Requirements Management and Modelling: A Strong Team

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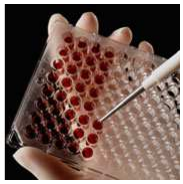
Our Business

The usage of **Requirements Management & Engineering (RM&E)** and continuous **process improvement** initiatives like **CMMI** or **SPICE** are an essential part for big and world wide organisations to develop complex products, services and systems.





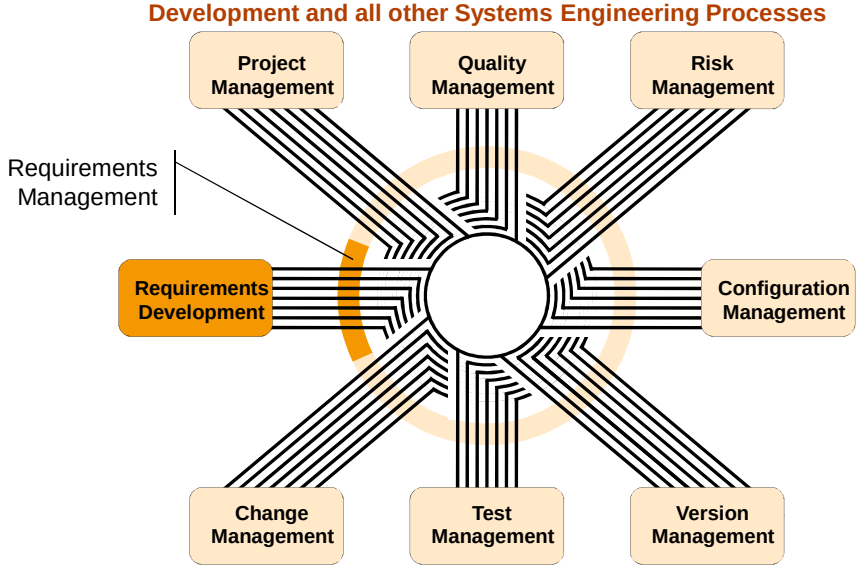


Our Customers

- **Automotive Manufacturer**
  - Adam Opel GmbH
  - Audi AG
  - BMW AG
  - Daimler AG
  - Volkswagen AG
- **Automotive Supplier**
  - Hella KGaA Hueck& Co
  - Robert Bosch GmbH
  - TRW
- **Logistic**
  - Deutsche Bahn AG
  - Schenker Logistics
  - Siemens Mobility
  - Thales Group
- **IT/ Software Development**
  - BMW AG
  - Volkswagen AG
  - Deutsche Nationalbibliothek
- **Aerospace Industry**
  - EADS
  - Astrium
  - Airbus
- **Medical Industry**
  - Drägerwerk AG & Co. KGaA
  - Siemens Healthcare
  - CareFusion (Viasys Healthcare)
- **Telecommunication**
  - Alcatel Lucent
  - NetCologne Gesellschaft für Telekommunikation mbH
  - O2 Germany GmbH & Co. OHG
- **Banking and Insurance**
  - AXA Konzern AG
  - BMW Bank GmbH
  - Interpolis

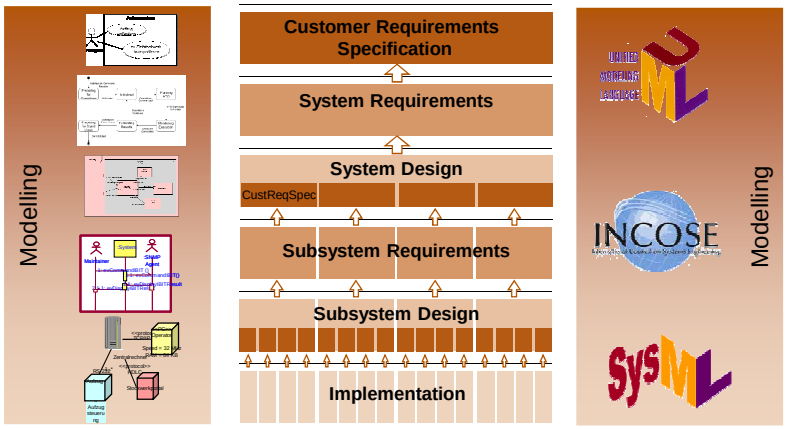
Our Expertise

Requirements Management is the interface between Requirements Development and all other Systems Engineering Processes



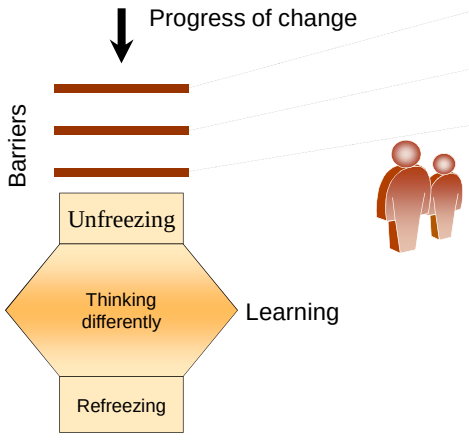
Model Based Systems Engineering Expertise (MBSE)

- Modelling is a central element in the HOOD Requirements Specification Process and in the derivation of requirements
- HOOD actively works on INCOSE “Model Based System Engineering vision 2020”



HOOD Guideline: Structure of Change

Process Improvement is not just a technical challenge.

