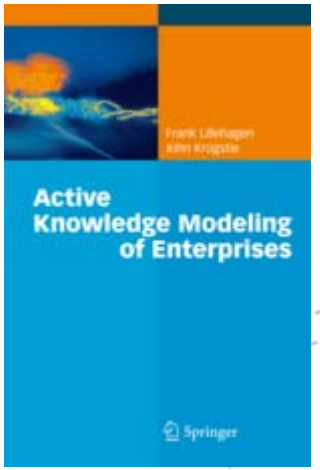
TDT4252
Modelling of Information Systems
Advanced Course
Example of (participatory) enterprise modelling with more complex modeling language

John Krogstie/Sobah Abbas Petersen

NTNU – Trondheim
Norwegian University of
Science and Technology

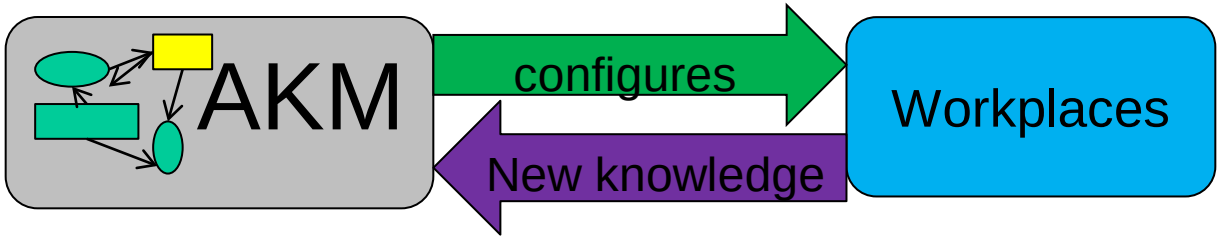
Today's Lecture



- AKM in Industry: an example
  - Lillehagen and Krogstie (2008), Chapter 7, Springer-Verlag, Berlin, Heidelberg. pp. 193-225.
- Additional Reading:
  - A15: K.Sandkuhl and F. Lillehagen, "The Early Phases of Enterprise Knowledge Modelling: Practices and Experiences from Scaffolding and coping, Stirna, J. and Persson (Eds.); PoEM 2008, LNBIP 15, pp. 1-14.

Objectives of example

- To develop and evaluate a model-based collaborative infrastructure for use in distributed product design.
- The purpose of the modelling process was to create an Active Knowledge Model (AKM);
  - An Enterprise Knowledge Model which supports execution of work tasks and is adaptable to the users' local demands.

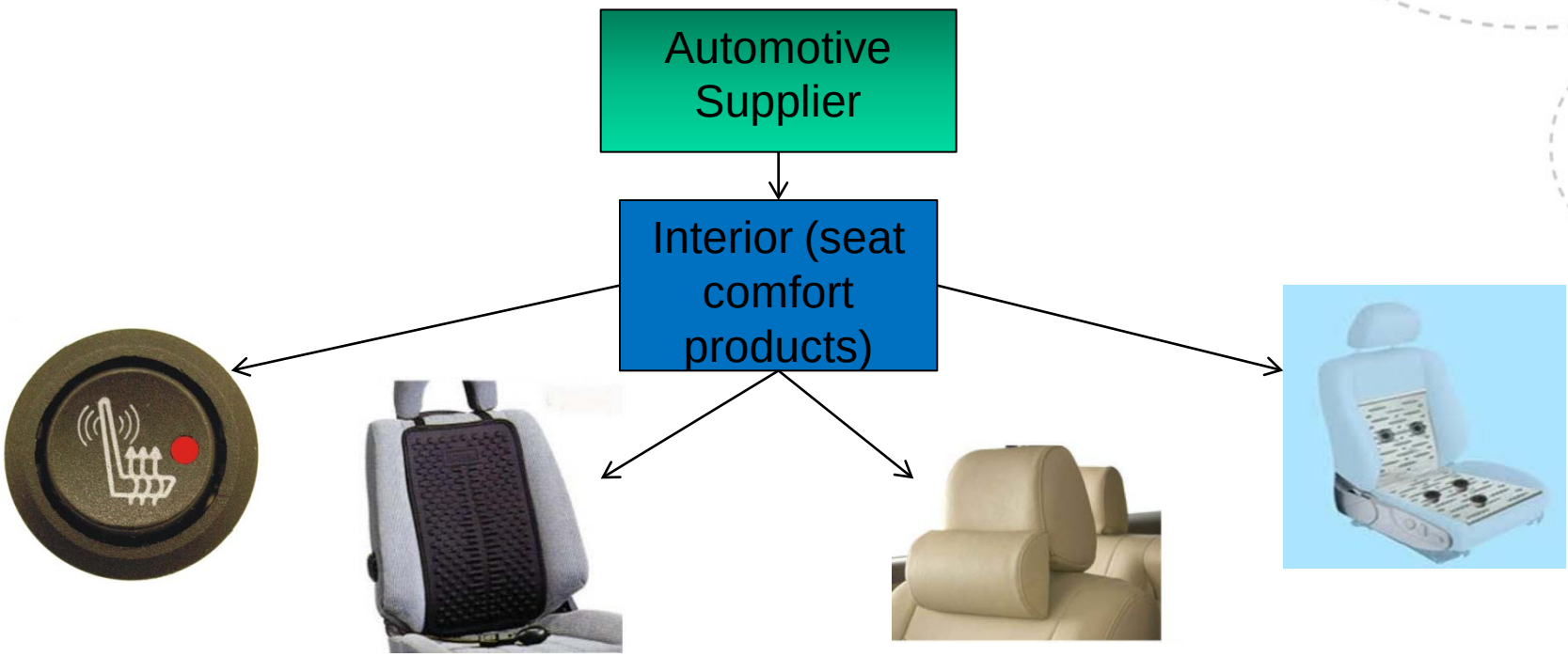


MAPPER Project

- Model-adapted Process and Product Engineering.
- Aim of MAPPER was to enable fast and flexible manufacturing in networked enterprises by providing methodology, infrastructure and reusable services for participative engineering.

Case Description (1)

