



COMMITMENT

Paradigm-shifting Concepts enabling Networked Enterprise Design and Operation

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Purpose

1. Understand the Nature of Enterprise Knowledge and paradigm-shifting Concepts
2. Exploiting the properties of Knowledge-spaces and Workspaces
3. Agile Approach - modeling for workspace execution & emergence
4. Holistic Enterprise Design – exploiting the concepts & properties
5. What Architecting teams need to capture:
 - Work-centric context and dependencies?
 - Rules for self-adjustment and autonomous capabilities?
6. How to support Continuous Learning and Innovation?
7. Towards a multi-dimensional layered Enterprise Knowledge Modelling and Management Framework
8. What are the added capabilities and opportunities?

First Industrial prototype – KASH platform



CC Builder

Demonstrations

Toggle Config

↔

Vertical

Horizontal

Matrix

Maximize

Close

> Demonstrations

⊕ Customer Request

⊕ Product Variants

⊕ Product Design



Improving driving comfort. Worldwide



AUTOMATIC GEARSHIFT

MANUAL GEARSHIFT

ARM RESTS

HEAD RESTRAINTS

SEAT SUPPORTS

CLIMATE SEATS

HYDRAULIC GEARSHIFT

MECHANICAL GEARSHIFT

CLUTCH ACTUATION

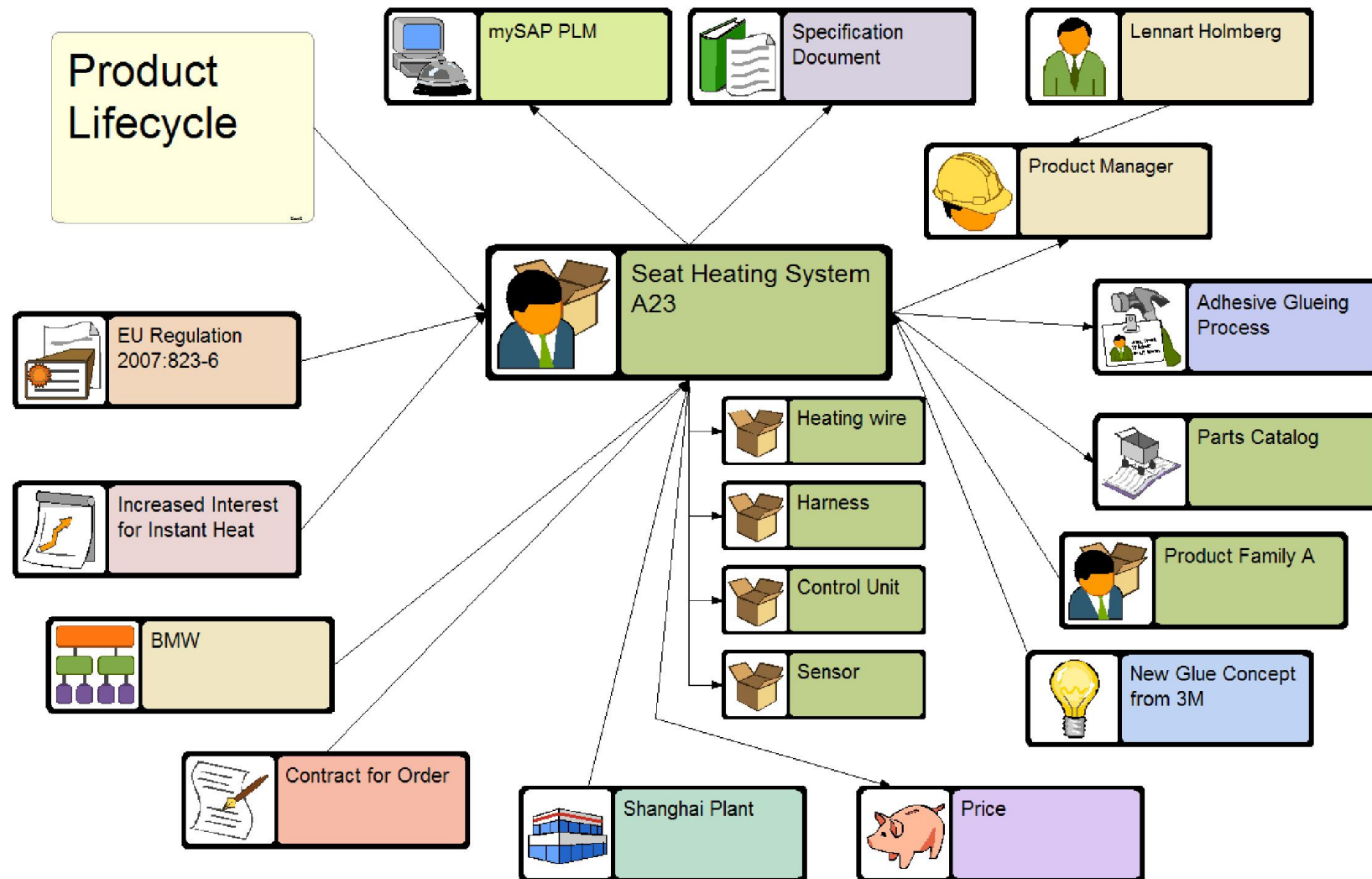
COMPONENTS

AIR COUPLINGS

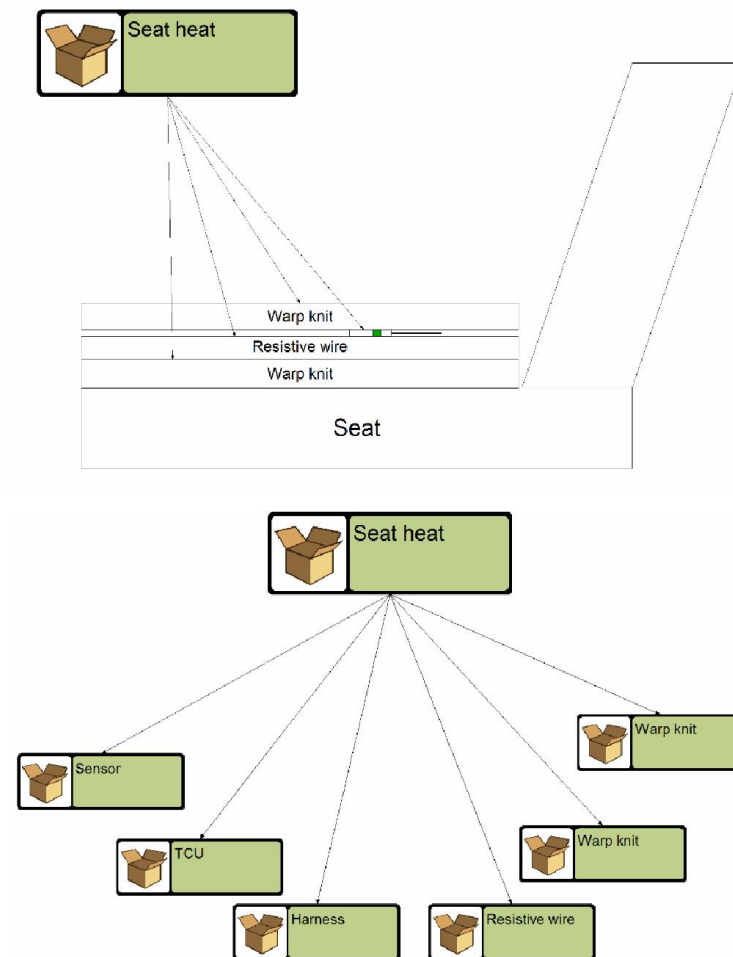


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Seat-heating design - knowledge aspects



Seat-heating Design – Product structures



The figure upper left shows a design principle view, the above is a functional view, and the left a product structure supporting a multitude of model views. Data-, role-, task-, and view-handling are core constructs in modeling, using and managing active knowledge models.

Workplaces for Material Specification

KONGSBERG ALUMINUM

CC Builder Material Specifier Product Specifier Demonstrations

Toggle Config View Vertical Horizontal Matrix Maximize

> Material Specifier

Material Specification

Parameters Clear Zoom Win

T399857

Name	Unit	Value	Remarks
Final pitch	mm	11	
Min tensile strength at RT	N	48	
Min yield strength at RT	N	28	
Number of bundles		1	
Pitch tolerance	mm	1	
Resistance	Ohm/m	0,066	
Resistance tolerance	%	5	
Single wire diameter	mm	0,05	

Material specifications

- Initialize
- Select variant
