OSGi Alliance Community Event

Open product lines

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Overview

- FAMILIES & COSI
- Product Line development
- Open source software use in industry
- Variability
- Relationship to OSGi

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FAMILIES & COSI

ITEA projects

- ESAPS-CAFÉ-FAMILIES (1999-2005)
  - Introduction of product lines
    In European embedded systems companies
- COSI (2005-2008)
  Co-development using inner & Open source in Software Intensive products
  - Open source development
    In European embedded systems companies
- Osiris (2005-2008)
  Open Source Infrastructure for Run-time Integration of Services

Cluster: Cosiris

- www.cosiris.org

Software Product Line Development why & how

- Software development improvement
  - Reduce development cost
  - Reduce product lead-time
  - Reduce maintenance
  - Feature propagation
  - Quality
  - Common look-and-feel
  - …
- Managed reuse
  - Variability management & platform

Product Line development in embedded systems

- Product lines in embedded systems
  - Since ~1990
- Enable managed reuse and managed variability
- Developing and evolving a platform
- Explicit variability modeling

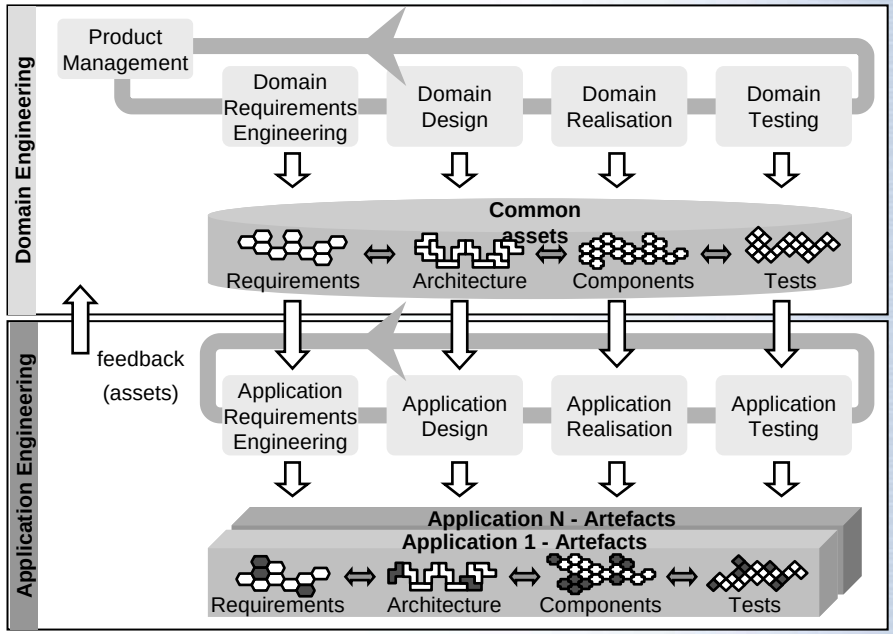
- Affects BAPO
  - Business, Architecture, Process & Organization

Product Line development main elements

- Two processes
- Explicit variability

Means:

- Platforms
- Explicit
  - Variation model:
    - Variation points & variants
    - Configurations
  - Variant decisions