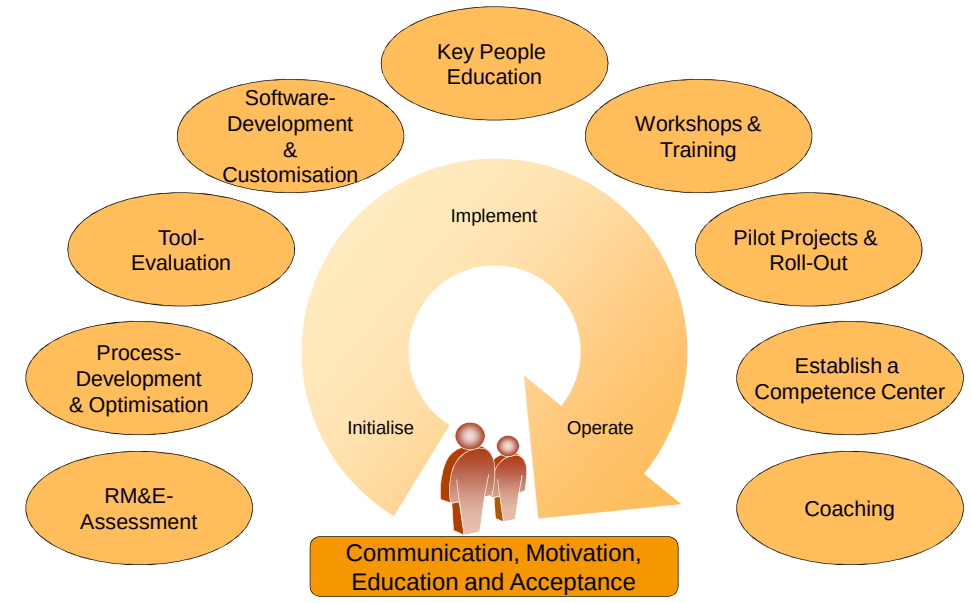


- Lack of discomfort/anxiety with present system
- Ignoring information that does not fit with the past
- Lack of psychological safety in the change, fear of loss of identity or integrity

Recognising the barriers to change and helping people to overcome their anxiety, is necessary for successful change

Source: Colin Hood 1997
Model of change based on work by Lewin 1947 and Schein 1961-1965