- New
- Search

Properties - [Smart wire]

Model Instance Links View Type Dependency

Name: T399857

Single wire diameter (mm): 0,05

Resistance tolerance (%): 5

Resistance (Ohm/m): 0,066

Min tensile strength at RT (N): 48

Min yield strength at RT (N): 28

Pitch tolerance (mm): 1

Final pitch (mm): 11

Number of bundles: 1

URI: virtual:cc_heatproducer.kmv#_002aso801g5t8kl1mdve

More

OK Apply Revert Cancel

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Workplace for seat-heating design

KONGSBERG AUTOMOTIVE

CC Builder | Material Specifier | Product Specifier | Demonstrations | Toggle Config View | Vertical | Horizontal | Matrix | Maximize

> Demonstrations

Partial heat prod services Rule ... Detail ... Neighbour Search Properties Clear Zoom Win

P services FR : DS : C Rule ... Detail ... Neighbour Search Properties Clear Zoom Win

Partial CPV : CP : CP Rule ... Detail ... Neighbour Search Properties Clear Zoom Win

P PPV : PP : CPV : DP Rule ... Detail ... Neighbour Search Properties Clear Zoom Win

Demo 1

Demo 2

Demo 3

- Select component
- Select variant
- Configure
- View design solutions
- View variant parameters
- View design/performance parameters
- View non-functional requirements
- Edit design parameters
- Edit performance parameters
- Edit requirements (discrete)
- Edit requirements (range)

CC: Partial heat producer encapsulation

CC: Partial heat producer encapsulation

DS: Lacquered strands

DS: Metal plated strands

C: Performance parameter requirements

C: Performance parameter requirements
CP: Hot spot quality

C: Performance parameter requirements
CP: Flammability requirement

C: Performance parameter requirements
CP: Fogging requirement

DS: Lacquered strands

DS: Lacquered strands
DP: Surface treatment material

DS: Lacquered strands
DP: Thickness

DS: Lacquered strands
PP: Maximum conductivity

DS: Lacquered strands
PP: Maximum fogging from the wire

DS: Lacquered strands
PP: Maximum temperature

DS: Lacquered strands
PP: Resistant to liquids

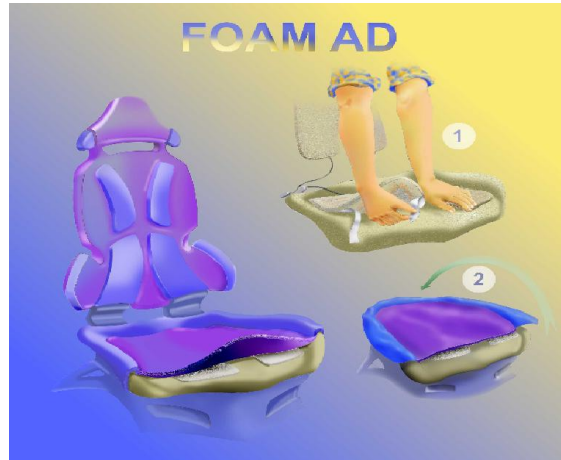
DS: Lacquered strands
PP: Surface treatment grade

DS: Lacquered strands
PP: Surface treatment temperature index

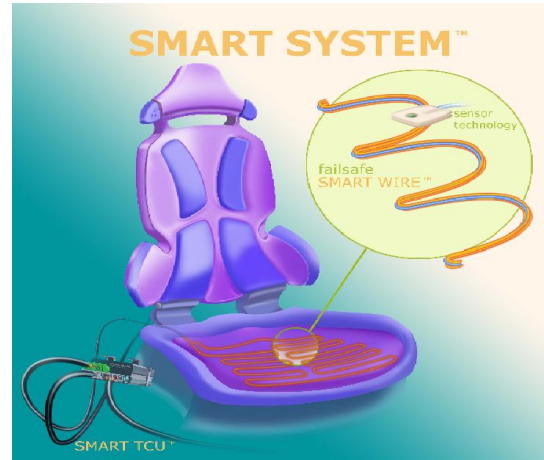
DS: Lacquered strands
PP: Wire extinguishing speed

