is not a software company, but…

there are quite a few software challenges to face!

ABB Robotics Application Domains
... more than 10 different domains

Spot Welding  Arc Welding  Painting/Coating  Cutting

Press Tending  Finishing  Material Handling  Machine Tending
ABB Robotics Software
... more than 100 applications

1 - 2500 KLOC
per Application

Example functions
- Operation monitoring
- Alarm & event handling
- Production scheduling

ABB Robotics Software
Functional Overlap
The Mission

Define PLA with coarse-grained systematic reuse

- Reduce maintenance costs
- Shorten time-to-market

Constraints

- Retain current functionality
- Enable user extensibility
- Provide common look&feel
- Iterative transition to PLA must be possible

Software Product Line Engineering for ABB Robotics

Outline

Mission
Robotics PC Software Applications
Software Product Line Design
ABB Robotics PC Applications
Product Line Scope

ABB Robotics PC Applications
Distributed Teams
Painting: RobView 5

Pick&Place: PickMaster 3
Software Product Line Engineering for ABB Robotics

Outline

Mission

Robotics PC
Software Applications

Software Product Line Design

Design PLA
Starting point

Architecture documentation
- Available for 2 products
- Sketches available for 1 product
- Not available for 1 product

To fill gaps...
- Stakeholder interviews were executed
- Manual and automated code inspection was performed
**Design PLA**

**Approach**

**Elicit requirements**
- Key architectural drivers
  - Composability: reuse and quality
  - Maintainability: less costs in distributed locations
  - Performance: production part 24/7

**Domain engineering**
- Find coarse components for composition
- Harmonize different domains

**Attribute driven design**
- Mapping of functionality to components satisfying key drivers
- 2-3 iterations done, based on complexity and priority
- Tight coordination with chief architects of single products

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**Domain Engineering**

**Common Functionalities**

- Engineering
- Simulation
- Supervision
- Job Control
- Job Coordination
- Plant Interaction
Mapping Functionalities to Existing Applications
Old, High-Level Software Architectures

New Product-Line Design
Component & Connector View
Observations & Lessons Learned

- A survey of existing products and user customizations is essential.
- Using iterative Attribute-Driven Design (ADD) was beneficial to confirm and establish the PLA.
- Unifying some concepts within the different products gave all parties a better understanding of the application domain.
- The emotional bindings towards their established products, was an obstacle to get their commitment to facilitate dialog.
- With multiple stakeholders, the architecture proposal needed more argumentation and an iterative approach. A champion advocating the benefits of a PLA can speed-up the design process and adoption.
- It is mandatory to have commitment for the target PLA from stakeholders to start planning migration activities and detailed design: avoid obsolete work.
Next Steps

- Execute iterative transformation of independent products into PLA
- First iteration planned to start summer 2009