



HASSO-PLATTNER-INSTITUT
for IT Systems Engineering at the University of Potsdam

Process & Knowledge Engineering

Hagen Overdick



Organization

- ❑ **Today: Presentation of topics**
- ❑ **02.05.06 12:00h Deadline for selection via email**
 - ❑ Please include
 - ❑ Name & registration number, three topics ranked by preference
 - ❑ You will receive your topic via email on 03.05.06
- ❑ **Presentations (graded)**
 - ❑ 30 minutes, 10 minutes Q&A
 - ❑ 2 presentations per day between 13.06.06 and 04.07.06
- ❑ **Paper submission (required)**
 - ❑ 14-16 pages, LNCS style
 - ❑ Paper submission deadline: 10.07.06 via email (PDF version)
- ❑ **Review submission (graded)**
 - ❑ You will receive two papers to review
 - ❑ Review submission deadline: 17.07.06 via email
- ❑ **Final paper submission (graded)**
 - ❑ You will receive the reviews of your paper
 - ❑ Final paper submission deadline: 31.07.06 via email (Source and PDF version)



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Available Topics

1. Process enactment in web environments

□ Change in environment

- Traditionally, process enactment systems are closed systems
- With the Internet as a platform, workflows need to spawn across heterogeneous and loosely coupled systems, interacting with the user via web browsers

□ Tasks

- Outline the challenges to process enactment in web environments
- Survey existing approaches, highlight pros and cons

□ References

- <http://citeseer.csail.mit.edu/graunke03modeling.html>
- <http://citeseer.ist.psu.edu/manolescu02workflow.html>
- <http://groups.yahoo.com/group/rest-discuss/message/5981>

2. Social Web Environments

□ Context

- Social software enables people to rendezvous, connect or collaborate through computer-mediated communication and to form online communities
- “Mash-up” applications try to do the same to web applications

□ Tasks

- Outline the relation between social web environments and workflow management and list criteria for success
- Survey emerging environments regarding these criteria

□ References

- <http://citeseer.ist.psu.edu/correa03flexible.html>
- http://www.firstmonday.dk/issues/issue2_4/goldhaber/

3. Microformats

- **Novel approach to semantic web**
 - Designed for humans first and machines second
 - From the time of creation to the first mentioning by Bill Gates in only 9 months

- **Tasks**
 - Introduce key concepts and survey real world usage of Microformats
 - Contrast existing approaches, e.g. RDF

- **References**
 - <http://blogs.msdn.com/alexbarn/archive/2006/03/31/566361.aspx>
 - <http://microformats.org/about/>
 - <http://www.w3.org/TR/rdf-primer/>

4. Searching for structure in XML

□ Context

- As Google has proven, searching within XML (HTML seen as an instance of XML in this context) is high relevant
- Google is known to take structural information into account, e.g. text in links is relevant to the document targeted
- Microformats (see last topic) increase the need for structural search on XML documents

□ Tasks

- Analyze existing approaches to XML storage and search algorithms regarding structural search
- Outline applicability to Microformats detection and Schema validation

□ References

- <http://lambda.uta.edu/cse6331/fall04/xmltosqlsurvey.pdf>
- <http://portal.acm.org/citation.cfm?id=1097054>

5. Survey on approaches for quality assessment in web information retrieval

□ Context

- Last topic focused on the “how” of search
- This topic focuses on the “why” regarding ranking

