

The Feature Pack Approach

Systematically Managing Implementations in Software Ecosystems

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Agenda

- Context
- Problem
- Approach
- Conclusion

Context - HIS

- HIS is a non-profit company
- Jointly owned by the Federal States of Germany
- Founded 45 years ago
- Currently about 200 employees / 30 core developers
- Most German universities use HIS software

Context | Problem | Approach | Conclusion

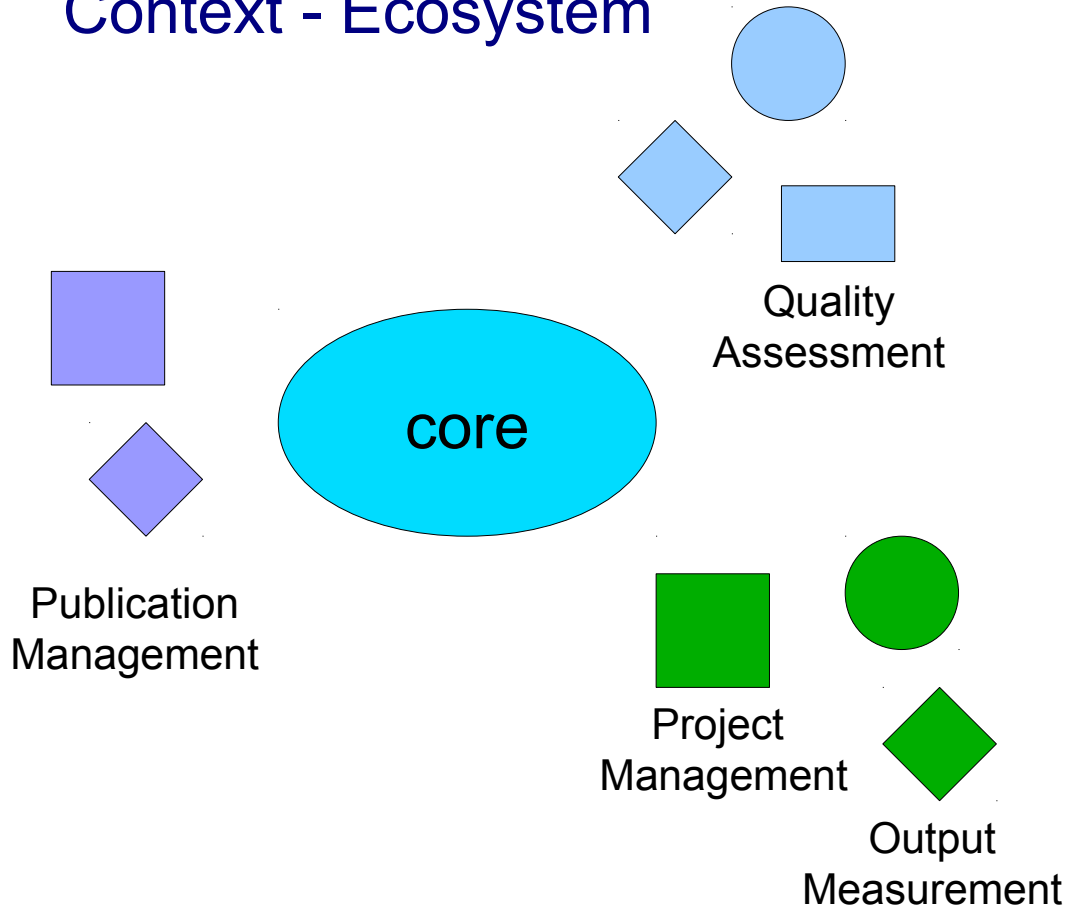
Context - HISinOne

- University Management System called “HISinOne”
- Development started 2007
- 9 major releases up to now
- Large system
 - > 5 Mio LoC
 - > 800 database tables
 - > 6000 columns
- is an ecosystem

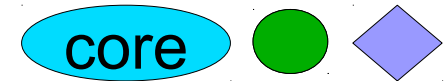
The screenshot displays two overlapping windows of the HISinOne system. The top window shows a form with tabs for 'Main data', 'Assignments', and 'Abstract'. The 'Main data' tab is active, showing fields for 'Publication Type' (Book), 'Title' (Die Entstehung von Finanzkrisen), 'Subtitle' (Vorbedingungen, Auslöser, Einflussfaktoren), 'Year of release' (2010, Month 12), 'Note' (Springer), and 'Link'. The 'Additional data' section includes fields for 'Editor', 'Volume', 'Number', 'Series', 'Edition', and 'ISBN'. The bottom window shows a similar form but with an 'Authors' section containing a table with columns 'Actions' and 'Last Name', listing 'Oskar' and 'Netv' with red 'X' marks. A 'Quality Assessment' section at the bottom right shows 'Assessment Type' as 'Not assessed'.