Services - Overview

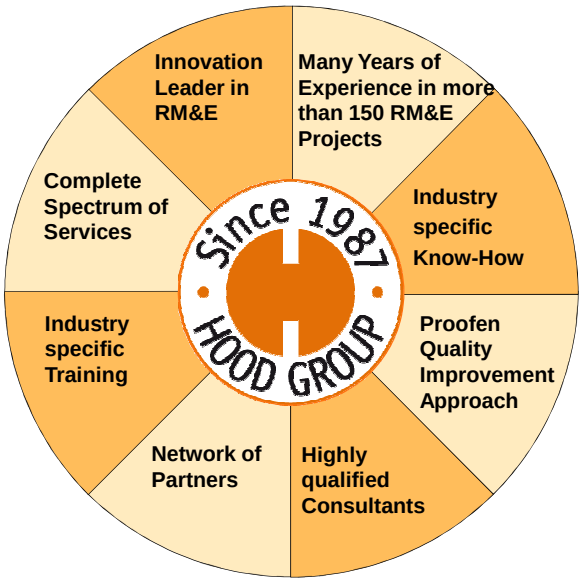


HOOD- Excellence in Requirements

ReConf

SubConf

Your Advantage in Working with HOOD



HCMs – Requirements Management & Definition

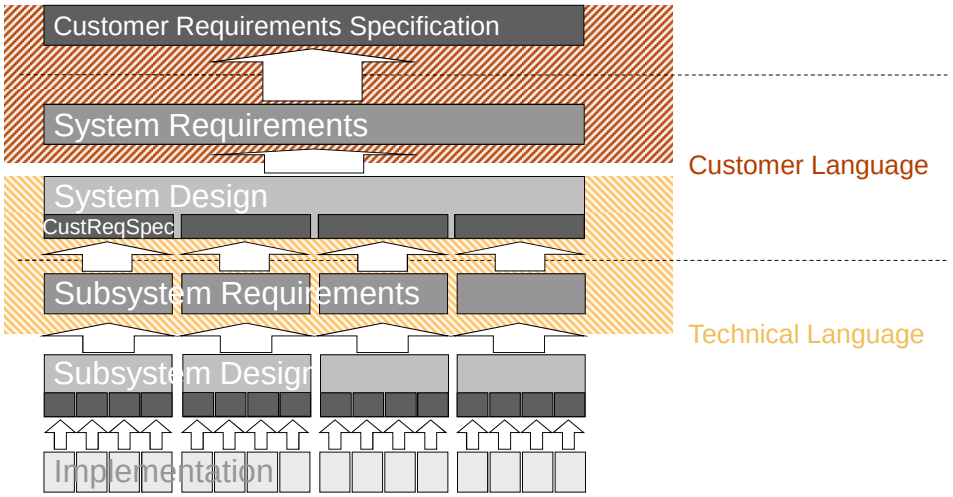
HOOD Capability Models

Agenda

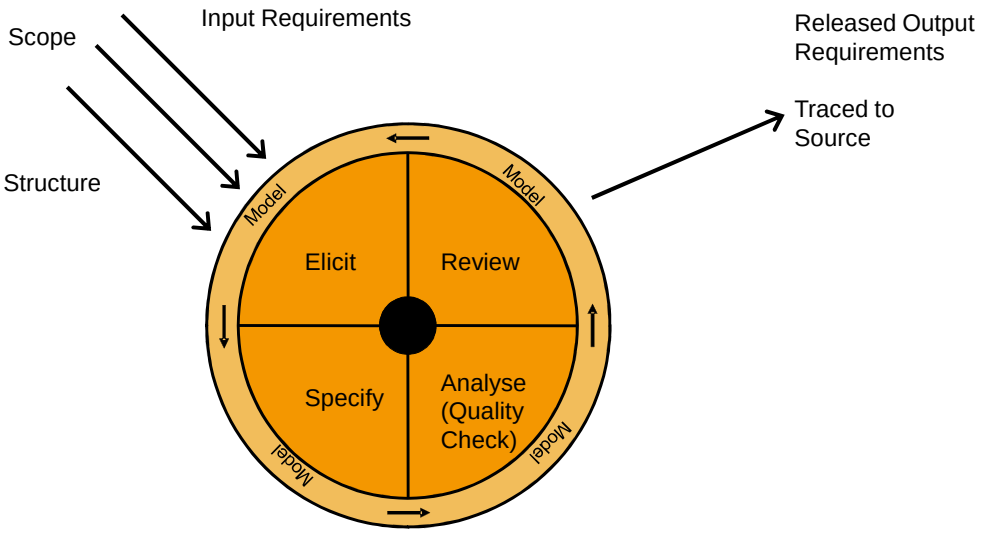
1. Requirements Engineering and Modelling - Motivation
2. From Business Process Modelling to Requirements
3. From Requirements to Software Modelling
4. Seamless Traceability
5. “Collateral Benefit”
6. Summary

Customer Language and Technical Language

The difference between Design and System Requirements:

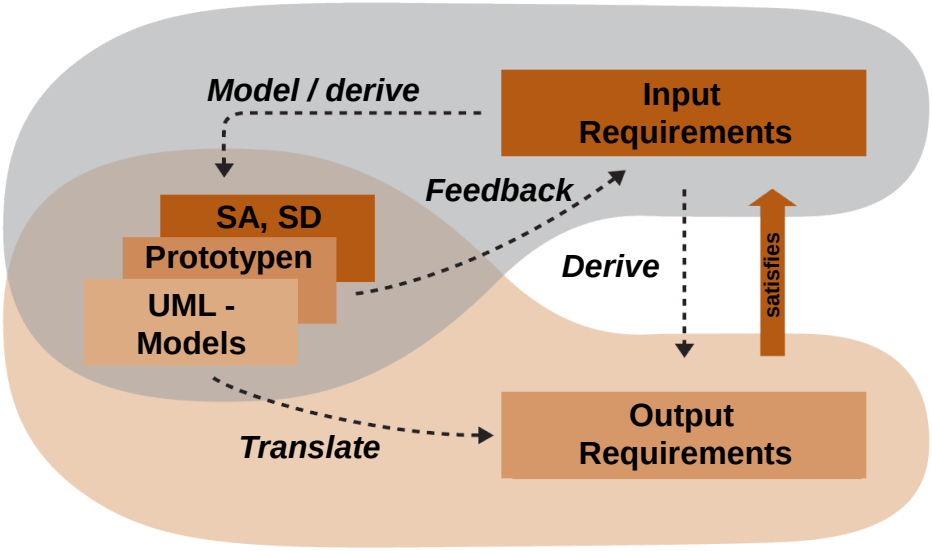


Requirements Definition - Process

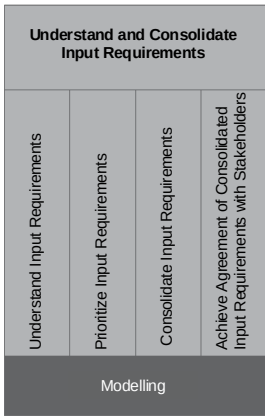


Requirements Definition – Modelling

Modelling supports everything

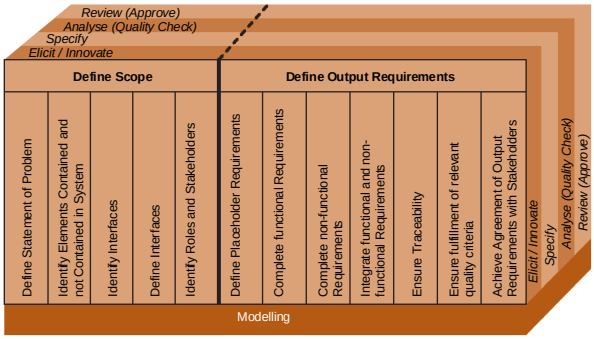


Requirements Definition – Processactivities



Understanding Requirements
Before we can define the next level of requirements we have to understand the requirements we seek to fulfill

Defining Requirements
The Requirements Definition Process is far more than just using a template



Source: HOOD INSIDE

Benefits of Combining RM and Modelling

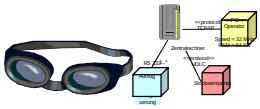
Different benefits for different stakeholders

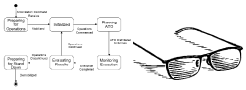
- Management
  - Communicate vision of the business
  - Track goal orientation
- Process Engineers
  - Analyse and/or define processes and identify improvement potentials
- Customer
  - Understand business context, services and constraints
  - Define service access interfaces
- Development
  - Understand business and operational context
  - Derive project/system requirements
- Supplier
  - Understand business and products
  - Define service interfaces
- Training
  - Understand and learn business processes
- Other stakeholders: financiers, ...
  - Central means of communication

Views, models and diagrams

- Different types of diagrams show different aspects of the system
- Aspects complement and overlap one another
- Architecture frameworks guide the creation of models
- Consistency of the model must be established
- UML/BPMN supports consistency