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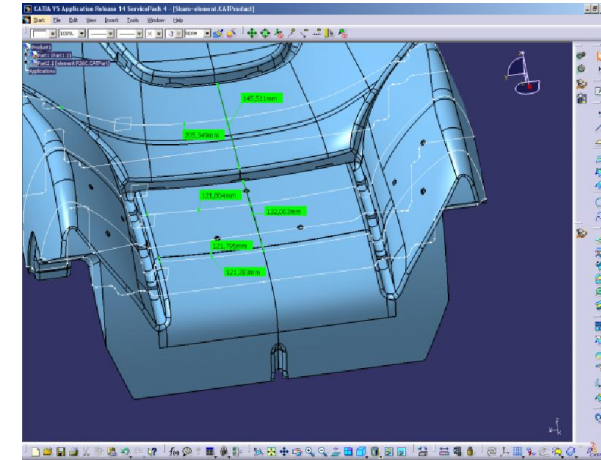
Role-based Modelling Approach



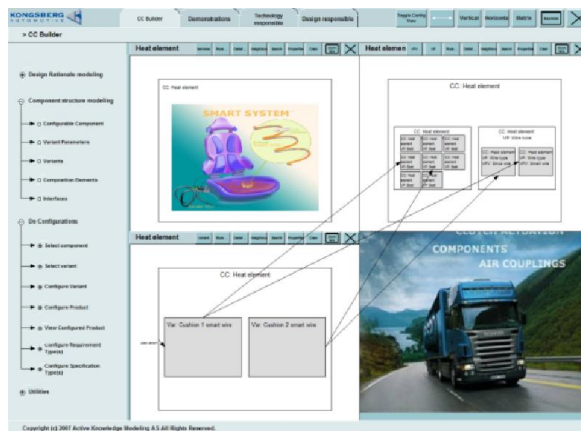
Product Manager



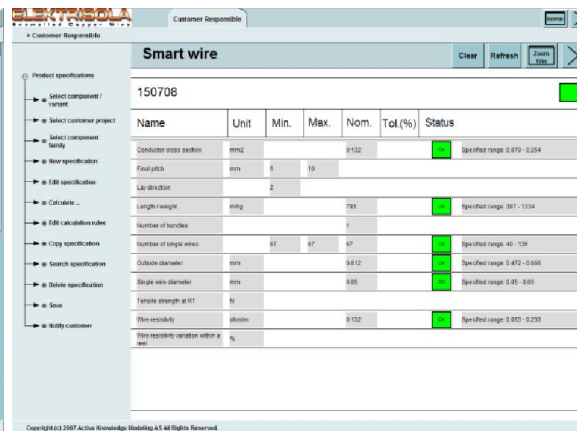
Chief designer



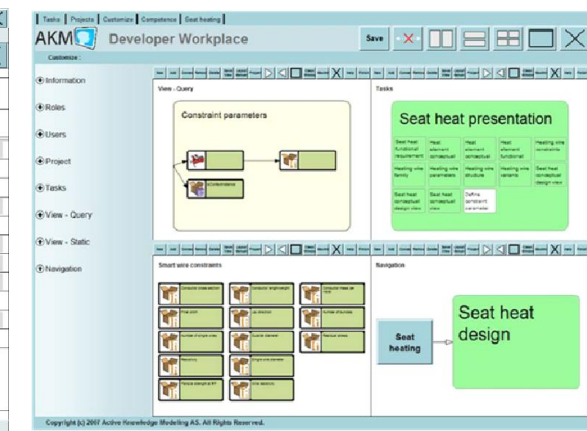
Customer Responsible



Product family designer



Supplier Responsible



Product Architect

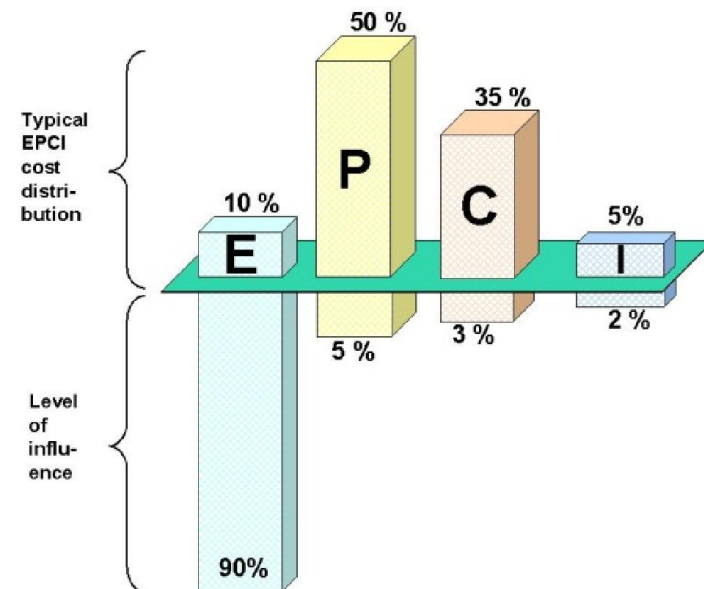
Automotive Seat-heating Design

The main challenges were to:

- Capture and correctly interpret customer requirements, material specifications, and design solutions
- Create role-specific, simple to use and re-configurable workplaces,
- Create effective shared workplace views and services for parameter balancing,
- Improve the quality of specifications and design for customers and suppliers,
- Improve communications, coordination and instant collaboration among stakeholders,
- Find a good methodology for product design, using task-patterns for automating most of the customized product design and engineering.

Akers Solutions - Pilot Demonstrator

- Start with concept definition of a subsystem involving 2-4 discipline teams
 - The subsystem should have some complexity of CTR parameter sets
- Restructure the PEM into a PEAK architecture
 - In particular reduce the complexity of Control and Execution level processes through role specific view
 - Capture and utilize contexts for parameters as relationships between work processes and knowledge areas / control objects / quality level parameters
 - Improve the PEM improvement process with patterns and templates