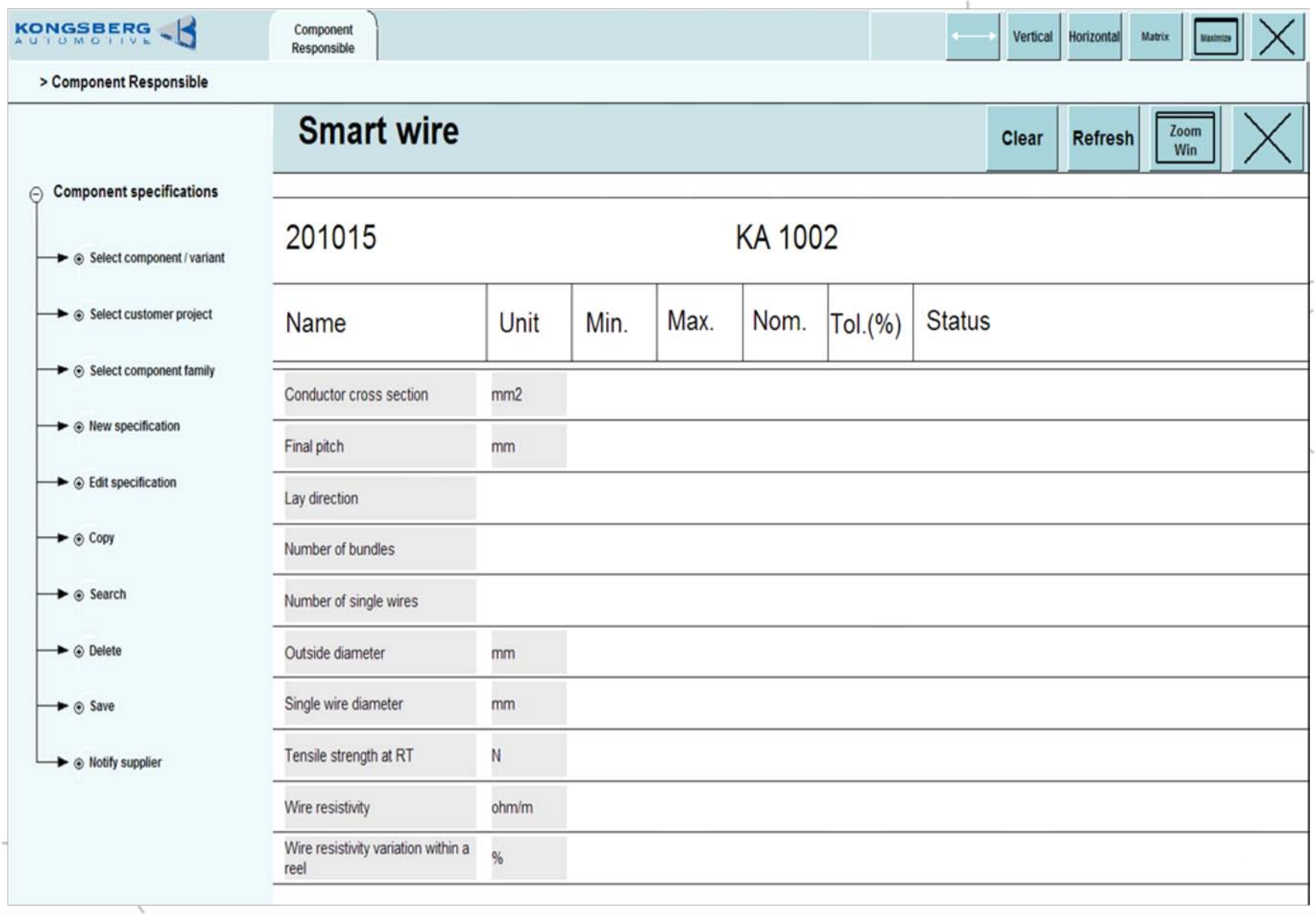
- Distributed product development and multi-Project lifecycles in a networked organisation with different subsidiaries of an automitive supplier.



Case Description (2)

- The focus was on the Advanced Engineering Unit, where the product development tasks concentrated on pre-development of new concepts and new materials.
- Geographically distributed.
- Product families: various versions of the components exist and have to be maintained and further developed for different models and different customers.

Workplace example

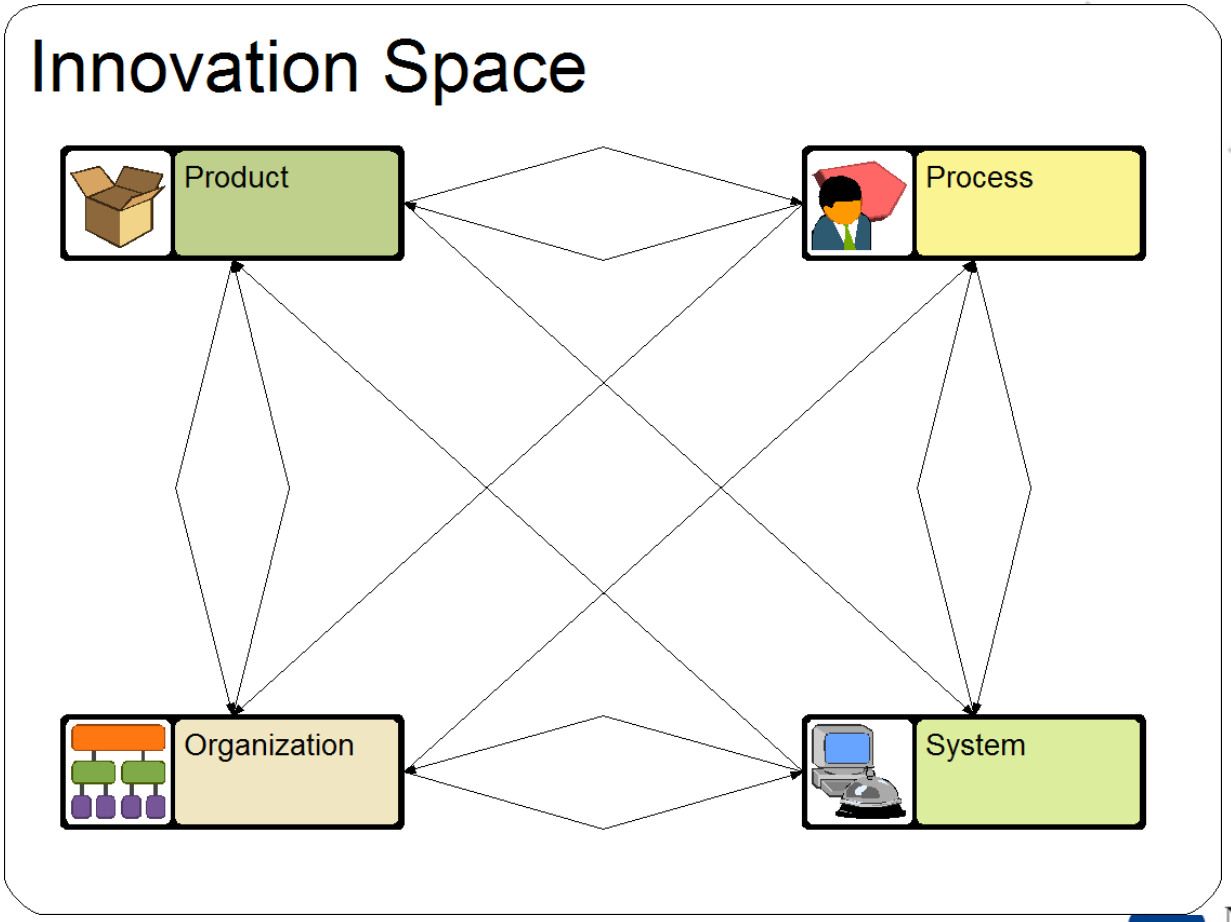


Purpose of Enterprise Modelling

- To capture the relevant product knowledge and process knowledge required for supporting collaborative engineering at different sites of the automotive supplier.
- The model was anticipated to solve several problems:
  - To support fast integration of geographically distributed collaboration partners.
  - To enable flexible development processes.
  - To coordinate a large nunber of parallel product development activities.