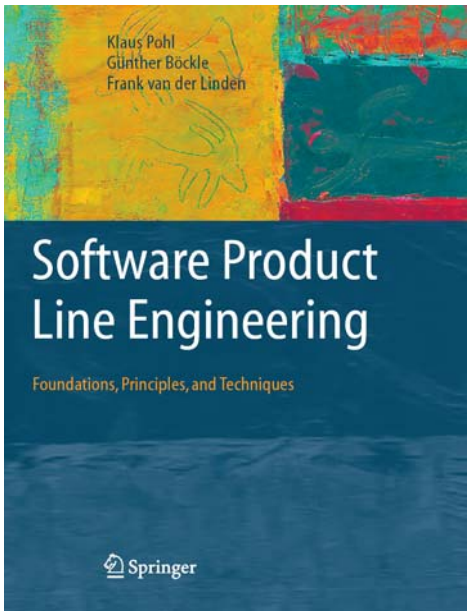
Managed Variability for Managed Reuse

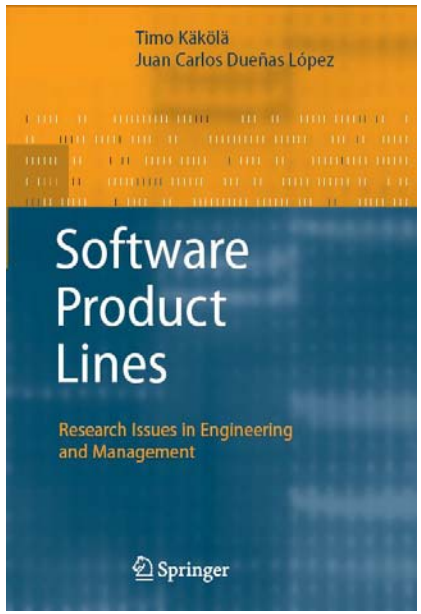
- Build many products on a reusable software platform
- Variable configurations of reusable assets
  - Variability mechanisms in platform
  - Variation points in platform
  - Variants in platform
- Managed variability supports managed reuse

Product Line development experienced advantages

- Product cost reductions of 60 to 70%
- Improved productivity by a factor of 2-6 times higher output
- Investment reduction by an average 50%, and up to 90%
- Product lead-time reductions by an average 50%, and up to 95%
- Maintenance cost reduction
- Portfolio complexity reduction
- Training time reduction
- Better product planning and use of roadmaps
- Product defect density 50% or less
- Reuse of test cases from 40 to 60%

Product-line development more information





Open source in embedded systems

- Embedded industries introduce software product lines
  - Large investments
  - Long term planning
  - Variability management
  - Often: large, thus distributed development
  - Internal company reuse
- IT industry uses open source profitable
  - Good software
  - Effort sharing
  - Agile development
  - Intrinsically distributed development
  - Reuse at global scale

Distributed development

- Common to Product Lines and Open Source development
- Open Source Principles are usable in Product Lines
  - Inner source =
    Distributed collaborative development

- Open product line:
  - Product line development in open source
  - Platforms are available
  - Often not explicit:
    - Variation model:
      - Variation points & variants
      - Configurations
    - Variant decisions

Global reuse

- Integration of any software in products

- Needs global platform
  - e.g. OSGi
- Needs global explicit variability management
  - Not yet existing
  - Needs:
    - Explicit variation model in platform
    - Explicit support to configure systems
    - Explicit support for decisions on variant selection

Variability management

- Variability is basis for many decisions in software development
- Variability model contains
  - Variation points
  - Variants
  - Relationships between them
  - Traceability of variants to and from other artifacts
  - Implementation in the platform
    - Variability mechanisms
    - Binding mechanisms
    - Configuration mechanisms
  - Decision support
    - Selection of variants & mechanisms
- Note that run-time variability is abundant
  - Most is not in variability model

Variability management in open source

- Variant can be many forms in software:
  - Component
  - Component parameter
  - Configuration of components
  - System constants
  - …
- In open source context the following may give rise to problems
  - No knowledge of final products and product line
  - No global variability
  - Support of many architectures
  - Support of many variability mechanisms
  - monolithic solution will not work
- The solution is to develop within an open community
  - Variability representation (model)
  - Variability management
- Leading to an "open product line".

Relationship to OSGi

- OSGi proposes an open platform development
- Variability management is a key requirement for embedded system developers
- Desired to have an open, common approach to variability in OSGi
  - Variability model
  - Traceability of variants to and from other artifacts
  - Implementation in the platform
  - Decision support

- Move from intra-company product line development
  to an inter-organizational product-line collaboration
- Reducing development costs by not reinventing the wheel

Conclusions

- For embedded systems developers product line is crucial
  - Need a platform with variability management
  - Need open development on variability modeling and support
- This can lead to an open product line
  - Reducing development costs for all
- OSGi towards open product line platform?