□ Task

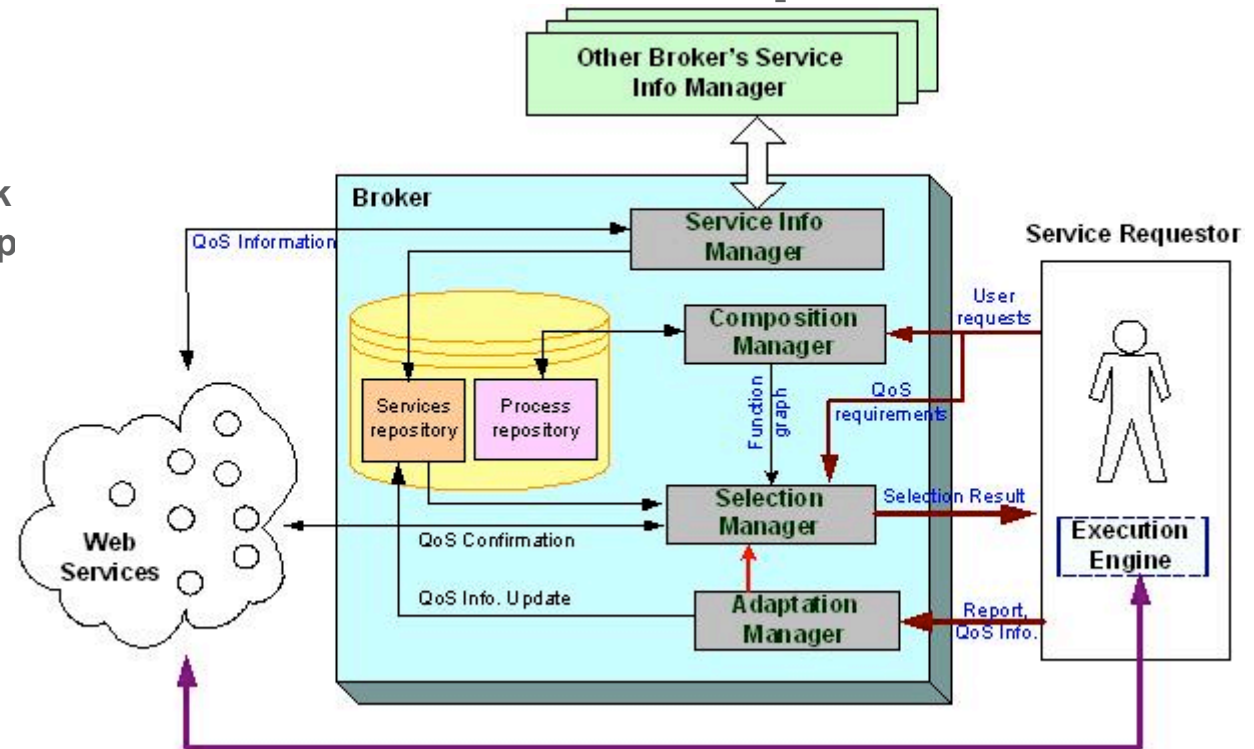
- Outline approaches to ranking of web content

□ References

- <http://www-db.stanford.edu/~backrub/google.html>
- Datenbank-Spektrum 12/2005

6. The QoS Capable Web Service Composition Project

- QoS broker-based framework
- dynamic integration and adap
 - QoS-aware Web services
 - end-to-end QoS constraints
- service selection and adaptation algorithms
- used by QoS brokers



□ Reference

- YU, Tao ; LIN, Kwei-Jay: *Service Selection Algorithms for composing Complex Services with multiple QoS Constraints*. In: BENATALLAH, Boualem (Hrsg.) ; CASATI, Fabio (Hrsg.) ; TRAVERSO, Paulo (Hrsg.): International Conference on Service Oriented Computing (ICSOC), Springer-Verlag, 2005 (LNCS 3826), S. 130–143



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Process & Knowledge Engineering

Guido Laures

Enterprise Architecture*

- **Questions when specifying an enterprise architecture**
 - What are the elements and relationships of an enterprise architecture model?
 - How can an enterprise architecture model be visualized?
 - How do I model the relation of business processes and technical infrastructure?
- **Today no sufficient standard exists**
 - UML too generic
 - CIM incomplete
 - ADLs mostly focus on software architecture
- **There is a need to work on formalization, modelling and visualization of EA.**

* By “Enterprise Architecture” in this context we do not mean a J2EE or .NET application architecture. Rather, it is the system, network, application, process and service architecture of an entire enterprise.

7. Formalizing the difference between Enterprise Architecture and Software Architecture

- **What distinguishes Enterprise and Software Architecture?**
- **Is it possible to use the same concepts to specify enterprise architectures as we use for specifying software architecture?**
 - If so, which elements belong to an enterprise architecture profile?
 - If not, which new concepts need to be included in an UML profile for enterprise architecture specification
- **How to formalize the relationship between functional (e.g. business processes) and structural (e.g. services) elements?**

8. Enterprise Architecture Modelling

- **What are the stakeholders that need to understand a visualized enterprise architecture model?**
- **What are their requirements towards an EA model?**
- **What are the use cases for an EA model?**
 - Automated analysis
 - audits and metrics
 - automated refactoring
 - ...
- **How could a modelling language look like?**
 - Visualization
 - Tooling