POPS*

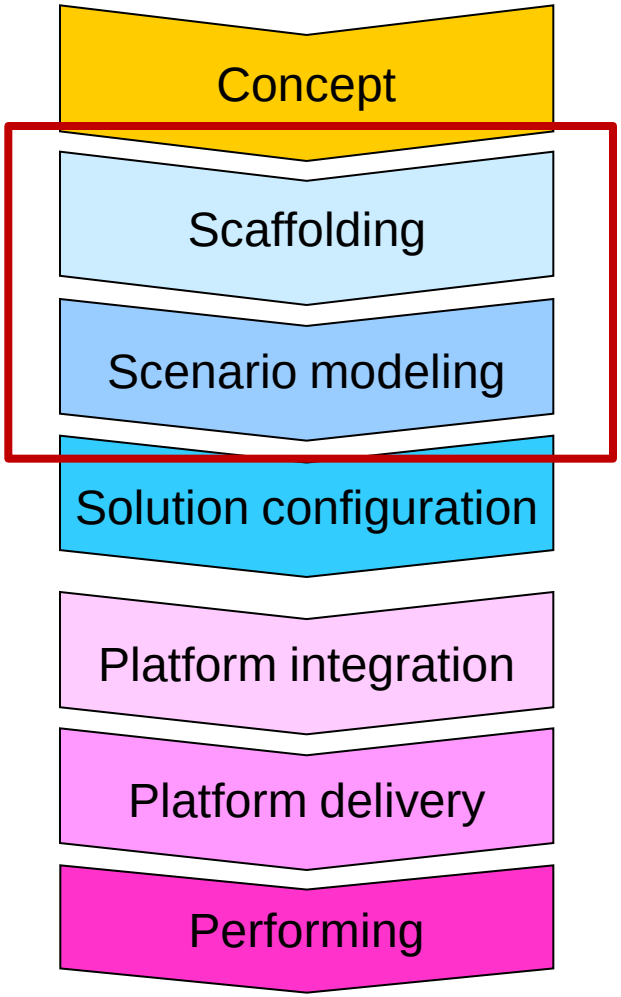
Process, Organisation, Product and System



POPS* vs ArchiMate aspects

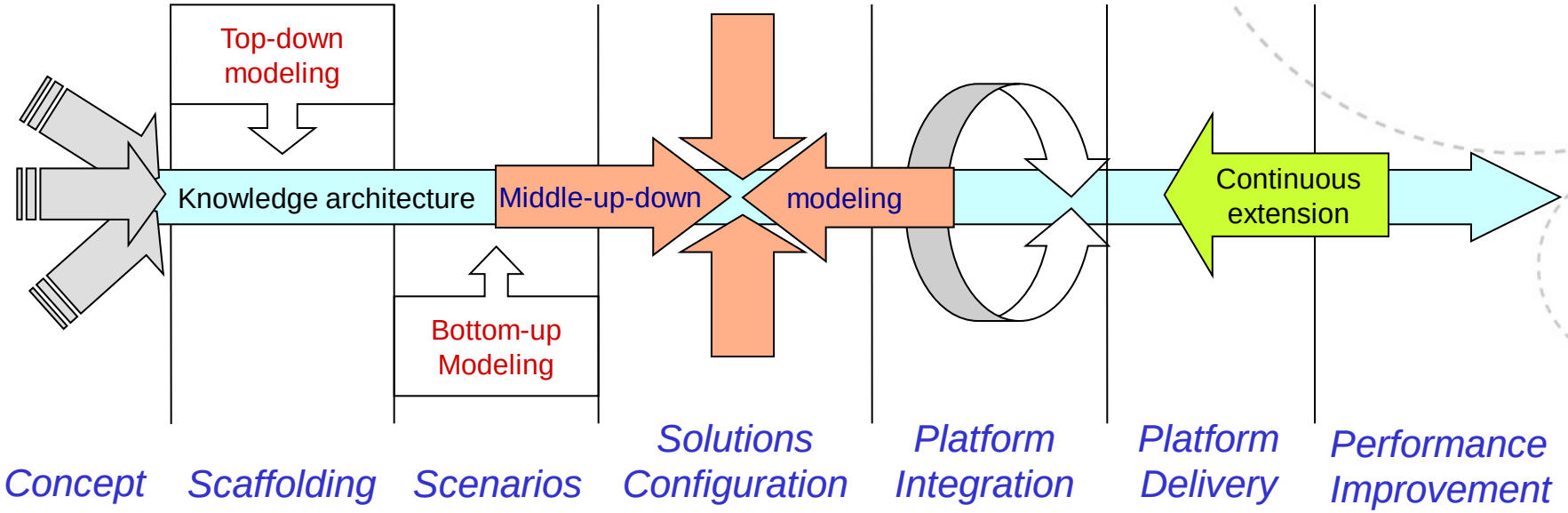
- Product - Passive structure
- Organization – Active structure
- Process – Behaviour
- System – Application layer
- * - E.g Objectives, skills, … (other perspectives on an as needed basis)

C3S3P Methodology



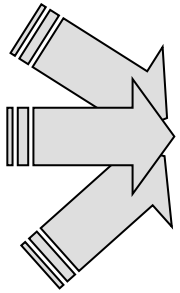
- *Concept*, exploring main objectives and overall solution approaches. Is enterprise modeling appropriate?
- *Scaffolding* creates an overview of current ways of working
- *Scenarios* are developed in close interaction with users on detailed areas
- *Solution* configuration defines views and workplaces
- *Platform* configuration integrates pre-existing applications and data
- *Platform delivery* includes training and practicing
- *Performing* agile business, continuously adapting and extending the solution through experiences in use