Logical View


Physical View


Behaviour View


Timing View

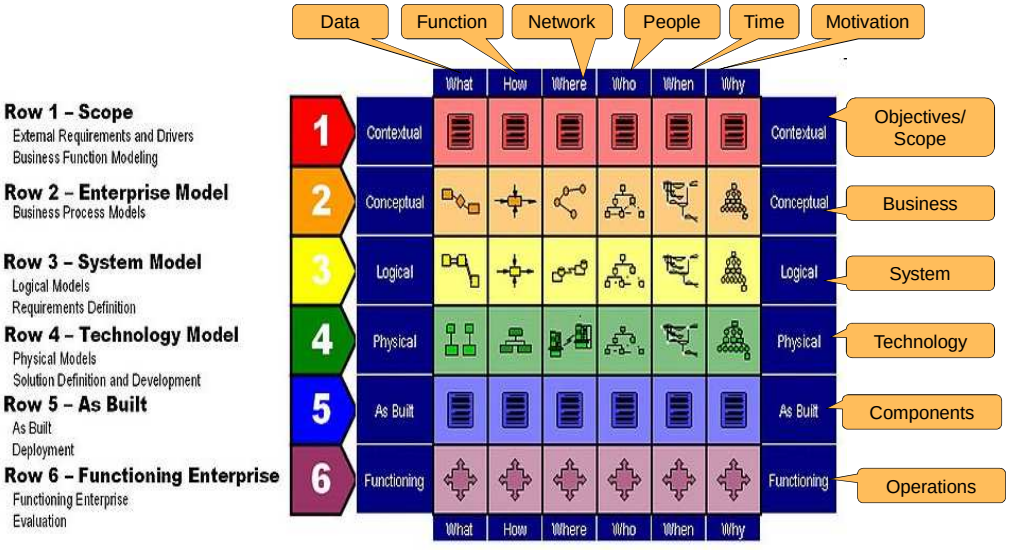

Requirements View


Operational View


Security View


Data View

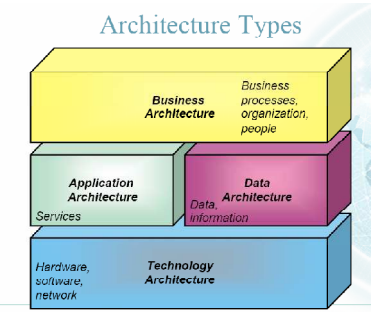
Zachmann Enterprise Framework



(from www.zachmanframeworkassociates.com/Standards)

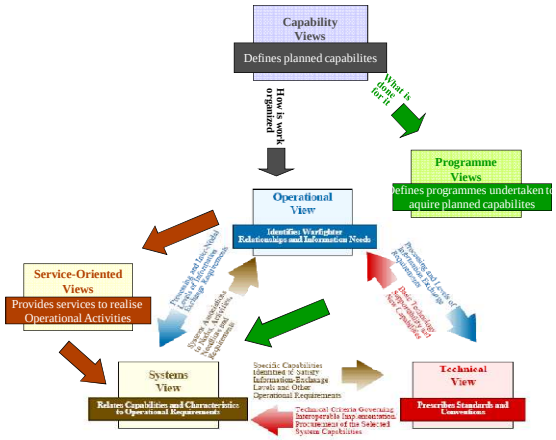
Architecture Types/Views

Open Group's TOGAF



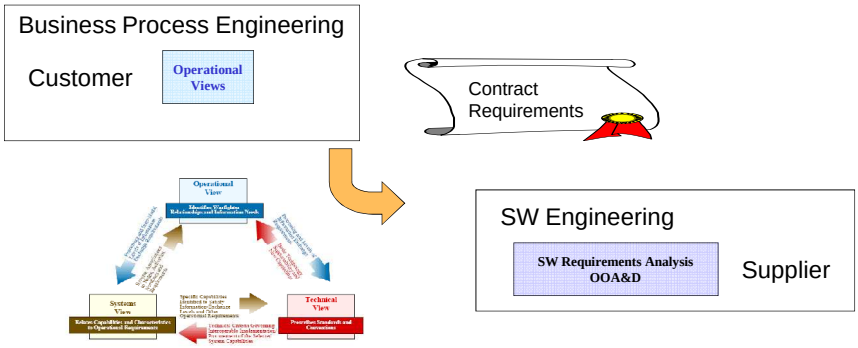
(from http://www.opengroup.org/togaf/)

NAF views

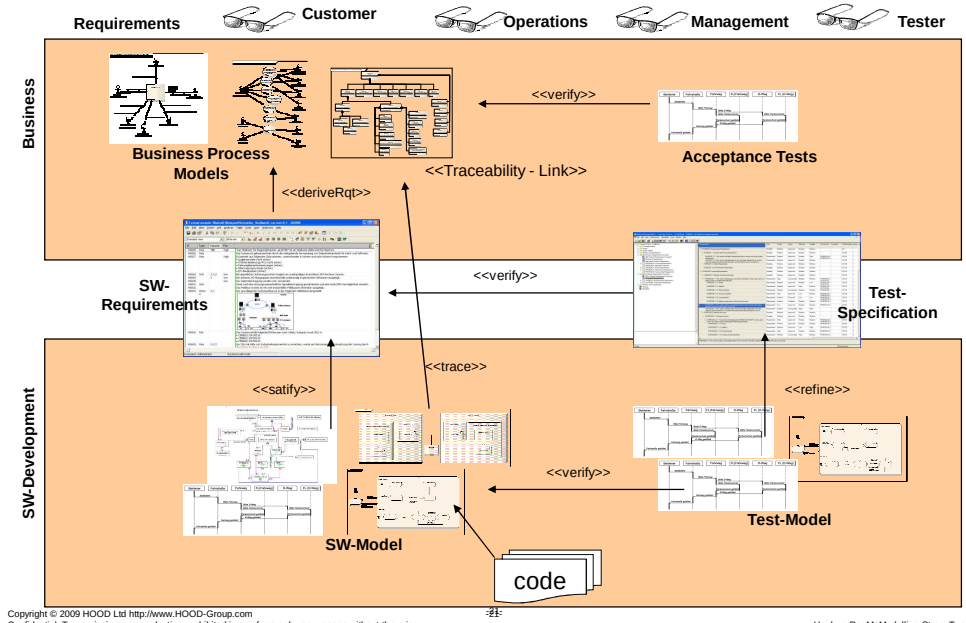


Business Process Modelling Scope

- Define clear hand-offs from Business Process Modelling (BPM) to SW Engineering
  - What does BPM Engineering
  - What does SW Engineering