Organization

- **The two topics are very closely related to each other**
- **Two master students working together on both topics and developing a consistent solution is also feasible**



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Process & Knowledge Engineering

Harald Meyer

9. Hierarchical Planning for Semi-Automated Composition

□ Service Composition

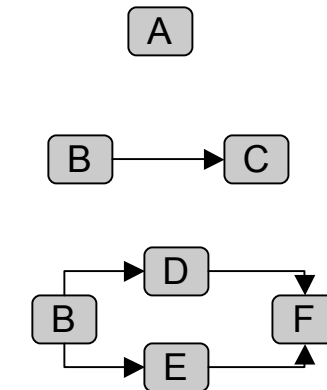
- Fulfil tasks for which no service exists
- Manual, semi-automated, automated creation

□ Hierarchical Planning

- Iterative refinement of plans
- Used for automated composition
- Problematic if plan refinement is not sufficient (e.g. concatenation)

□ Tasks

- Adaptation of a hierarchical planning algorithm for semi-automated composition
- Interaction between human modeller and modelling tool
- User-friendly specification of plan refinement operators



10. Light-weight semantic annotations

- **Semantic Web Services**
 - Meaning of input & output parameters defined according to domain ontology
 - Functionality specification (precondition / effect)
 - Allow (semi-)automated discovery & composition of services

- **Challenge: Annotating is a complex task**

- **Light-weight semantics**
 - Ontology of functionality concepts (e.g.: Request for Quotation)

- **Tasks**
 - Elaborate light-weight semantics
 - Use cases
 - Domain ontologies vs. Functionality ontologies
 - Implementation in WSDL-S

11. Dynamic Process Configuration in ASG and Meteor-S

- **Processes are specified in WS-BPEL**

- **Dynamic Binding to concrete services**
 - Possible with non-semantic Web services (limited)
 - Semantic Web Services allow binding to services with different WSDL interface but equivalent functionality

- **Tasks**
 - Compare approaches from ASG and Meteor-S
 - Identify limitations e.g. binding to services with different message types
 - Develop an own approach

12. Web Services Middleware

- **Functionality for Service Delivery**
 - Broker
 - External functionality (e.g.: payment, authentication)

- **This is not about middleware / application server functionality**
 - e.g. how to implement web services using EJBs