Knowledge Architecture Driven Approach

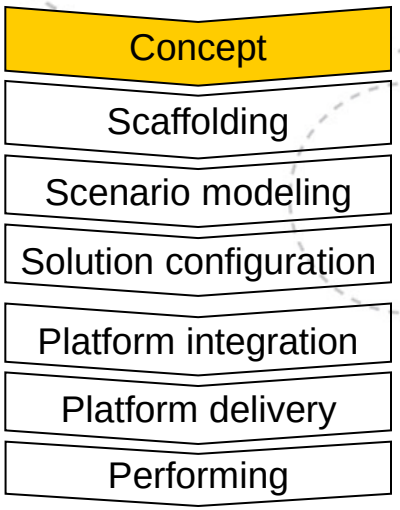


Customer Delivery Process

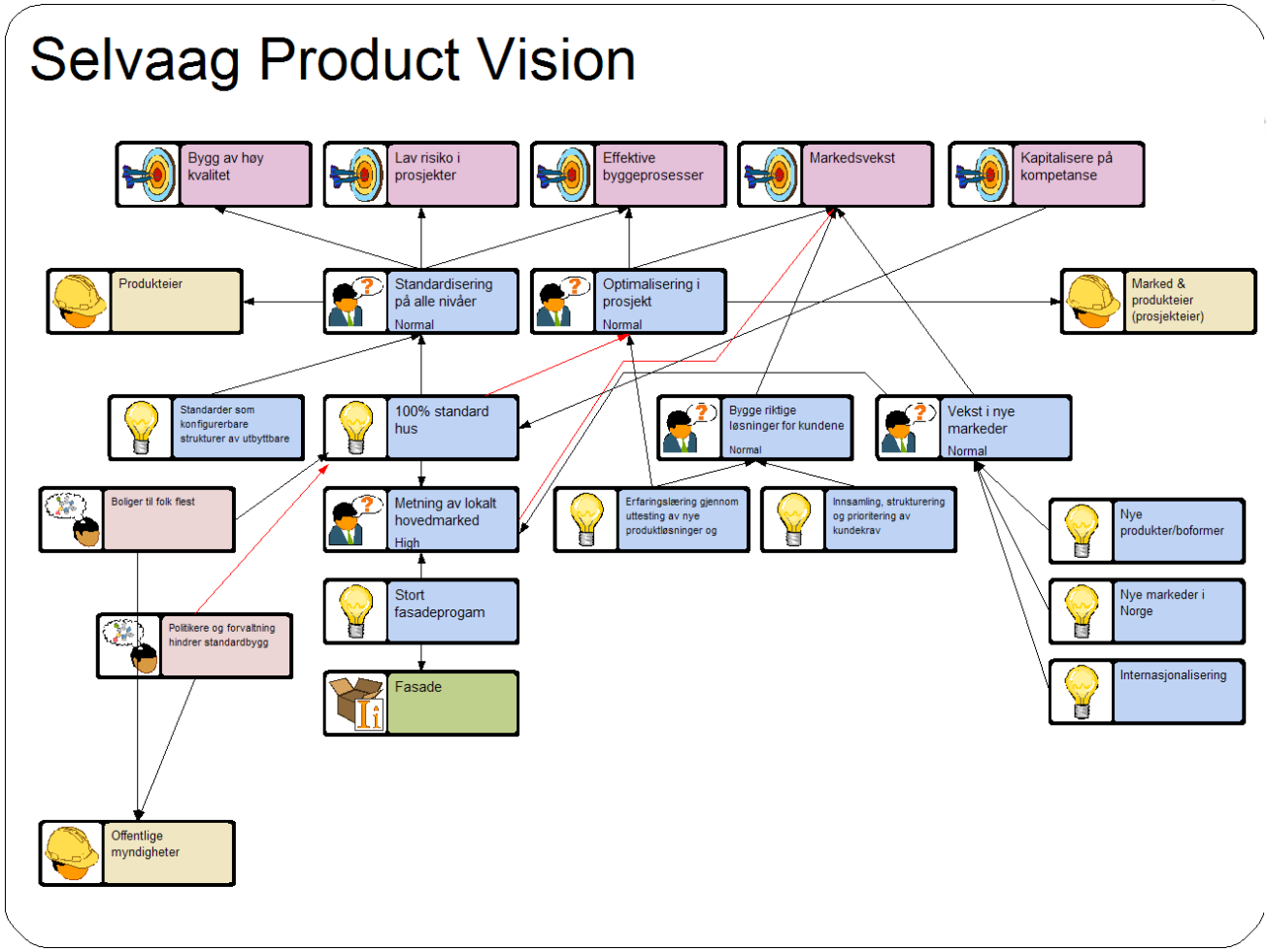
1. Concept Selection



- Capture the main objectives and challenges
- Experiment with existing concepts
  - Make the users familiar with modeling
  - Trigger discussions about opportunities
- Existing solution concepts
  - Previous projects
  - Methodologies already in use by the company
  - Methodologies in use in the industry
  - AKM methodologies for e.g. product design

