challenge 3: Smart products in large-scale open systems and environments**

Objectives

- **Objective 1: Development of *integrated concepts and methods* for proactive knowledge embedded in smart products**
- **Objective 2: Development of *architectures* and *technologies* for the creation, processing, management and distribution of self-aware, adaptive proactive knowledge**
- **Objective 3: Realisation of context-aware, personalised and *multimodal* human-product and product-environment *interaction***
- **Objective 4: *Product-centred* knowledge management**
- **Objective 5*: Socio-economic analysis* of smart products and their application**
- **Objective 6: Prototypic deployment and evaluation in *three different scenarios***

Use Case 1: Automotive (Fiat Research Centre)

- **Total Quality Manufacturing**
  - **Collection of data throughout the life cycle**
  - **Continuous improvement of manufacturing processes**
- **Product Quality Monitoring**
  - **Data from all vehicles to detect systematic faults and enabling an Early Warning System**
- **Enhanced Interaction with worker / operator / machine / driver**

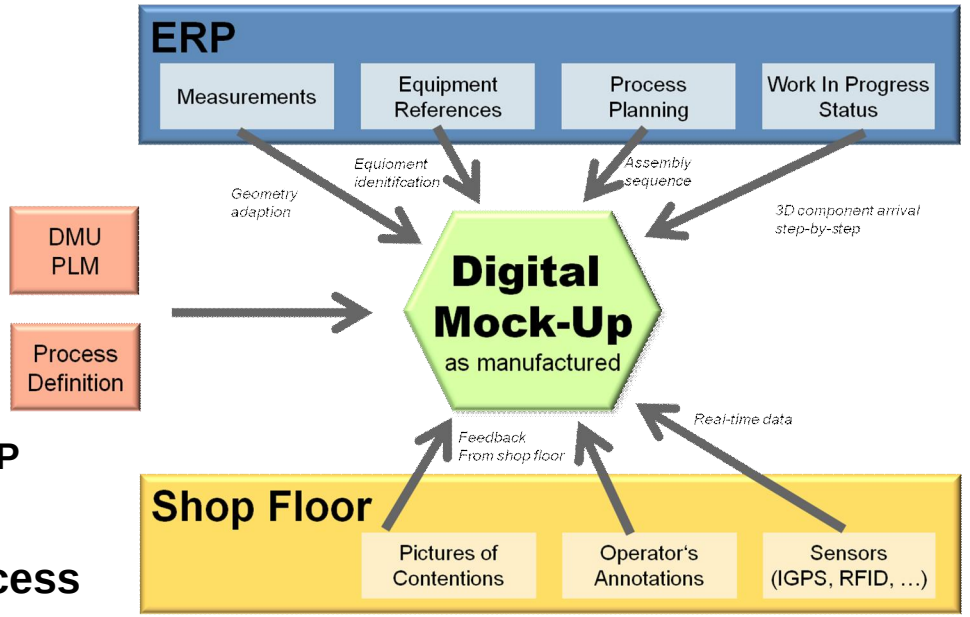


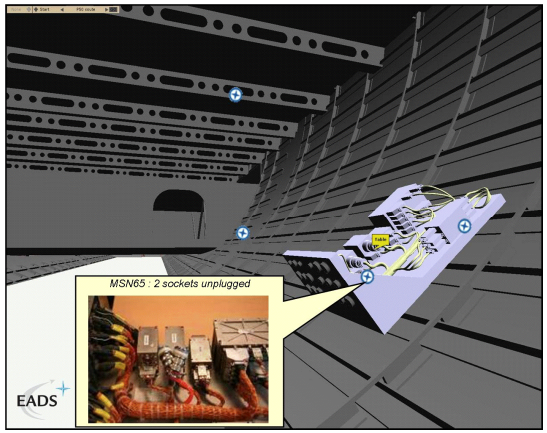
- **Customer Relationship Management (CRM, 1:1 from OEM to Customer)**
  - **Improve customer experience and support use of on-board systems**
  - **Create direct channel from customer to OEM**
  - **Create direct channel from OEM to customer**

Source: CRF

Use Case 2: Aircraft Manufacturing (EADS)

- **Optimized Real-Time Manufacturing**
  - **Exact information about the state of the individual airplane in production (Digital Mock-Up as manufactured)**
  - **Aggregation of data from ERP, PLM, shop floor sensors etc.**
  - **Virtual product and digital factory models updated in real time from WIP events and sensor data**
- **Geometry-based manufacturing process planning**
- **Automatically generate shop floor work instructions from knowledge contained in the design and manufacturing planning definition**
- **Support worker with the use of smart tools**





Source: EADS

Use Case 3: Smart Kitchen Life (Philips)

- **Food as an important element in a healthy lifestyle:**
  - **For people who want to reduce cognitive effort required in food preparation, yet make the experience more enjoyable and social**
  - **Combining food processing and appliance design for inspiration, for a healthy lifestyle through recipe recommendation and nutrition-fitness balance support**

- **Envisaged Example Solutions by 2015**
  - **MyCookingCompanion: coach providing recipe recommendations and guidance around food and health**
  - **Smart pans, providing support in optimal preparation of food**

Source: Philips

Smart Products – Fact Sheet

Instrument

- **Instrument:** IP
- **Theme:** ICT-2007-4.4 Intelligent Content and Semantics
- **Call:** FP7 Call 3
- **Duration** 36 Months

Budget

- **Total Budget:** 10.55 M€
- **Total Funding:** 6.97 M€
- **Total Resources:** 860.3 PM

Consortium

- SAP AG (Administrative Coordinator)
- TU Darmstadt (Scientific Coordinator)
- EADS Innovation Works
- Philips Research Laboratories
- University Sheffield
- Centro Ricerche Fiat
- VTT Technical Research Centre
- Open University
- Universität St. Gallen
- ETH Zürich

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