- **Instead: business level service discovery and provisioning**



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Process Family Engineering

Arnd Schnieders

- **Product family development** is very common in industry



C 200 CDI

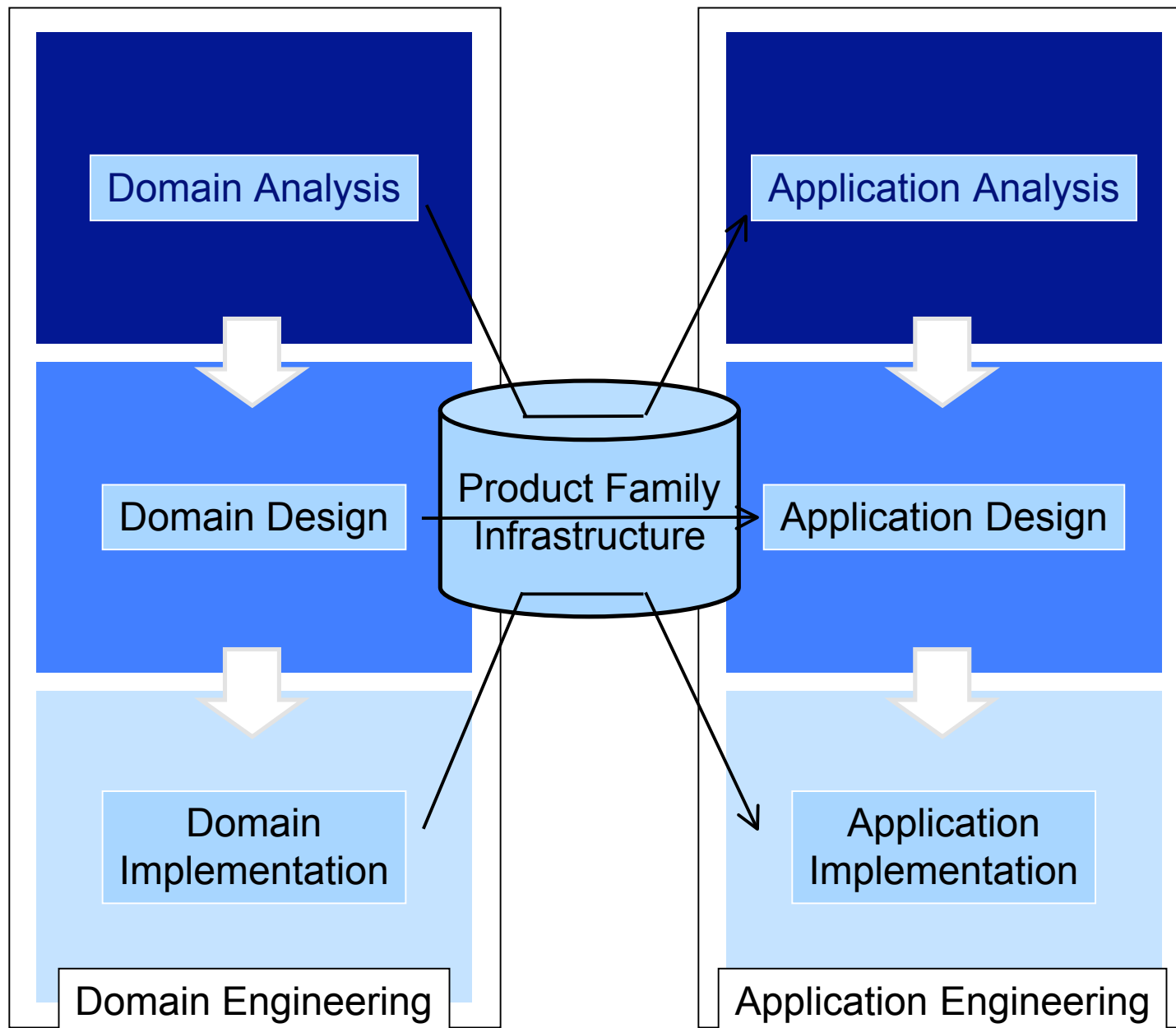


C 220 CDI



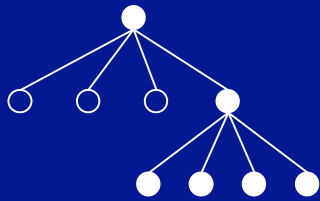
C 270 CDI

- Product line approach for software development: **Software Product Family Engineering (PFE)**
 - Examples: Nokia, Hewlett Packard, Motorola
- Next Step: **Process Family Engineering**: product family approach for development of process oriented software
 - E-Business Systems, ERPs, Control Units in Automotive

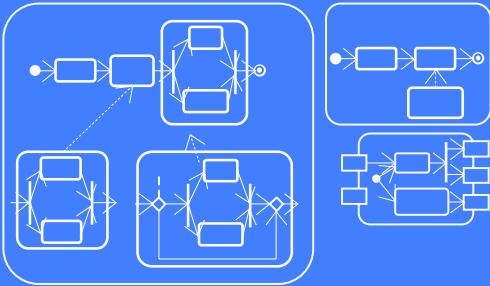


□ **Dual development lifecycle**

□ **Design for reuse + design with reuse**



Requirements for the Members of the Product Family



Product Family Architecture

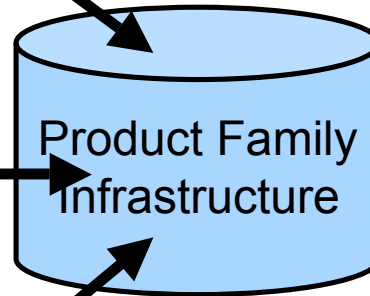
```
//Menu Global Item
#define pixTOrc(x) (8*(x-1)) //convert pixel into row and col format
#define COL 8 //Column Value for Menu Item
#define MAXITEM 5 //Total menu items

// To display the Inventory Main menu options
typedef char option[15];
option mainMenu[] = {
    "SAVE",
    "ABOUT ME",
    "CLOSE"
};

// Function to displays all the menu prompt messages from the pointer array of option a[]
void normalVideo(int x,int y,char *str)
{
    x=pixTOrc(x);
    y=pixTOrc(y);
    outtextxy(x,y,str);
}
```