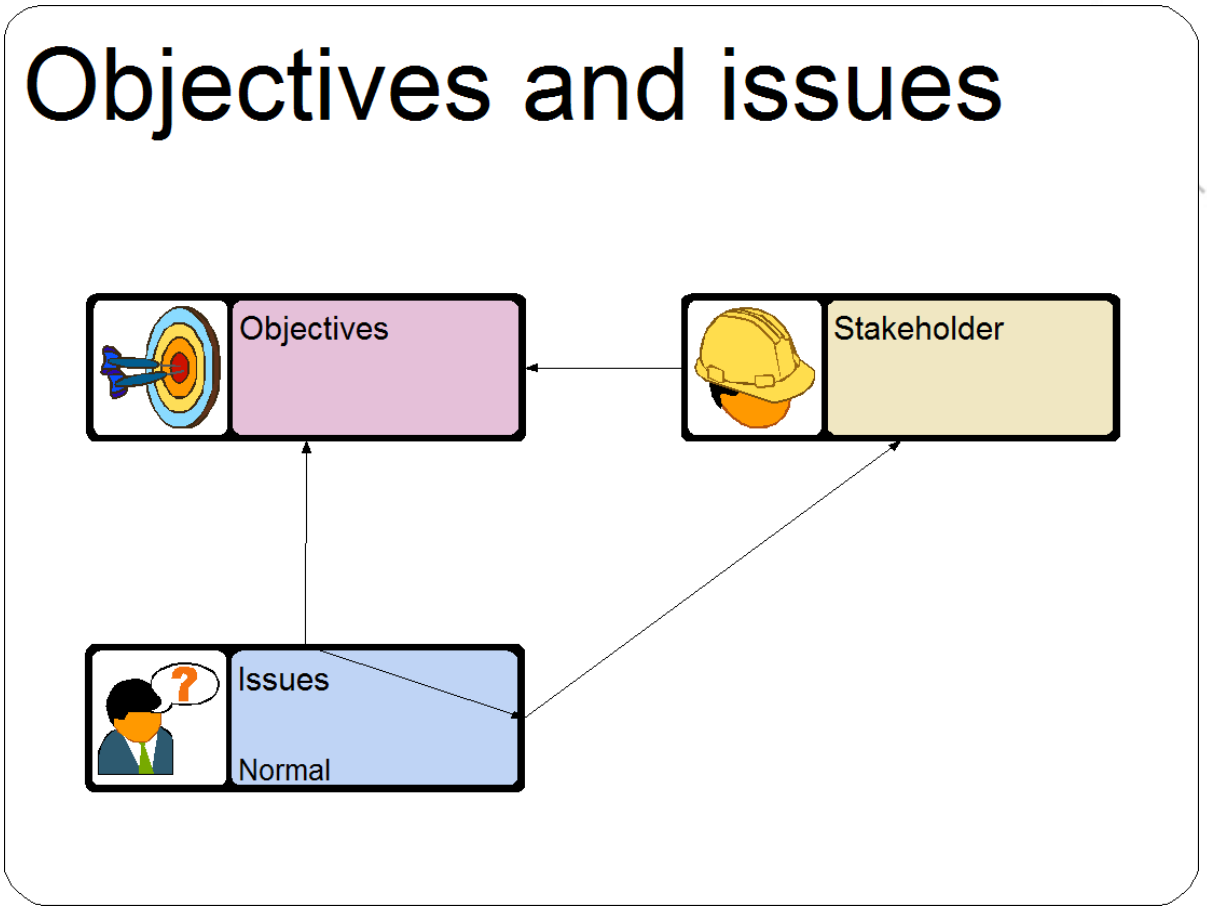


Objectives Model Example



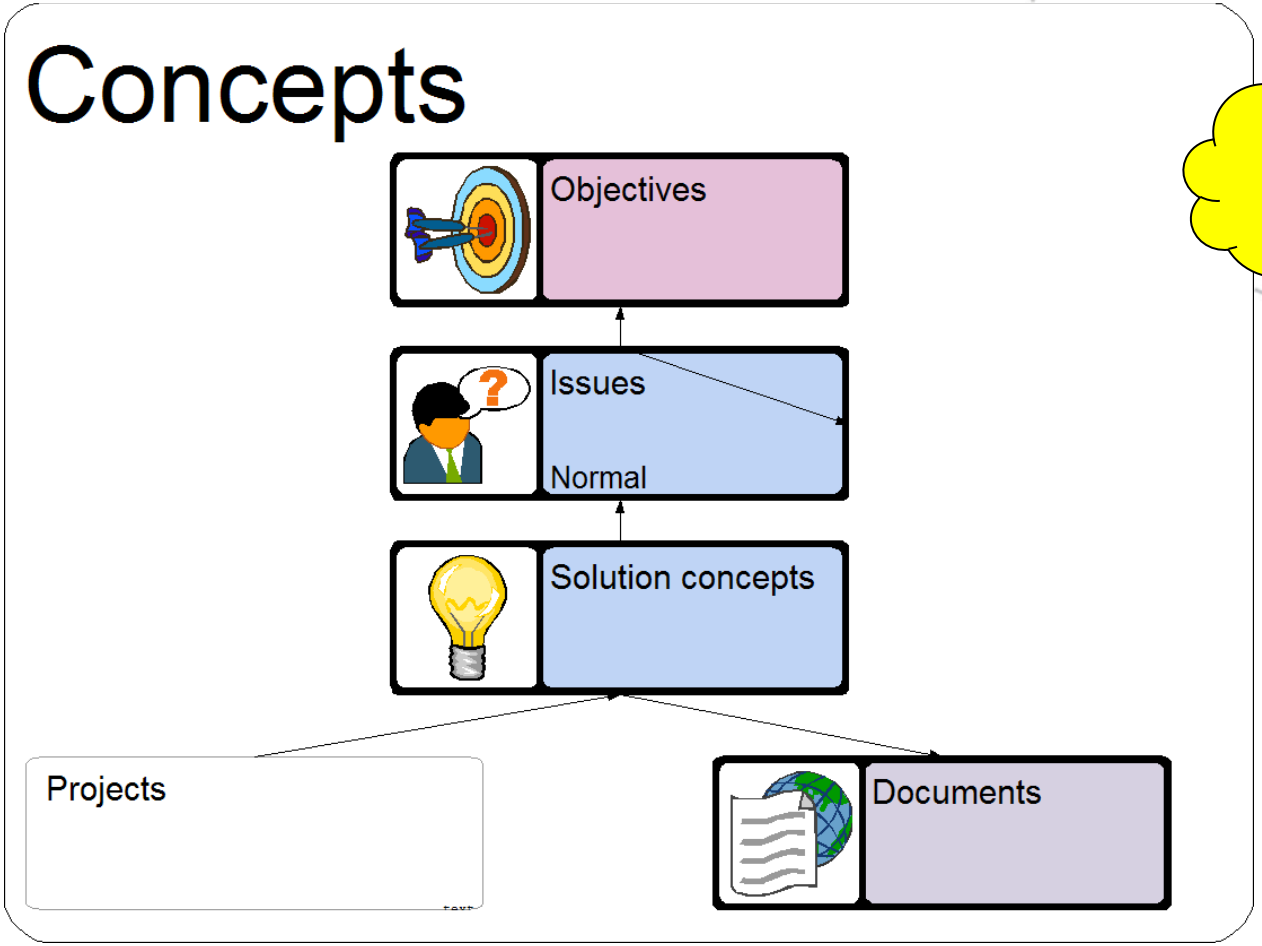
An instantiated model

Objectives and Issues



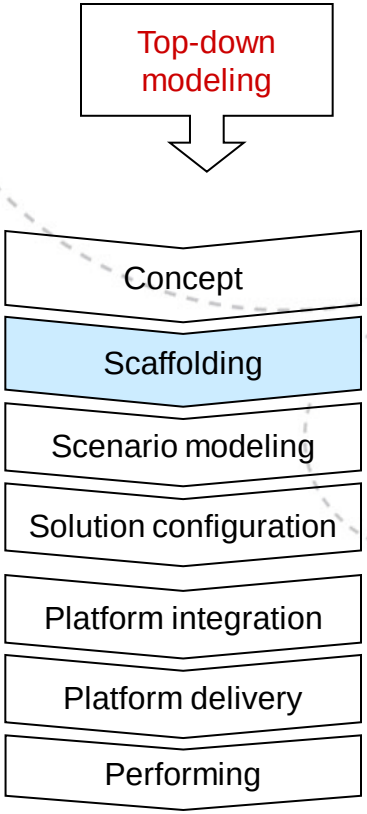
Meta-model

Solution Concepts

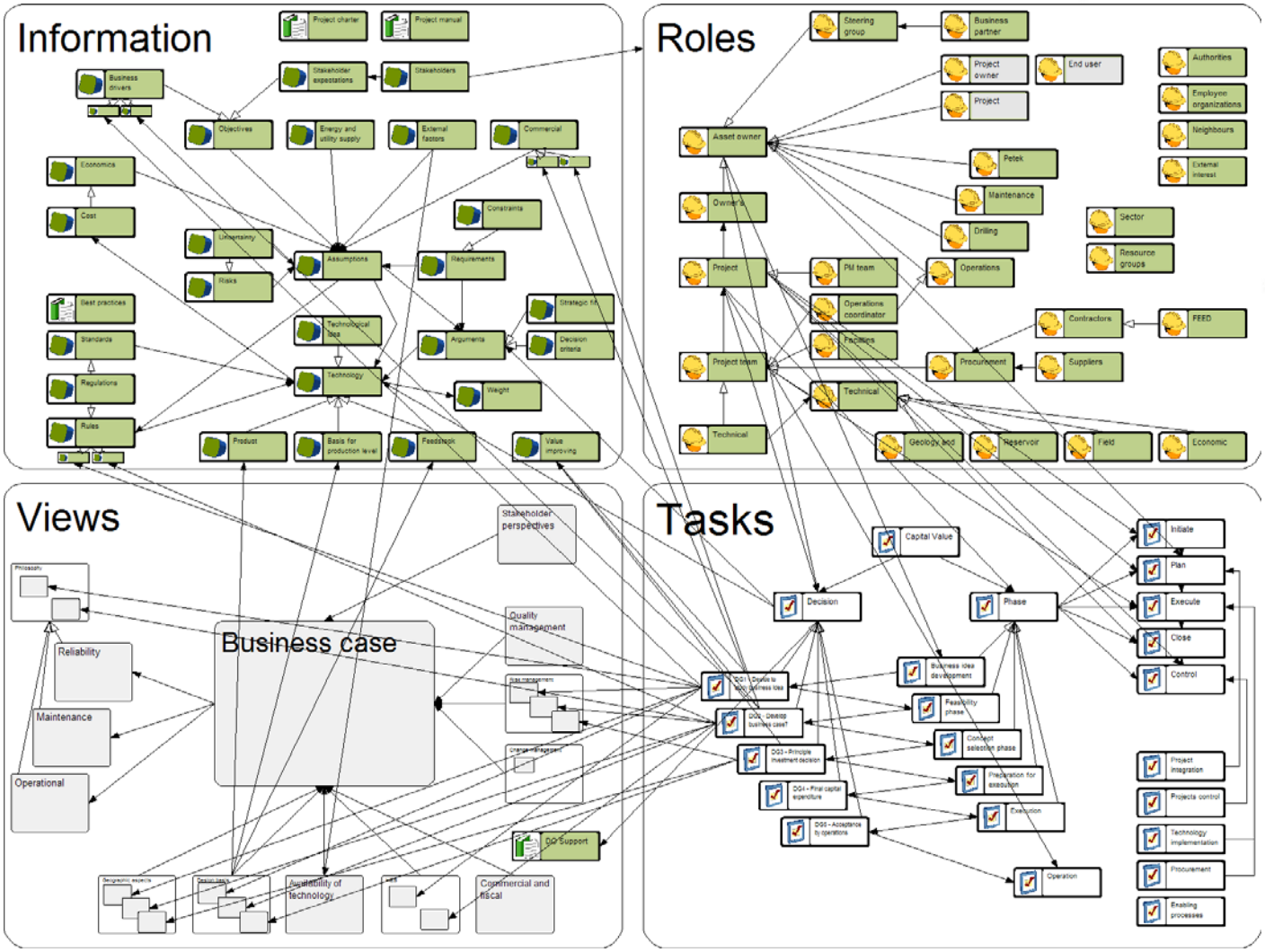


2. Scaffolding - Get an Overview

- Capture the domain as an active knowledge model
  - The stakeholders and roles
  - The main tasks they perform
  - The information they use and produce
  - Main views and perspectives
- Raise the customer's understanding of modelling.
- Suggested to proceed with the analysis mainly in the above order.