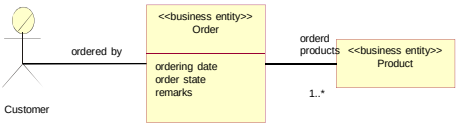
Seamless Traceability



Agenda

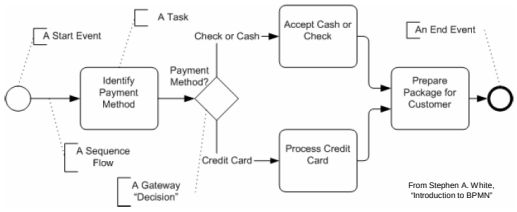
Customer Requirements

- Capturing current business situation
  - Business Modelling can help to understand current business:
    - Applying techniques like scenarios, use cases, interviews,...
    - Using notations for business processes, workflows, roles, information, ...
    - However, notation must be easy to understand!

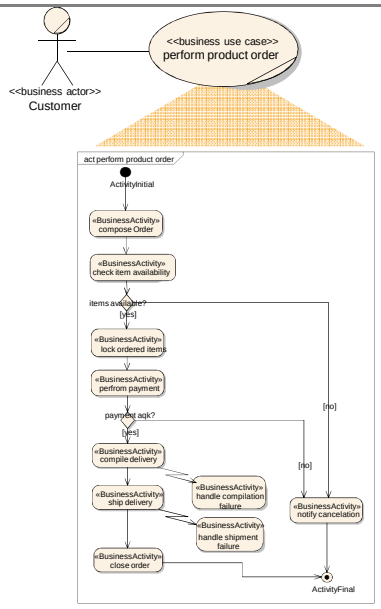


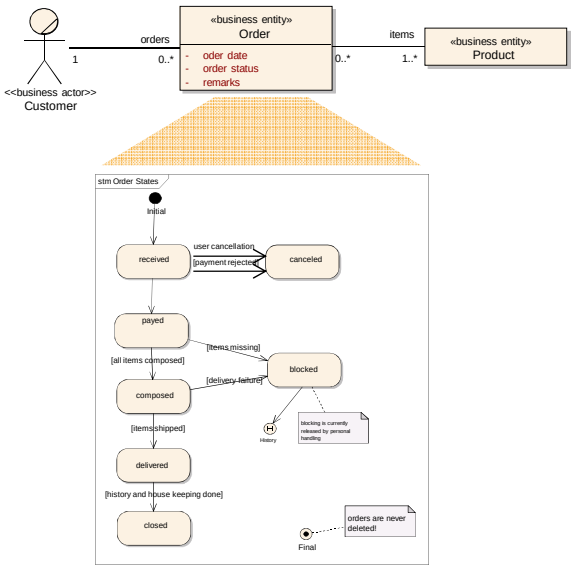
UML Business Modelling profile

BPMN as new standard
(for BPEL as execution language)