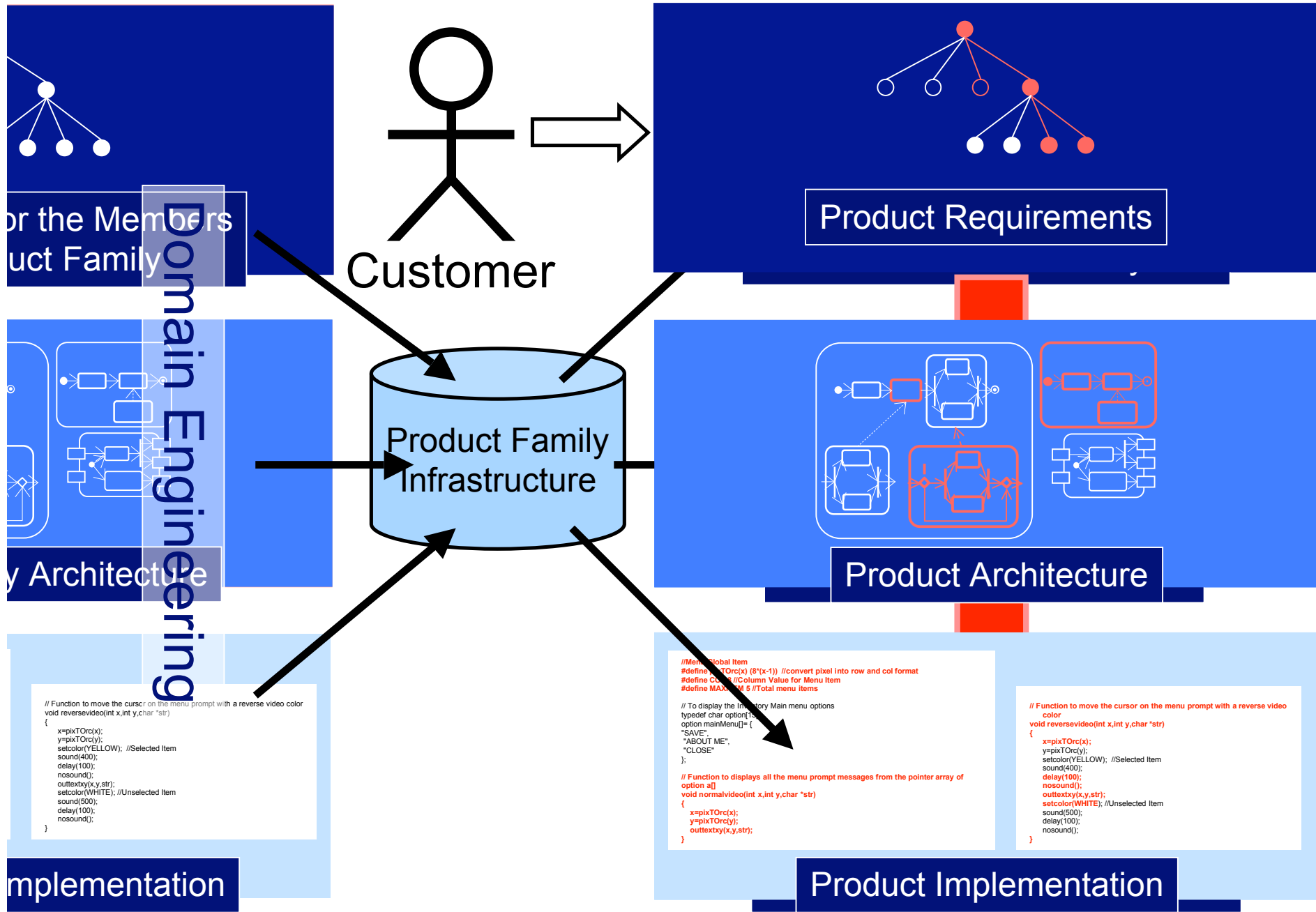
```
// Function to move the cursor on the menu prompt with a reverse video color
void reverseVideo(int x,int y,char *str)
{
    x=pixTOrc(x);
    y=pixTOrc(y);
    setcolor(YELLOW); //Selected Item
    sound(400);
    delay(100);
    nosound();
    outtextxy(x,y,str);
    setcolor(WHITE); //Unselected Item
    sound(500);
    delay(100);
    nosound();
}
```