Context | Problem | Approach | Conclusion

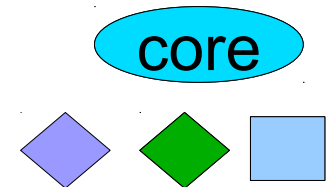
Context - Ecosystem



Customer 1



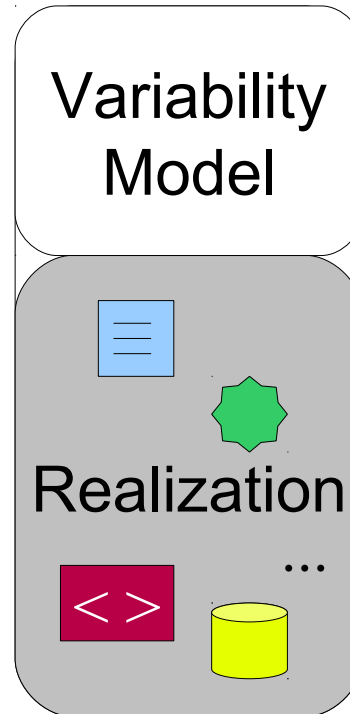
Customer 2



Problem

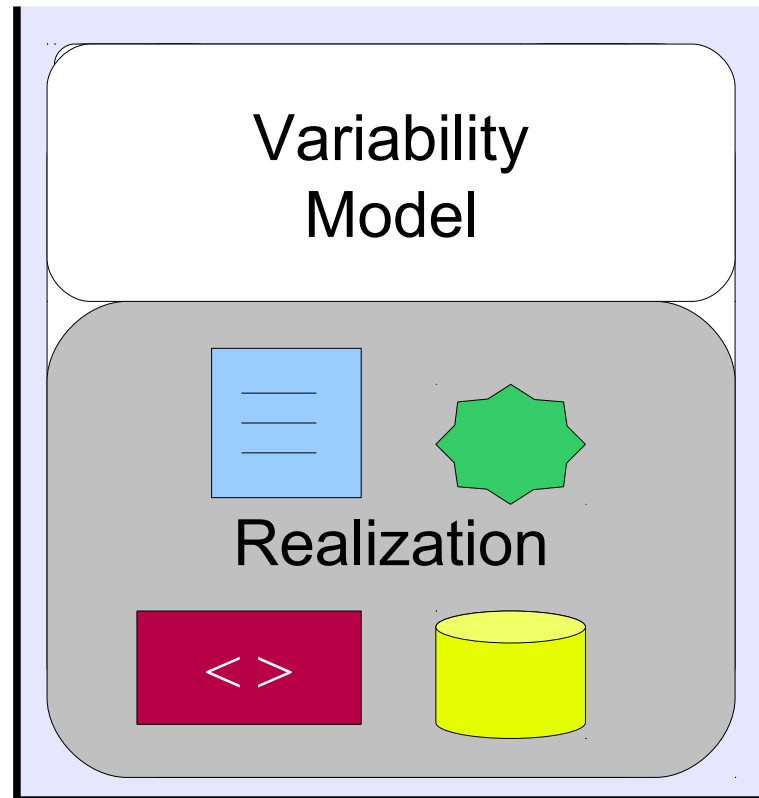
- Heterogeneous implementation elements (e.g., UI, business logic, database elements, webservice definitions)
- Distributed implementation of features (e.g. feature developed by customers)
- No knowledge of complete variability model
- Composition of features from different sources by customers
- Detection of inconsistencies arising from combinations