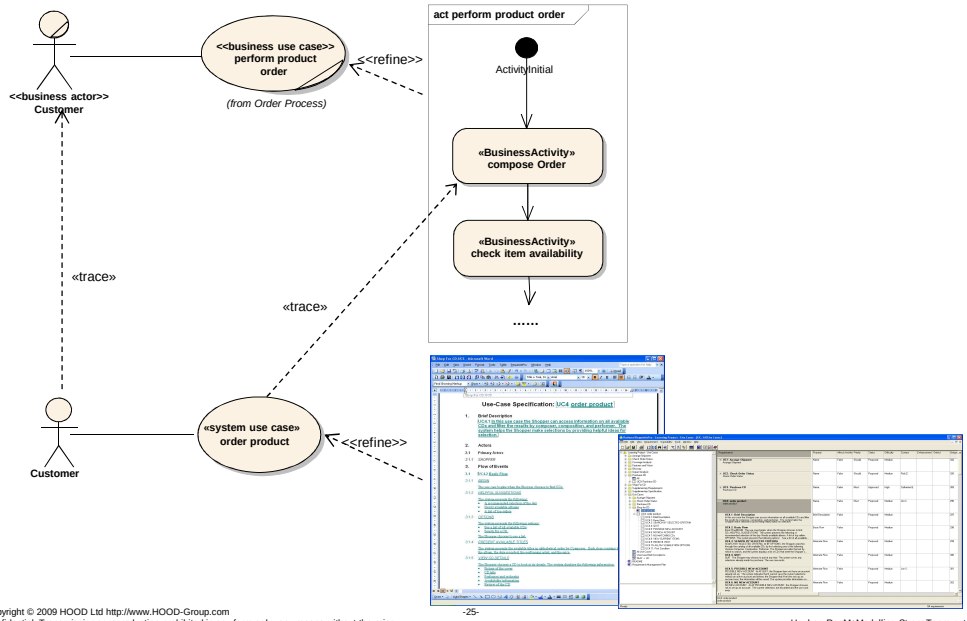


Business Process Modelling Example





From Business Process to Requirements

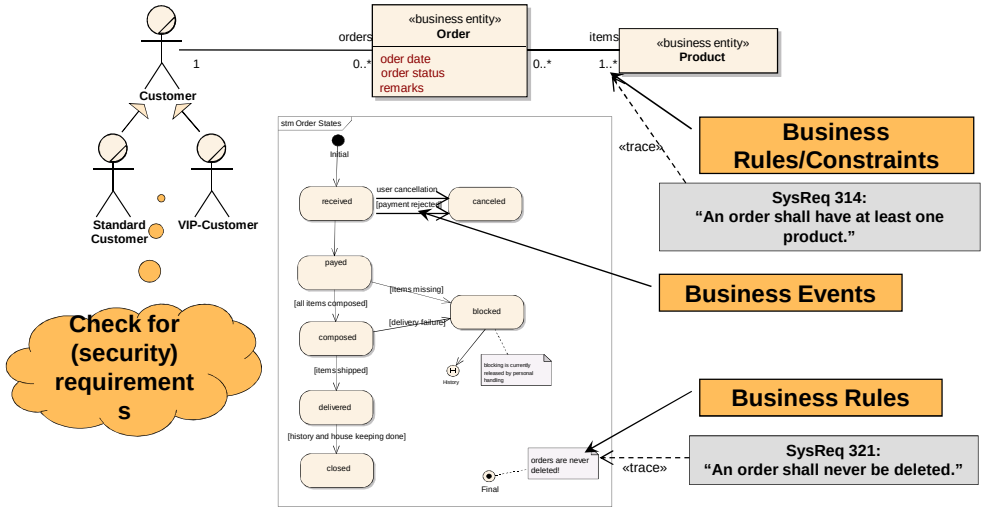


From Business Process to Requirements

- Use Case descriptions can be seen as functional requirements
- Manage use case descriptions in RM tool
- Enhance use cases by non-functional requirements
  - Performance
  - Security
  - Availability
  - Usability
  - …..
- Additional cross-cutting non-functional requirements exists
  - Maintainability
  - Safety
  - ….
- Business rules are requirements
- Consider requirements related to business entities
- Consider requirements related to business workers, actors (security!)
- Derive non-functional requirements from business goals and processes