Scope: Stage 2C Global Design Completion



Concept Execution

HSE in Design

System Engineering

Global Eng., P&ID, Line List
Databases & Registers

Procurement

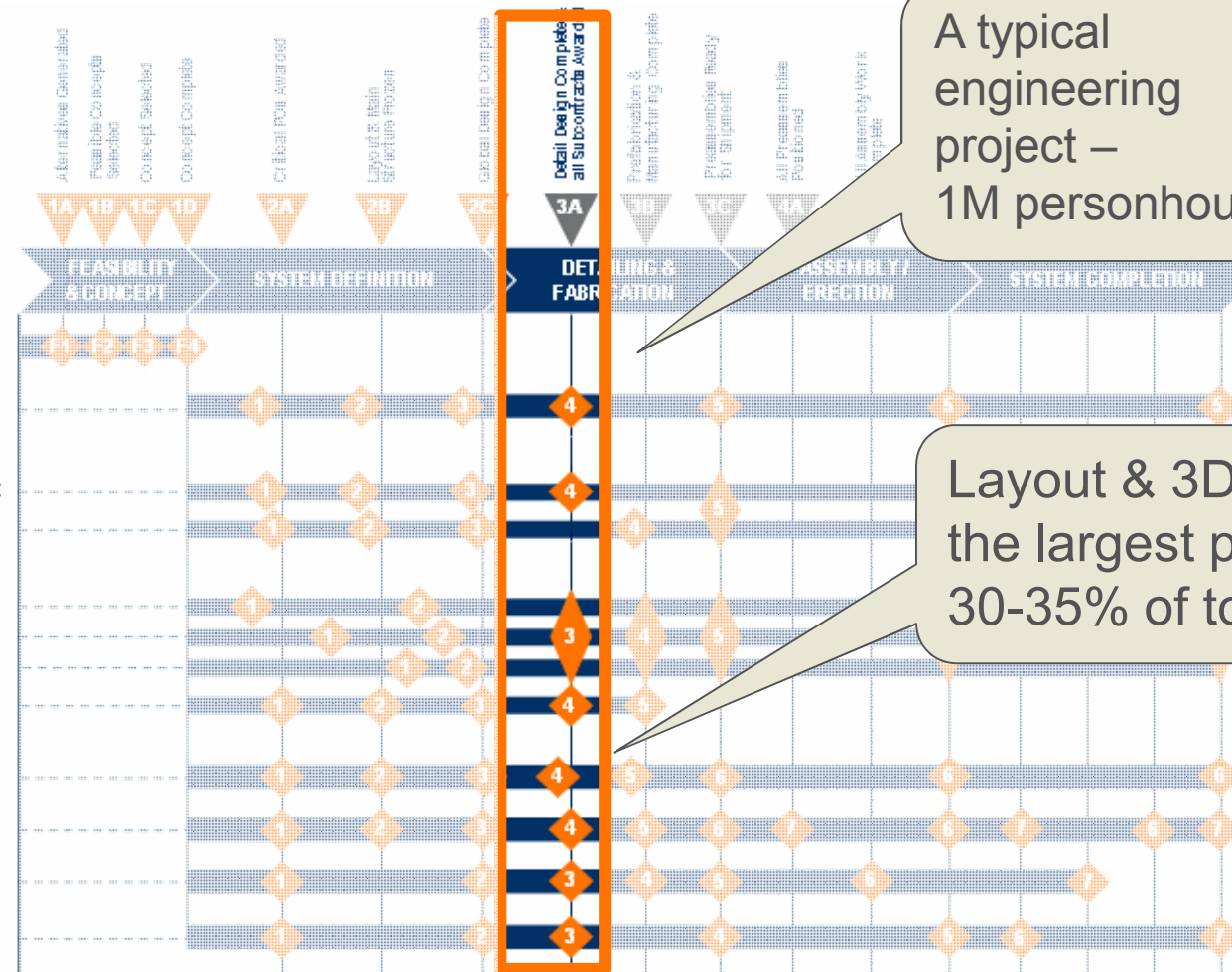
1st priority Equipment
2nd priority Equipment
3rd priority Equipment
Bulk Material/MTQ

Layout & 3D Model

Sub-contracting

Fabrication/Construction

Completion



A typical engineering project – 1M personhours

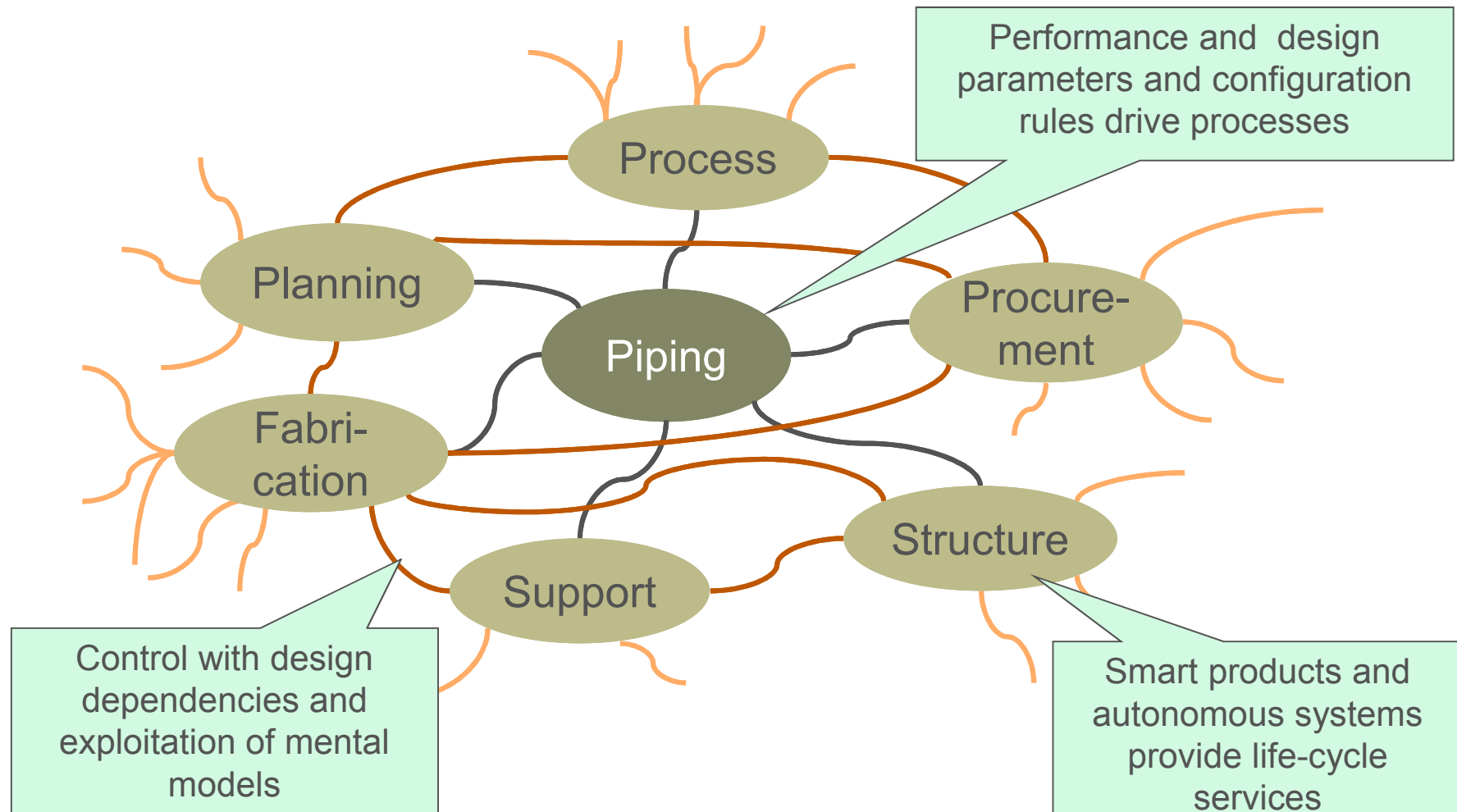
Layout & 3D is the largest part, 30-35% of total