Scaffolding Model

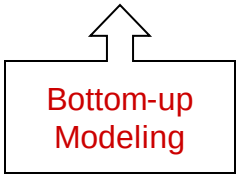


NTNU – Trondheim
Norwegian University of Science and Technology

Key Questions for the Modeling Session

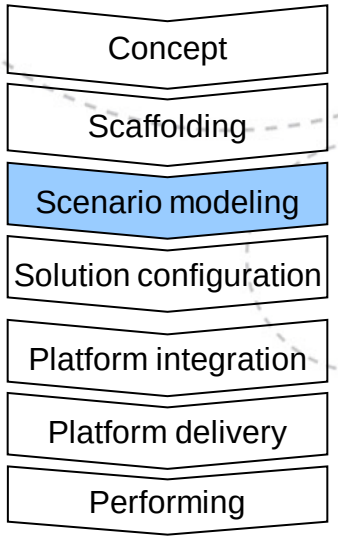
- Information
  - What information do you need to perform your work?
  - What is hard to find today?
- Roles
  - Who do you collaborate with, on what?
  - What is their expertise?
- Tasks
  - What do you do?
  - What are your responsibilities?
- Views
  - What should your workplace on the computer look like?
  - What should it contain?

Scenario modelling



- Modelling the core competences of the enterprise as work-processes for execution as task patterns.
- Scoping, select a narrower set of
  - Roles
  - Tasks

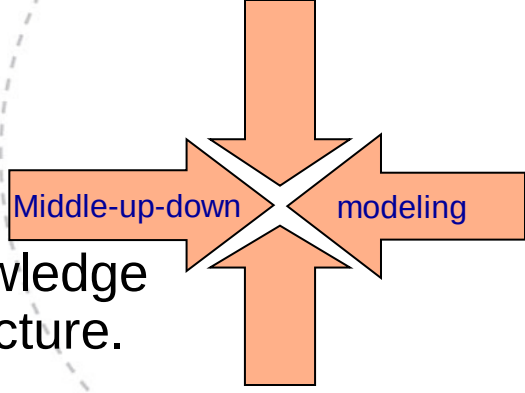
  that the further analysis should focus on
  - Which workplaces to demonstrate
  - Which people to involve in the modelling
- Criteria for selection
  - Demonstrate holistic approach, but simplified
  - Concrete case if possible
  - Assess benefits and values
  - Reuse and adapt existing solution concepts



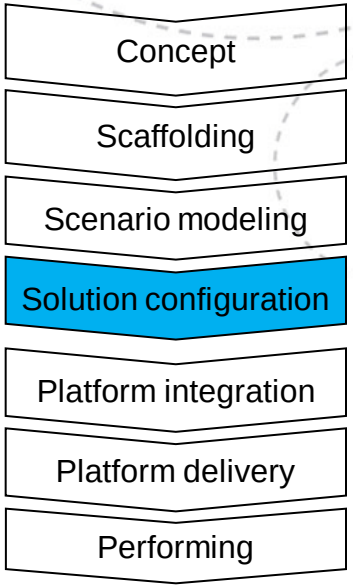
Build Scenario Models

- Detailed modelling of the selected scope:
  - Information structures from documents
  - Tasks from project handbook
  - Interviews and discussions with stakeholders
- Add context
  - Where does the information come from?
  - Who do we need to communicate with?
  - How will the information we produce here be used, by who, when, to do what?
- Main need to narrow the scope.

Solution Configuration



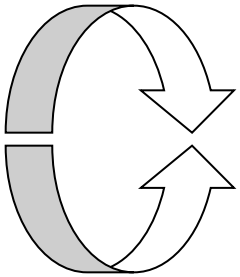
- To externalise holistic and pragmatic enterprise knowledge and to present it in an Enterprise Knowledge Architecture.
- Define workplaces and views for selected users.
- Define templates
  - Information templates
    - Objects with properties and parameters
    - Reusable structures
    - Patterns of relationships to be managed
  - Task pattern templates
    - Interactive tasks performed by users in model-configured views
    - Workflow processes, event-driven tasks
    - Scripts
    - Modelled rules
- Define initial model content, test data
    - Users
    - Project data



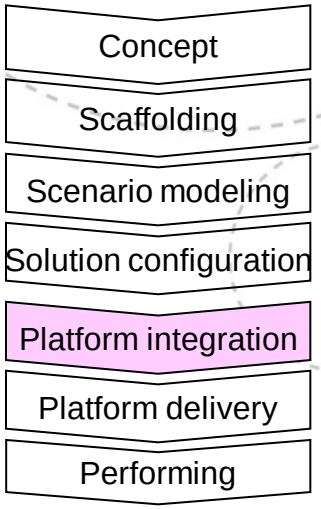
Solution Modelling – Modelling Aspects

- Business Process hierarchy (top down)
- Work Processes (bottom up). Task patterns that are already modelled are adapted. Task patterns are linked to process hierarchy.
- Develop common views among stakeholders (middle-out).
- Product modelling (lifecycle aspects, components, etc.).
- Product structures – conceptual design of products.
- Organisational modelling: competences, responsibilities, etc.

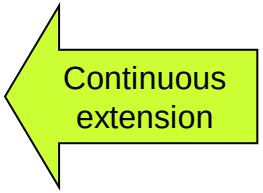
Platform Configuration



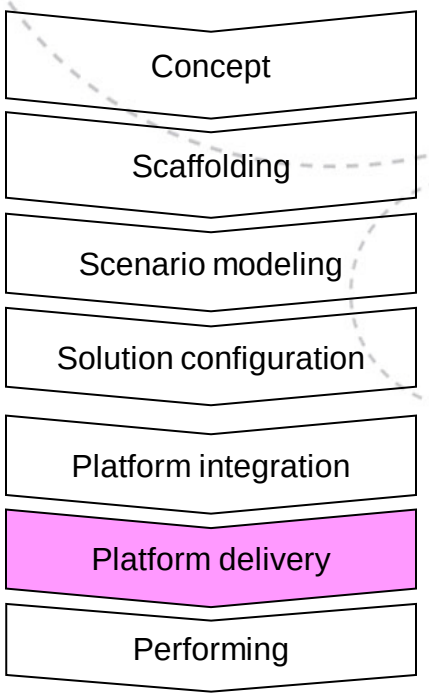
- Integrating other systems and tools by modelling other systems data models and other aspects, often expressed as UML models.



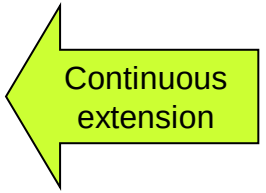
Platform Delivery



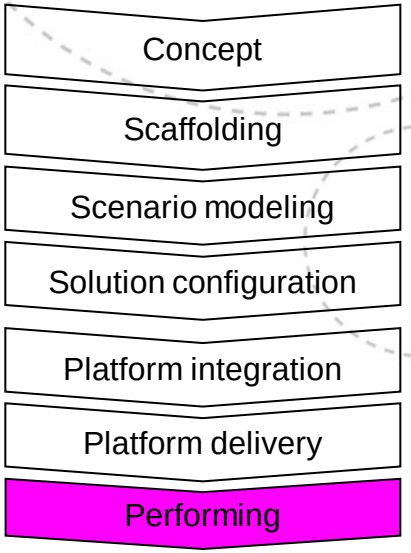
- Adapts services to continuous growth and change by providing services to perform extensions and still keep consistency and compliance across platforms and networks.