Approach - Feature Pack Definition



Context | Problem | **Approach** | Conclusion

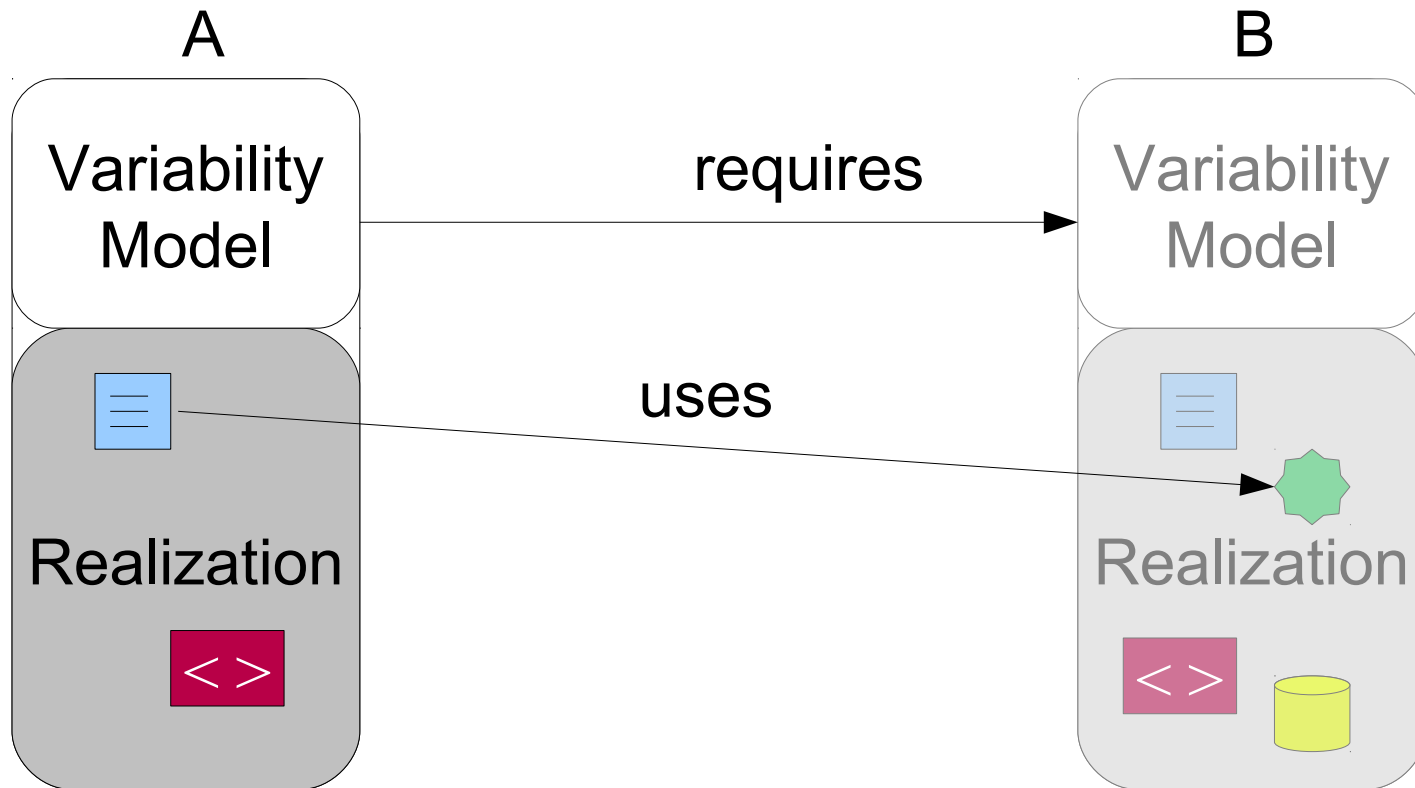
Approach - Installation Definition



Approach – Quality Criteria

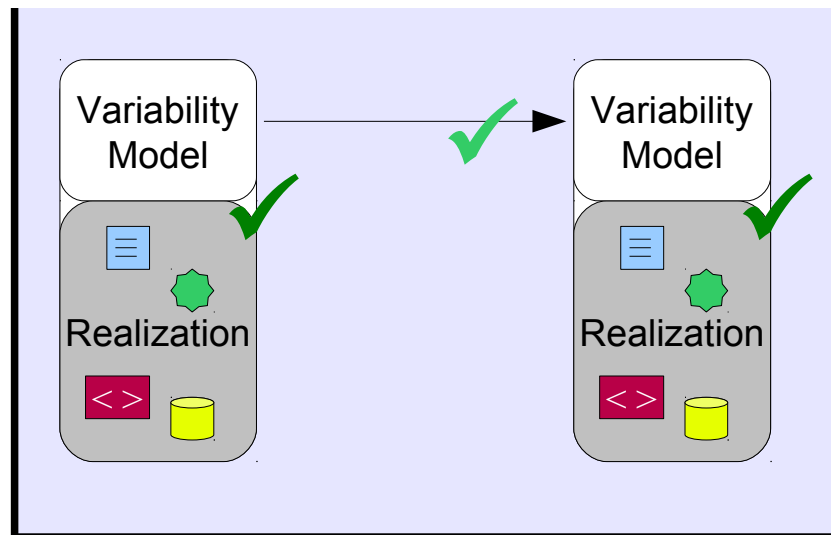
- Variability-model vs. asset consistency
- Referential consistency
- Type consistency
- Behaviour consistency
- Configuration completeness
- Reference data completeness

Approach – Variability-Model Asset-Consistency



Approach – Referential Consistency

- All Feature Packs Variability-Model Asset-Consistent ✓
 - All dependencies resolved ✓
- Installation is referential consistent ✓



Approach – Implementation for Referential Consistency

- Open Source Project plugfy
- Checks Java Byte Code, Spring Configuration
- Prototype
- In production use at HIS

Conclusion - Results

- Presented approach for systematic management of implementations:
- Feature Packs bundle variability model and realization
- Heterogeneous implementation assets
- Formalized two quality criteria (in our paper)
- Instantiated approach for a specific system
- Implemented a tool for verification of referential consistency for specific technology

Conclusion - Further Work

- Extend approach to evolution
- Formalize remaining quality criteria
- Describe “instantiation” of feature packs for systems

Questions?