Relationship: Milestone – QL – Status

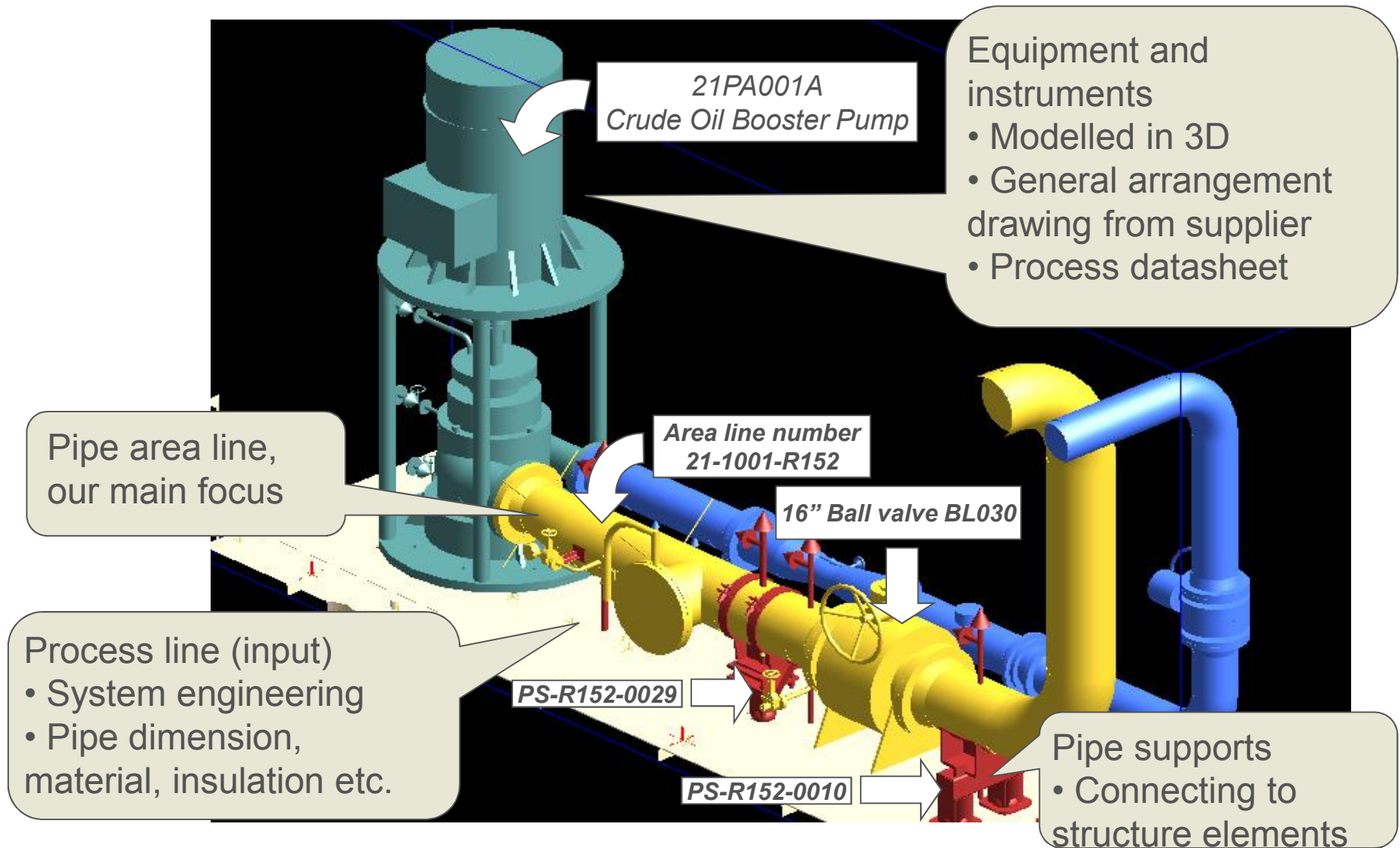
General Control Object Status

Document Milestone Chains

Knowledge-space & Workspace properties



Example of Pipe- area designer tasks



Architecting and Design Workplace early version

Equipment
Areas
PEM
Configure

AkerSolutions
Piping Design Workplace (M2A)
Save
Logout

Demo project: M2A

R001
R051
R261
R123
R052
R161
R260
R160
R152
R124
R125
R150
R151
R152
R161
R261

Riser area

R152

21PZ001-2 Oil export pump

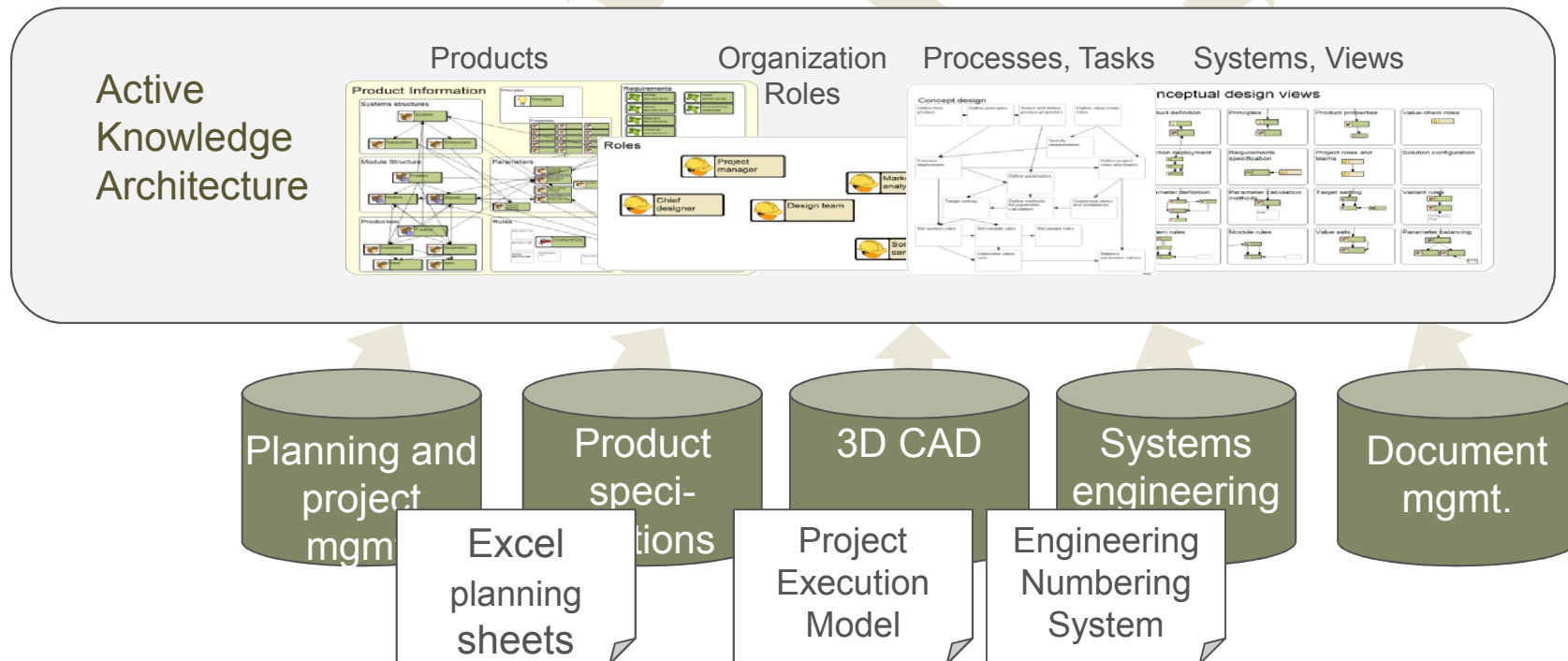
Name	Status	Target	Value	Unit	Dev.	Comment
Capacity		34000	34000			
Check Equipment info consistency in 3D model against Keyops Registers (then no Area, Coordinates, Path, assembly)						
Check Equipment info consistency in Keyops Registers against 3D model (then no, location and description)						
Client check performed						
COG						
Datum locations acceptable						
Dimension of envelope		4.25 x 12.5 x 6.45	4.65 x 10.5 x 6.45	m	0.40m	Envelope too high for the area
Equipment assigned Process Numbers in model according to project Brochure Numbered Rollstock						
Equipment attributes input according to WI						
Location of footprint (modelled as separate SUBE)						
Maintenance and lifting facilities (motors and pasties)						
Maintenance and vibrational volumes modelled						
Modelled according to frozen vital vendor info received vendor						
Nozzle locations checked						
Nozzle modelled (size, rating, tag& number) according to revealed info						
Space for Support pack modelled provided in accordance with structural standards						
Weight						