Performance Improvement

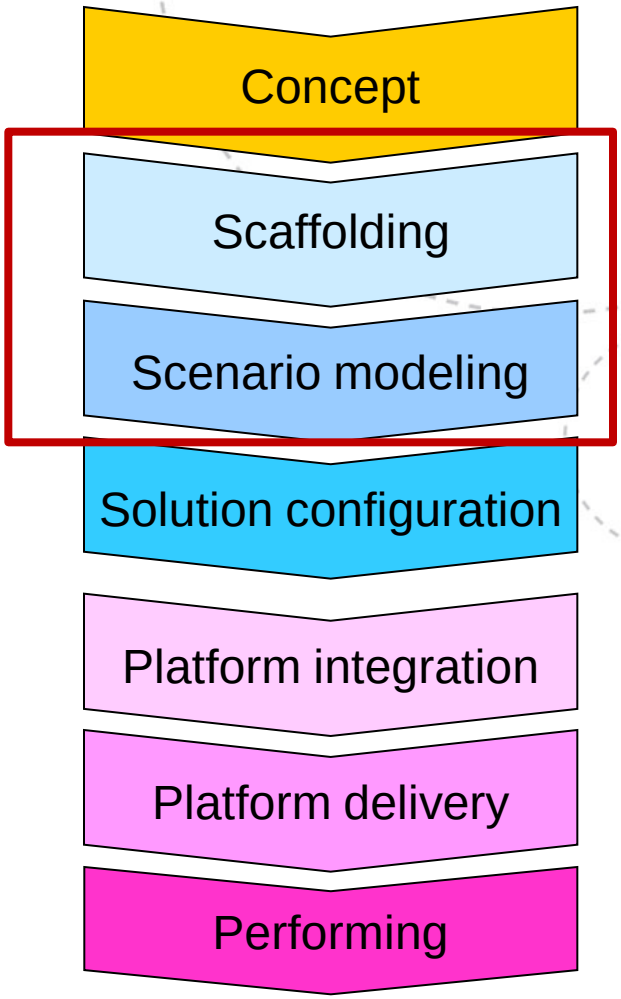


- Continuously performing improvements and adaptations and providing services to semi-automatically adjust models.
- Re-generate model-configured and model-generated workspaces and services, tuning solutions to produce the desired effects.



Summary: C3S3P

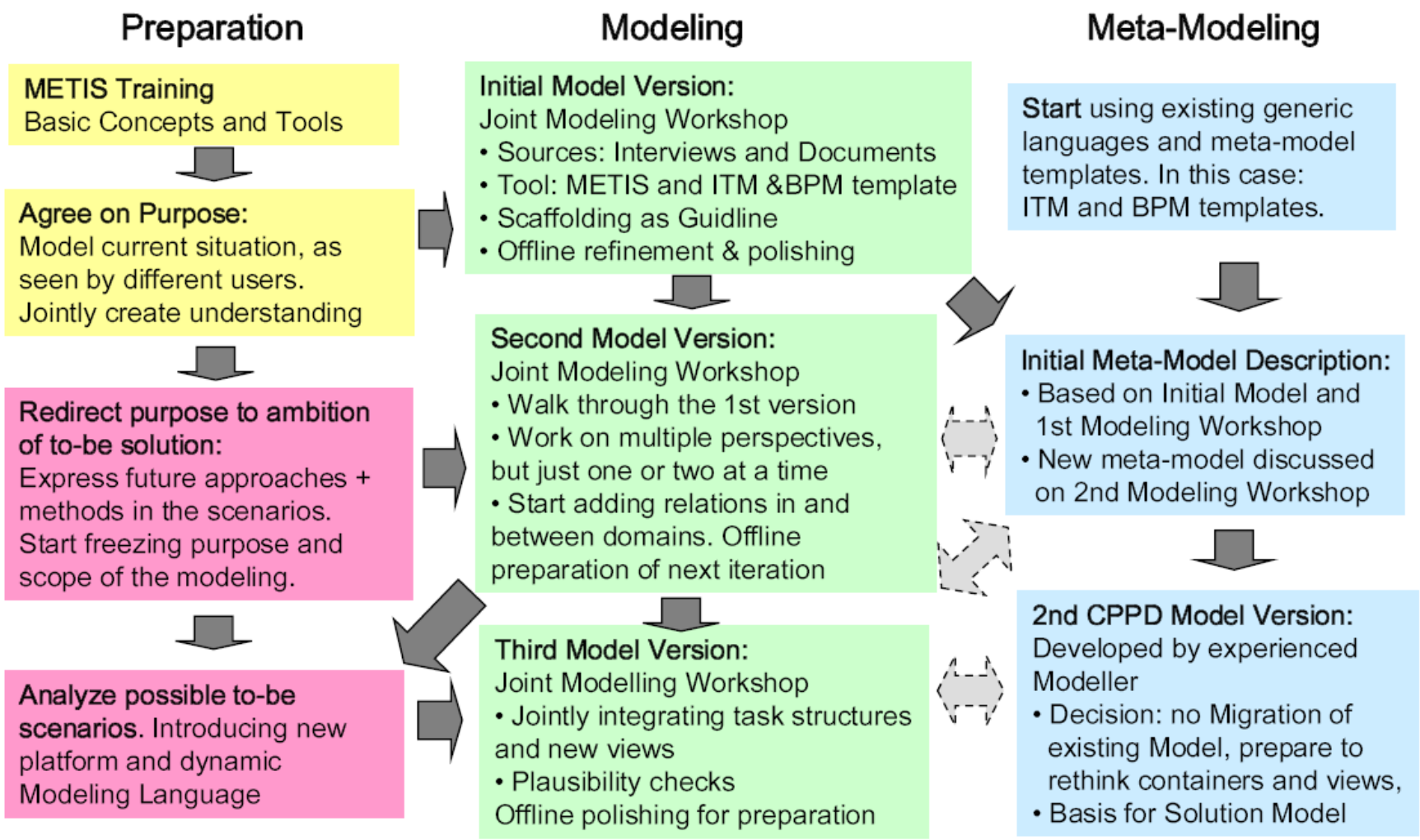
- A method to use AKM in industry.
- Model to capture the enterprise knowledge.
- Generate views using the model.