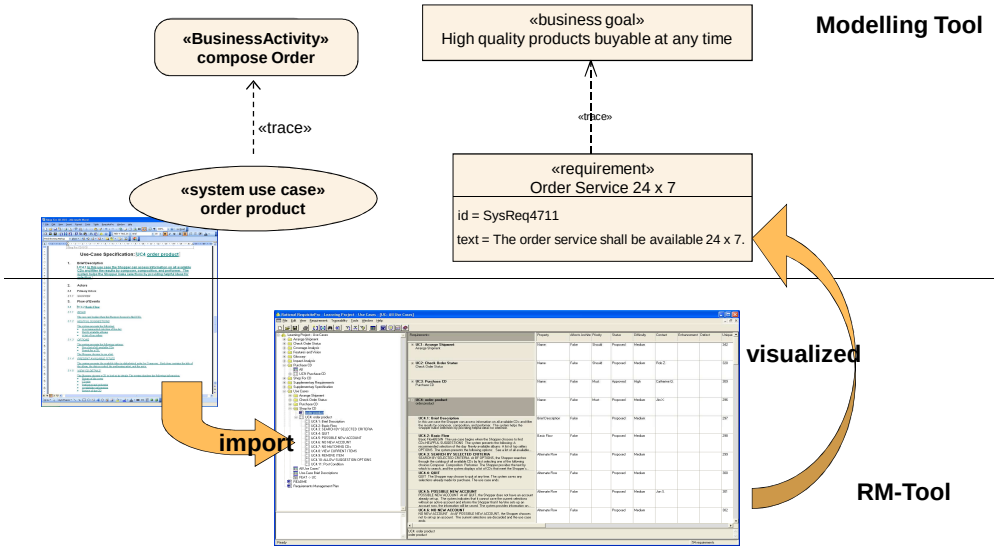
From Business Process to Requirements

- Derive requirements for business rules and constraints

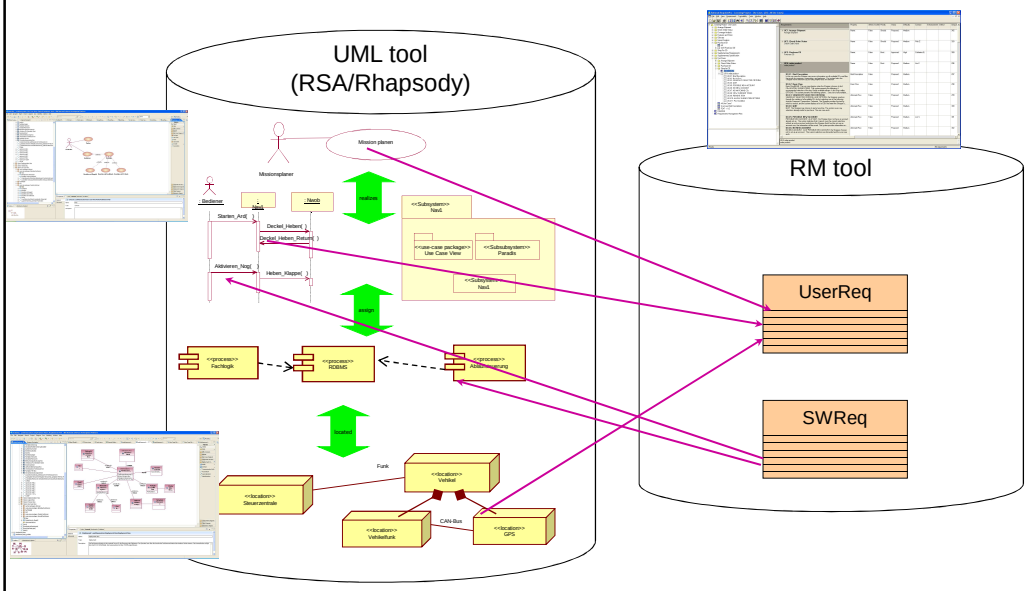


SysML Requirements Traceability

- Example



RM – Modelling tool interface



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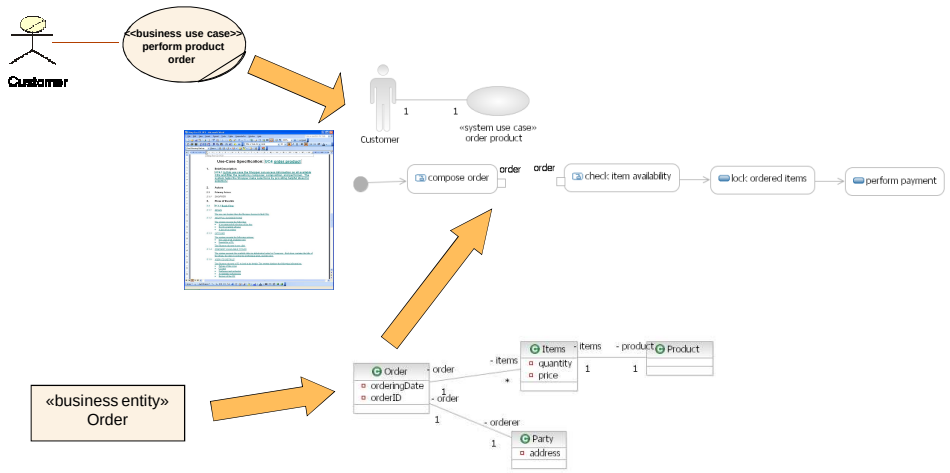
From Requirements to Software Modelling

- Refine use case realizations from use case descriptions (functional requirements managed in RM tool)
- Consider impact of non-functional requirements on use case realizations
  - Performance
  - Security
  - Availability
  - Usability
  - …..
- Consider impact of cross-cutting non-functional requirements on architecture
  - Maintainability
  - Safety
  - ….
- Trace non-functional requirements to behavioural and structural elements

From Requirements to Software Modelling

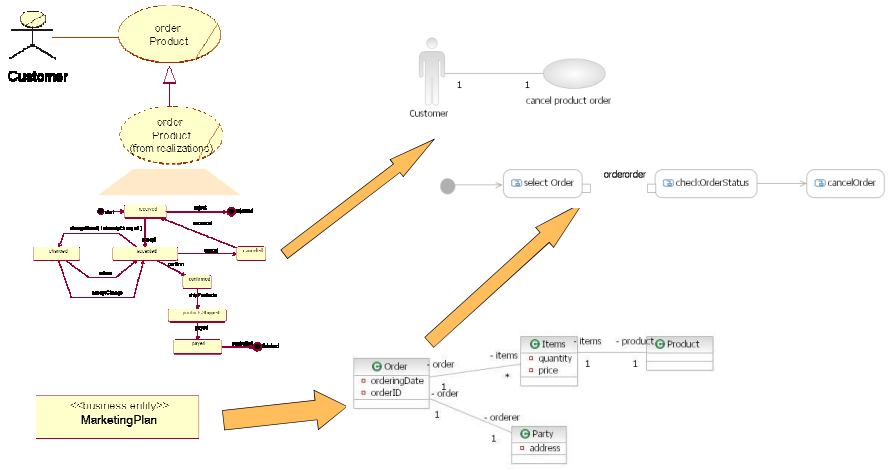
Alternative 1: Create SW Use Cases for (system –supported) Business Use Cases



From Requirements to Software Modelling

HOOD Experts in Requirements

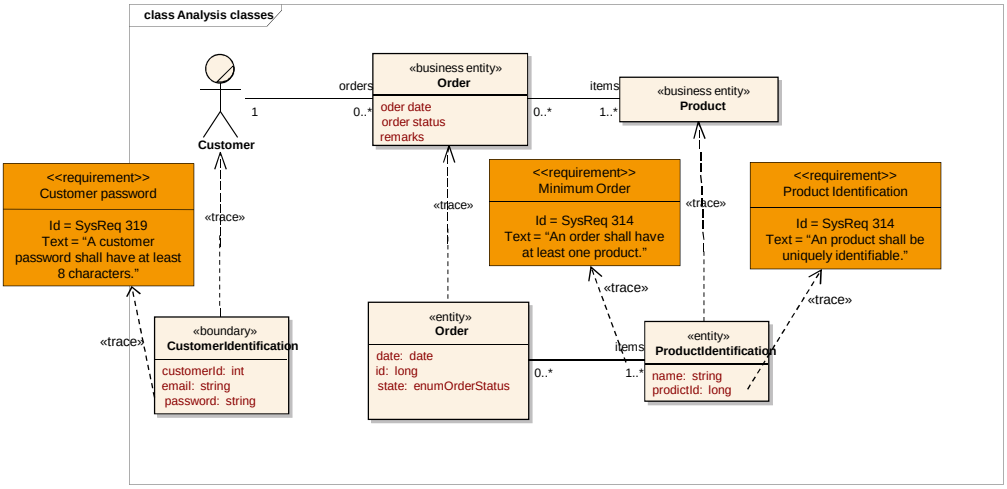
Alternative 2: Refine Business Use Case Activity to SW Use Case