21PZ001-2 Context

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Solution Architecture

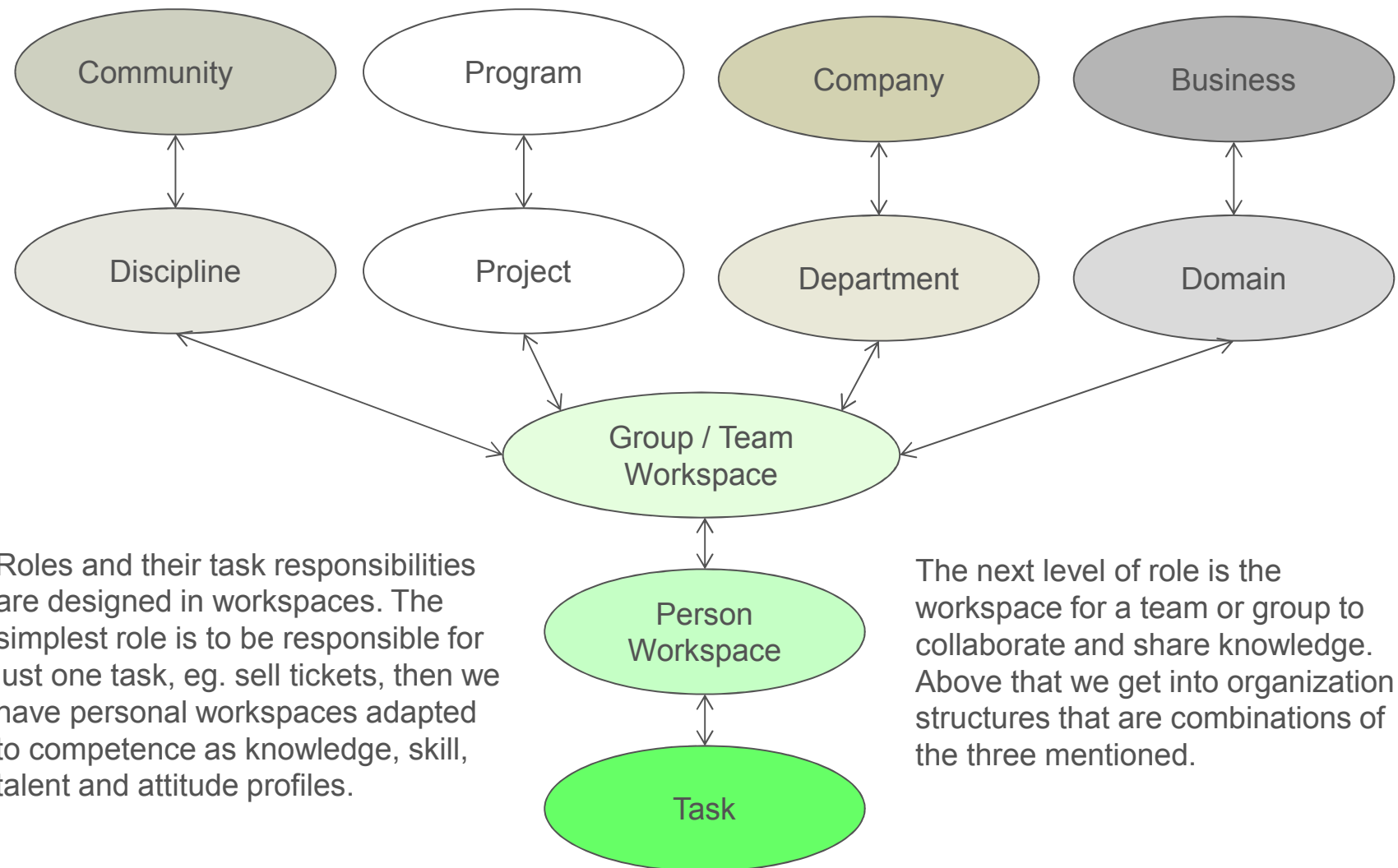
Workplaces
for roles



The Paradigm-shifting Concepts

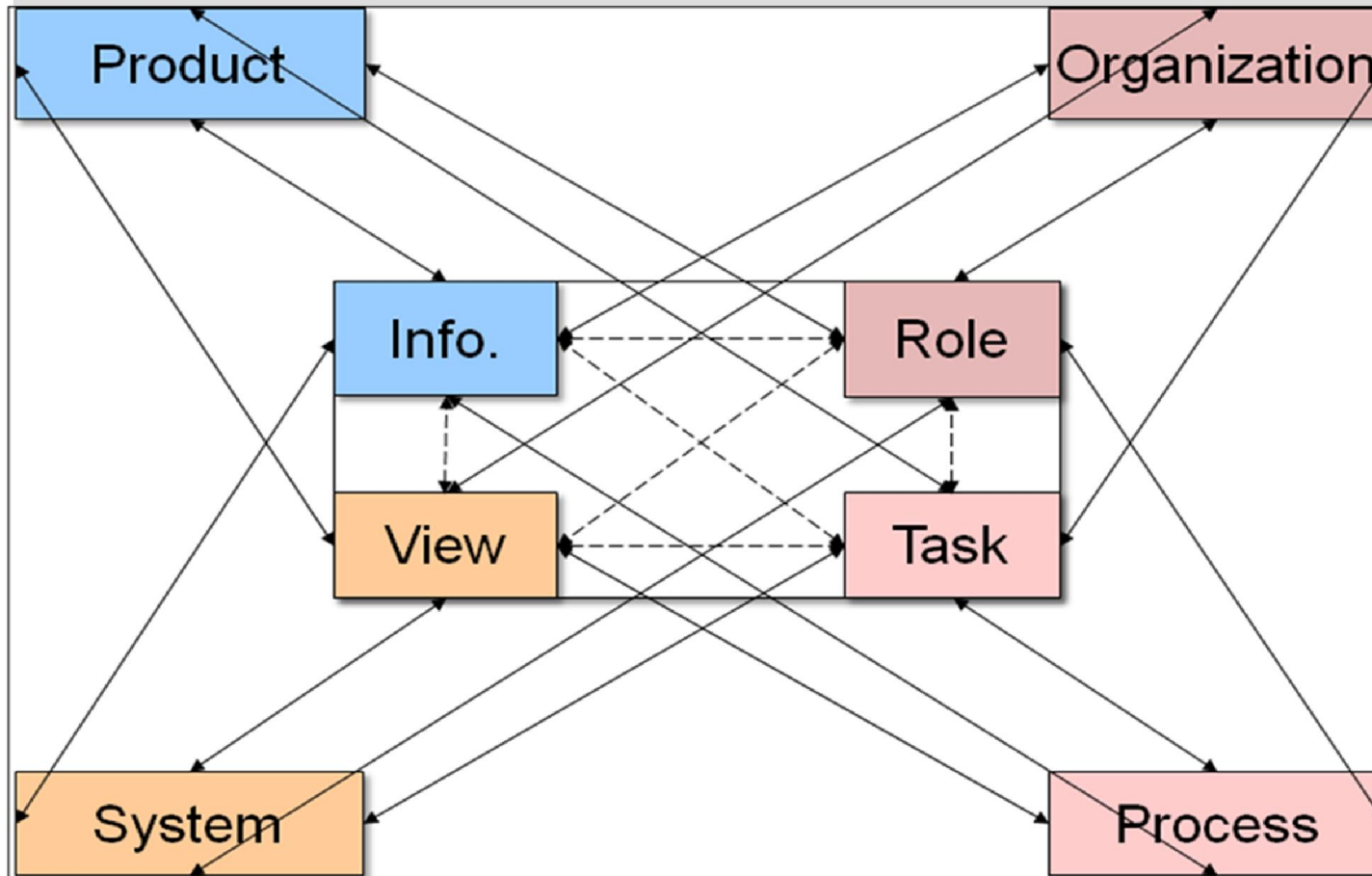
1. *Role-oriented Organizations* - capturing work-centric contexts
2. *Multi- dimensional Knowledge Spaces* - simplifying collaboration and property parameter management
3. *Holistic Design Methodology*– working top-down, bottom-up and middle-out
4. *Context-rich Workspaces* - enabling model execution and model-based workplaces
5. *Active Knowledge Architecture* - integrating approaches, methods, services and systems
6. *Model-based, Architecture-driven Workplaces* - configuring agile workplaces and solutions
7. *Concurrent Modeling and Operation* – close the gaps between design and execution
8. *Workplace Visual Landscape* – simplifying networked collaboration