Modeling in the seat heating-case: 2 Cycles of using C3S3P

1. Capture the organisational knowledge and best practices.
2. Integration of the product knowledge into best practices.

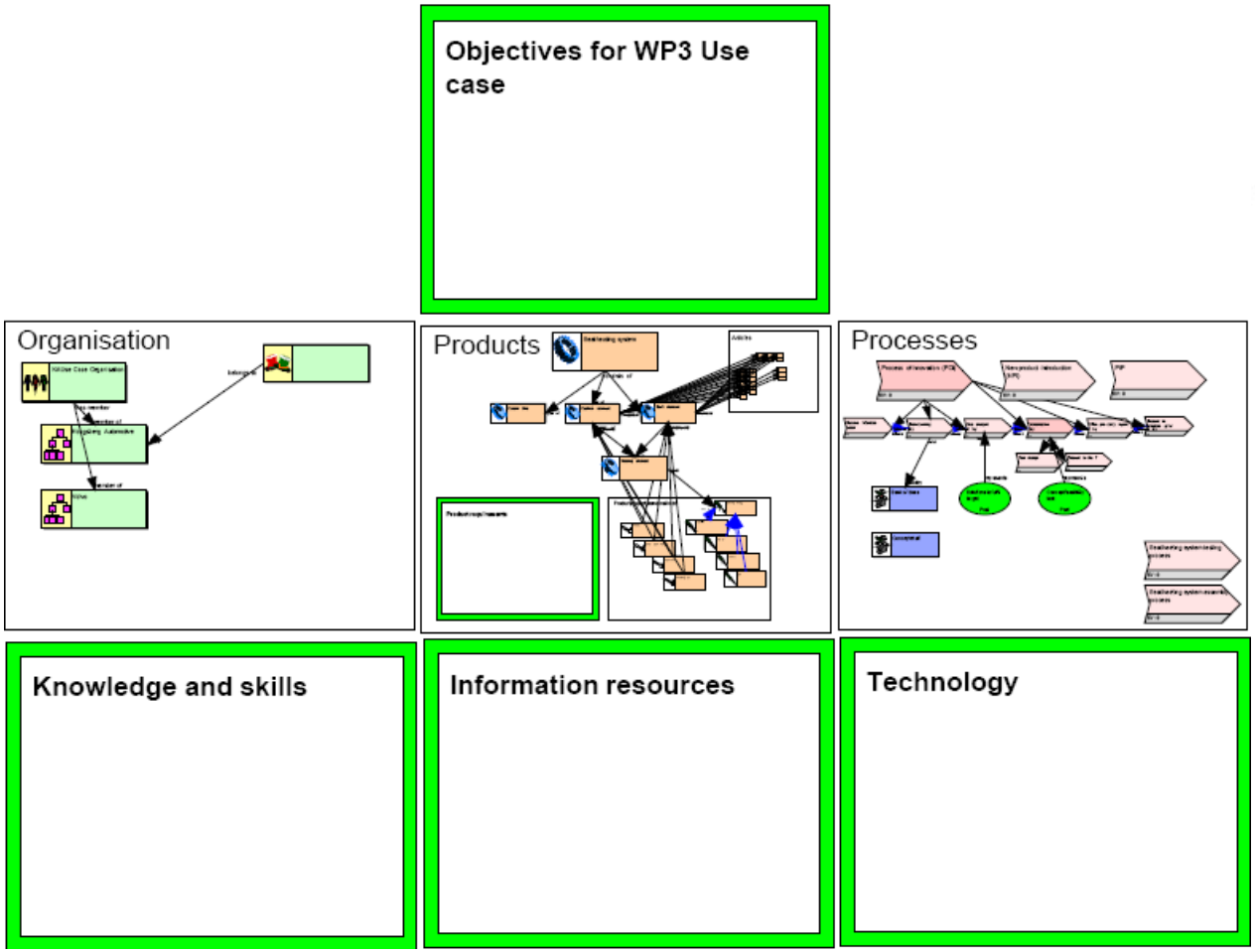
Steps in the Scaffolding Phase



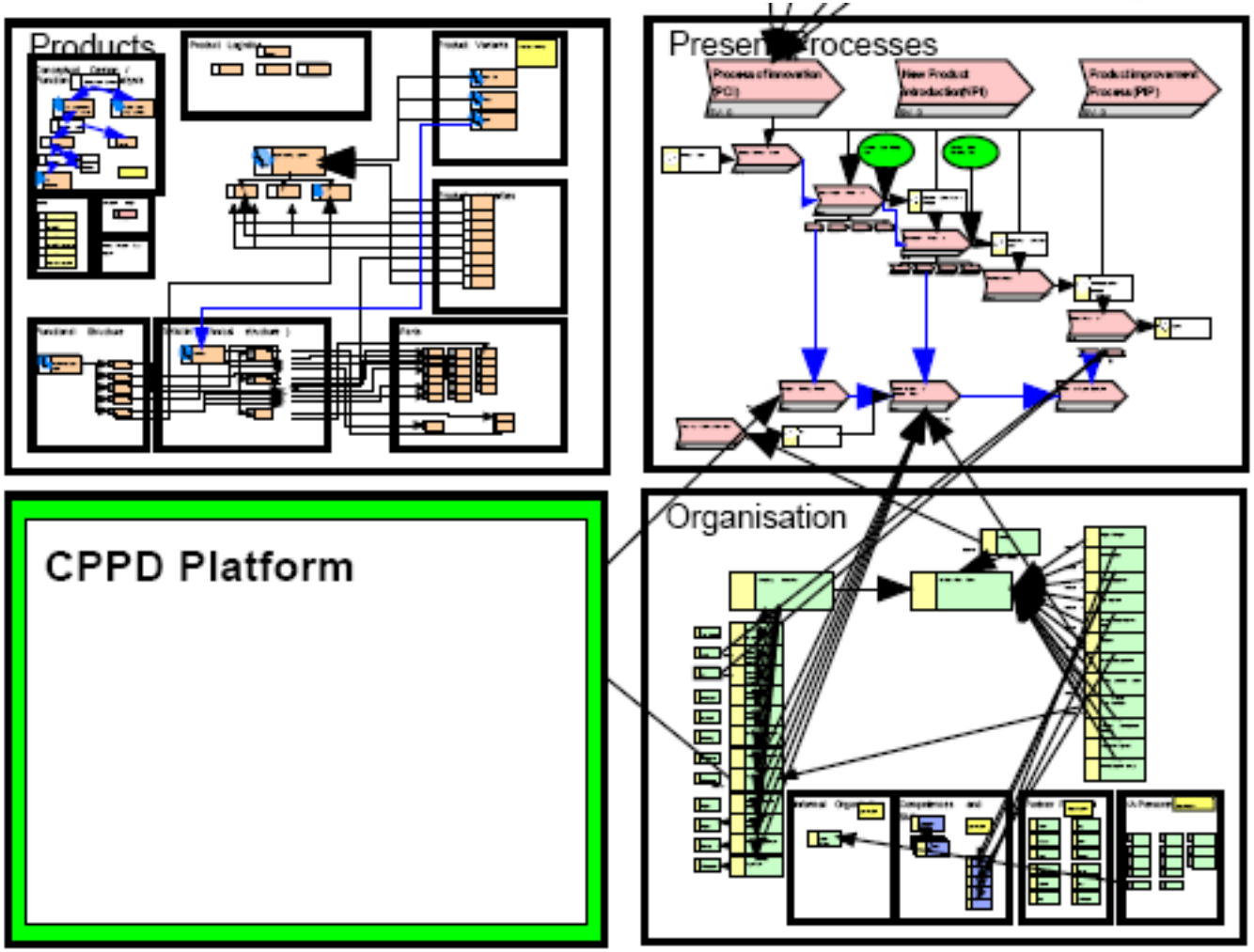
Scaffolding: Roles in the Modelling Process

- Manager (aka Problem Owner)
- Planner
- Modelling Expert
- Facilitator
- Coach
- Modeller
- Domain expert

Initial Model Version



Final Model Version



Scoping or Scenario Modelling

- Purpose: Develop initial versions of the solution models that specified the intended future way of working in the future product development process at the automotive supplier's business area, which is seat comfort.
  - Detailed models
  - Technical details, e.g. collaboration services, internal IT systems
- In addition to the models, textual descriptions of the scenarios were created.

Scoping: Roles for Modelling Process

- Based on the scenario descriptions, a model was developed by the Modelling Expert and the Coach.
  - This was because of the level of (technical) detail required in the model.
- The model was then presented to the team members for a discussion.

Experiences

- Participation of Stakeholders is a success factor.
- Different levels of participation were required during the different modelling phases.
- Starting each modelling session by walking through the current status of the model was beneficial for a common understanding.
- Meta-modelling and consolidating the model was a non-participatory activity.

Lectures next week

- Evaluation of models
  - Competency question : SAP
  - Model quality: JK