Product Family Implementation



Application Engineering





Product Family Architecture

Domain Engineering

Customer

Product Requirements

Product Family Infrastructure

Product Family Architecture

Product Architecture

```

// Function to move the cursor on the menu prompt with a reverse video color
void reversevideo(int x,int y,char *str)
{
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    nosound();
    outtextxy(x,y,str);
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    sound(500);
    delay(100);
    nosound();
}

```

Product Implementation

```

//Menu Global Item
#define TORC(x) //convert pixel into row and col format
#define COL //Column Value for Menu Item
#define MAX 5 //Total menu items

// To display the Inventory Main menu options
typedef char option[15];
option mainMenu[] = {
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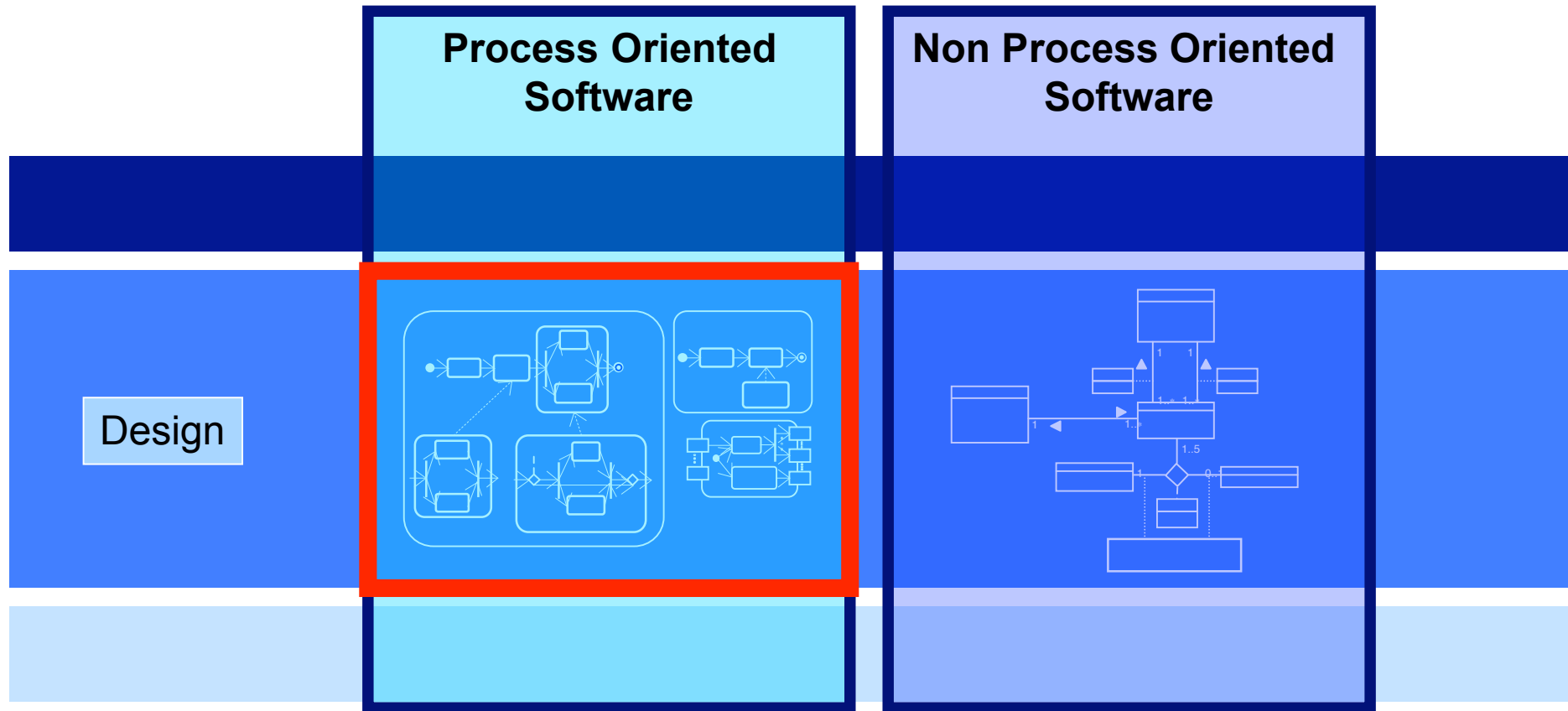
```