From Requirements to Software Modelling

HOOD Experts in Requirements

- Consider impact of non-functional requirements



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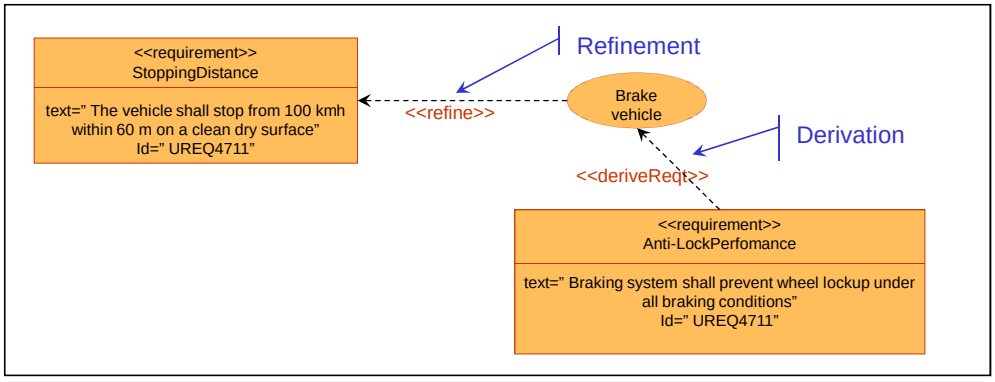
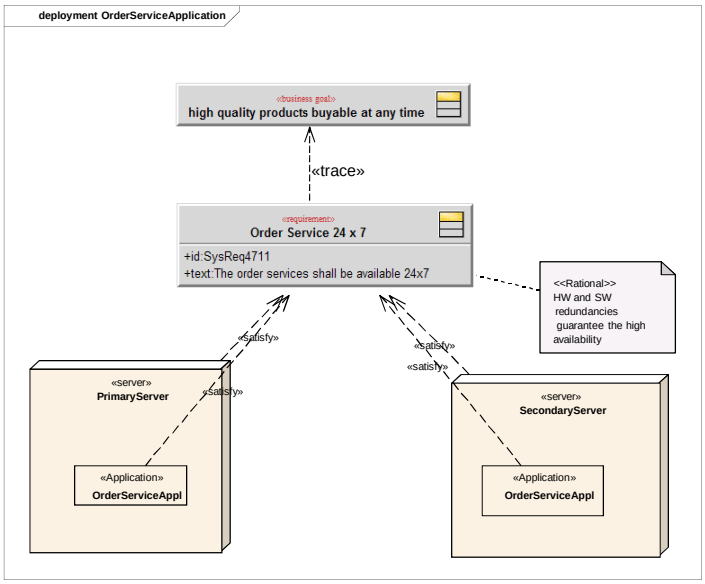
Tracing of non-functional Requirements

- Until now there was no standard to integrate traceability to requirements into modeling
  - normally done by UML surrogates in RM&E tool
- SysML supports tracing in Requirements Diagram



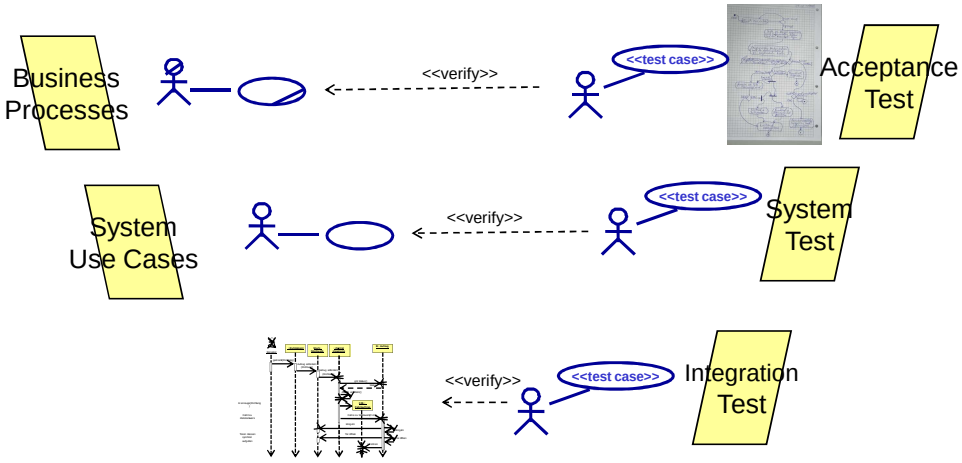
SysML Requirements Traceability



Agenda

“Collateral Benefit”

Seamless traceability from Business Processes to System Use Cases easies derivation of test cases



Agenda

Benefits of Integrating RM and Modelling

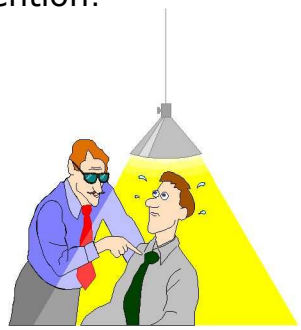
- Seamless traceability from business processes to software implementation
- Improved communication and understanding between all stakeholders
  - Business experts
  - Software analysts
  - Software developer
  - Project managers
  - Testers
  - ….
- Traceability of software architecture from requirements and business processes
  - reduces integration failures and efforts
  - improves maintainability
  - Improves extensibility and scalability of applications

Discussion

Thanks for your attention!

Questions &

Discussion



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