Product Implementation

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// Function to move the cursor on the menu prompt with a reverse video color
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    delay(100);
    nosound();
}

```



13 - Modeling Variant Rich Processes – Survey

□ Context

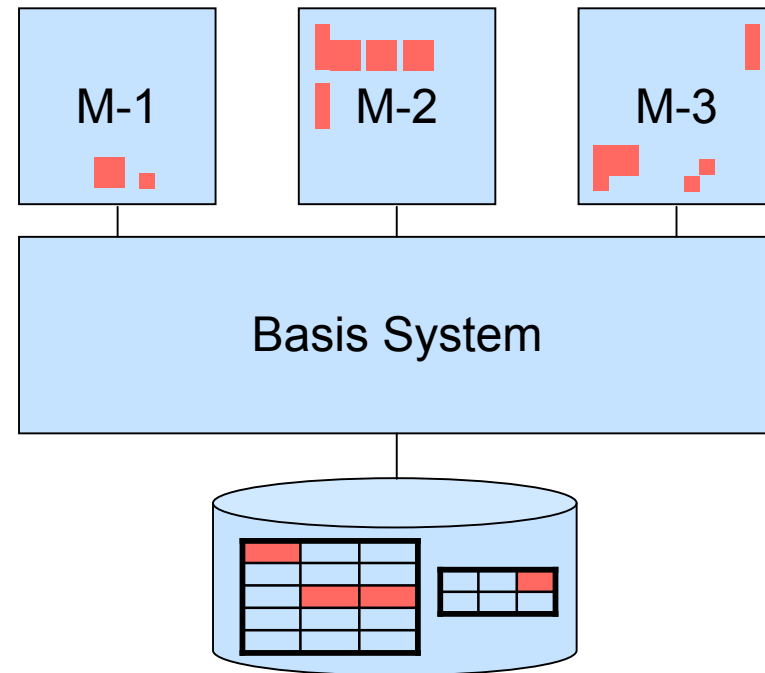
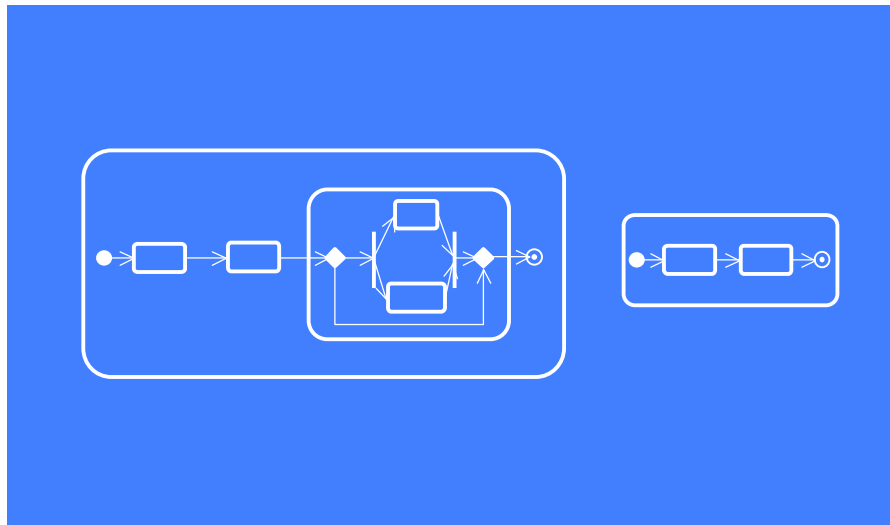
- Central design artifact in process family engineering
- Some approaches have already been suggested

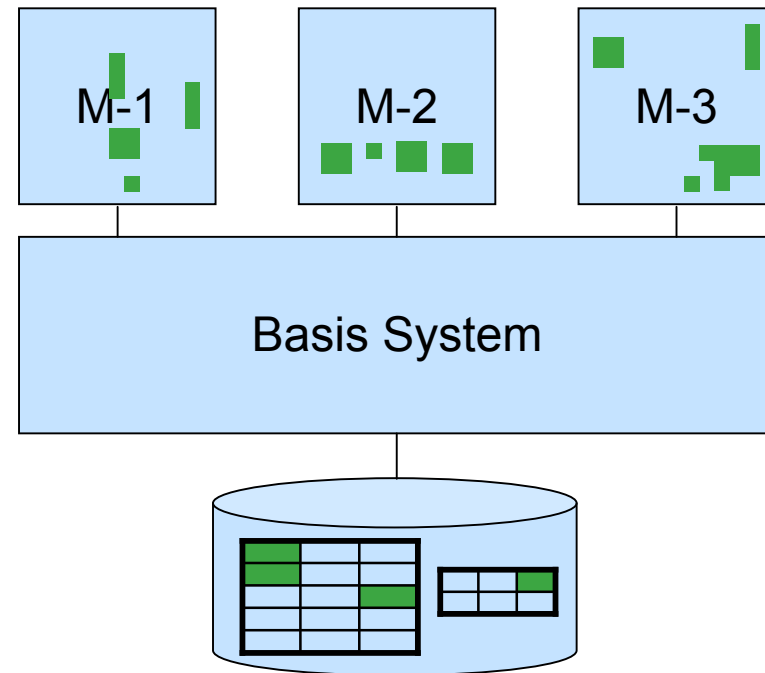
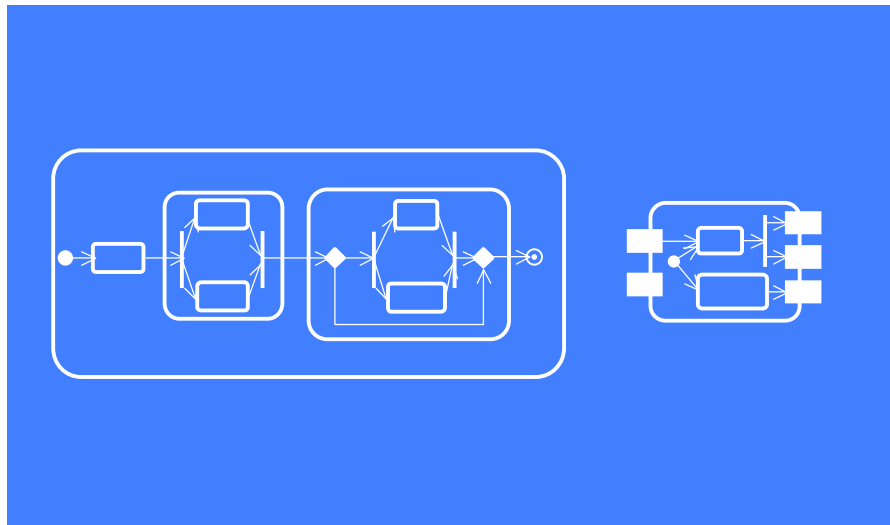
□ Task

- Analyze the requirements
- Compare existing approaches

□ References

- M. Rosemann and W. van der Aalst. A Configurable Reference Modelling Language. Information Systems, In Press, 2005. Datenbank-Spektrum 12/2005
- Klaus Pohl, Günter Böckle, and Frank van der Linden. *Software Product Line Engineering: Foundations, Principles, and Techniques*. Springer, 2005.





- Event Driven Process Chains = process modeling notation typically applied for ERP system
- Process Family Engineering for ERP systems requires variant rich EPCs

14 - Modeling Variant-rich EPCs

□ Tasks

- Transfer an existing approach for modeling variant-rich processes to EPCs
- Model exemplary processes using the developed notation

□ References

- J. Becker, P. Delfmann, R. Knackstedt. *Konstruktion von Referenzmodellierungssprachen. Ein Ordnungsrahmen zur Spezifikation von Adaptionsmechanismen für Informationsmodelle*. In: *Wirtschaftsinformatik*, 46 (2004) 4, S. 251-264.
- Arnd Schnieders, Frank Puhlmann: *Variability Mechanisms in E-Business Process Families*. In *Proceedings of the 9th International Conference on Business Information Systems*, Klagenfurt, Austria (2006) (to appear)

15 - Compliance Rules and Process Variability

□ Context

- Compliance = Adhering to and demonstrating adherence to a standard or regulation
- Examples:
 - Sarbanes-Oxley Act: Accounting regulations in USA
 - Basel II: Regulations for the estimation of the equity of a company

□ Tasks

- Survey on business compliance rules
- Exemplarily analyze the impact on processes and process variability