Generic Types of Roles

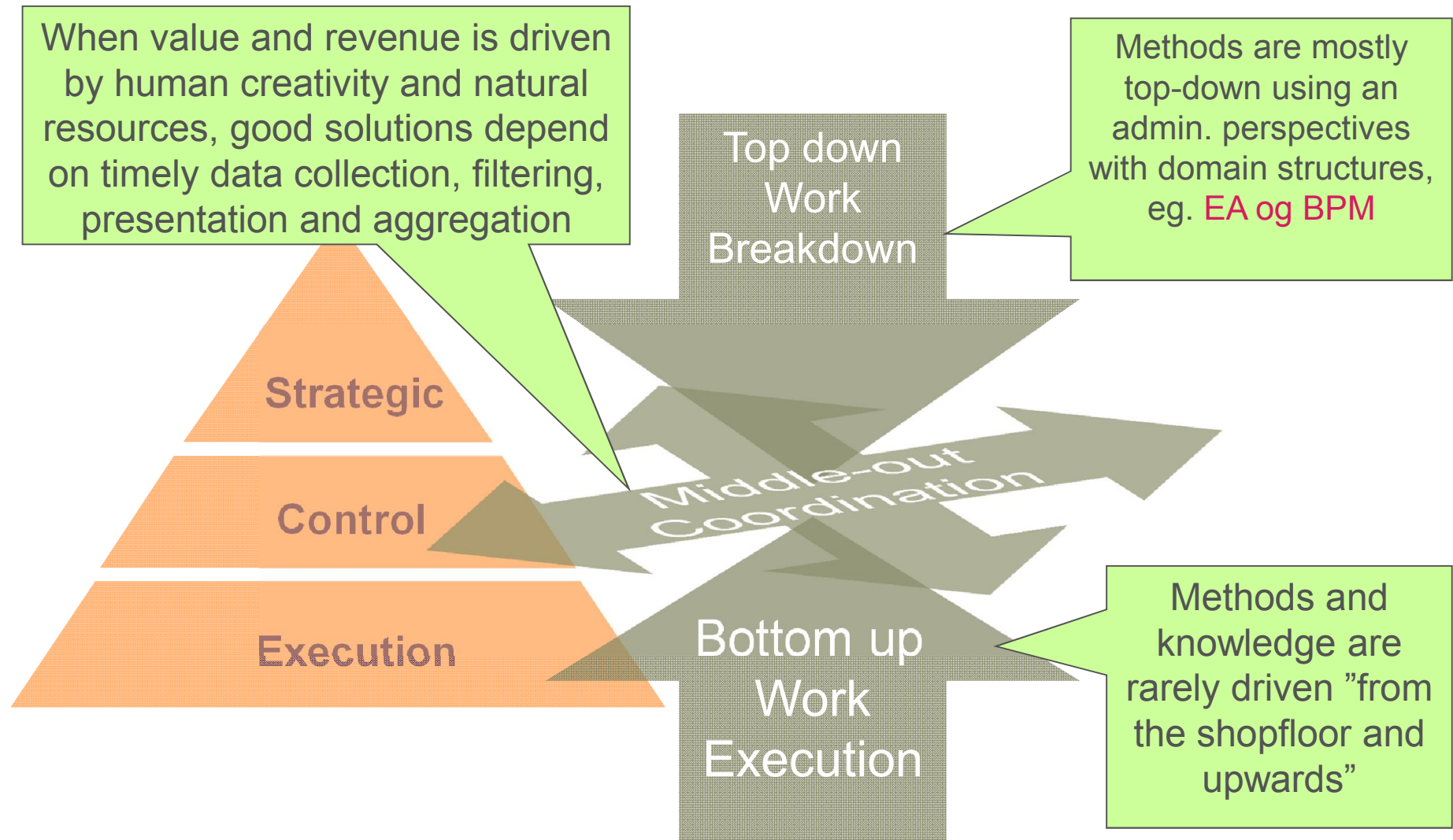


Finegrained design modelling language

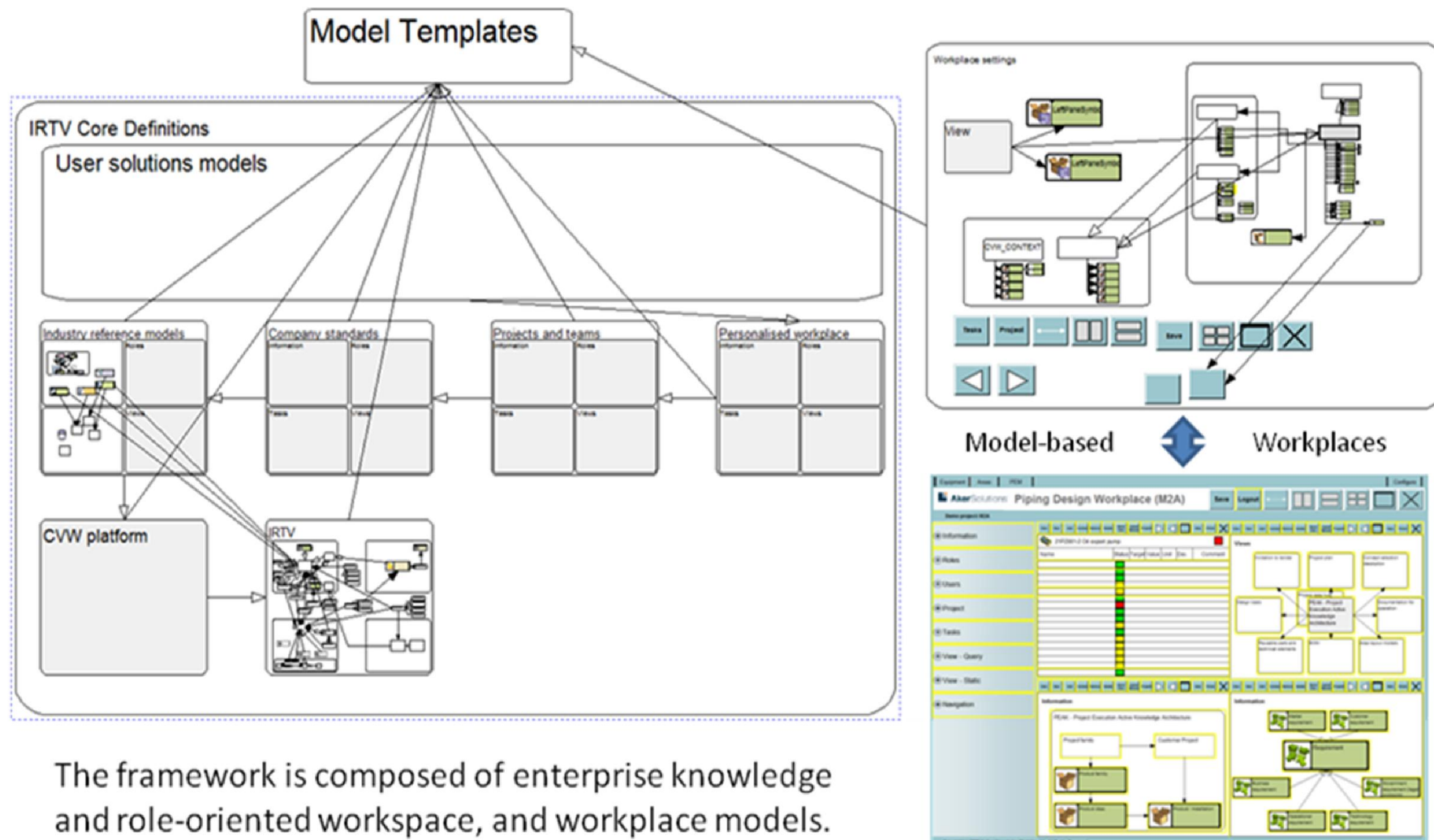
*The key to holistic design and executable models, is the visual
IRTV language, realizing innovative design principles.*



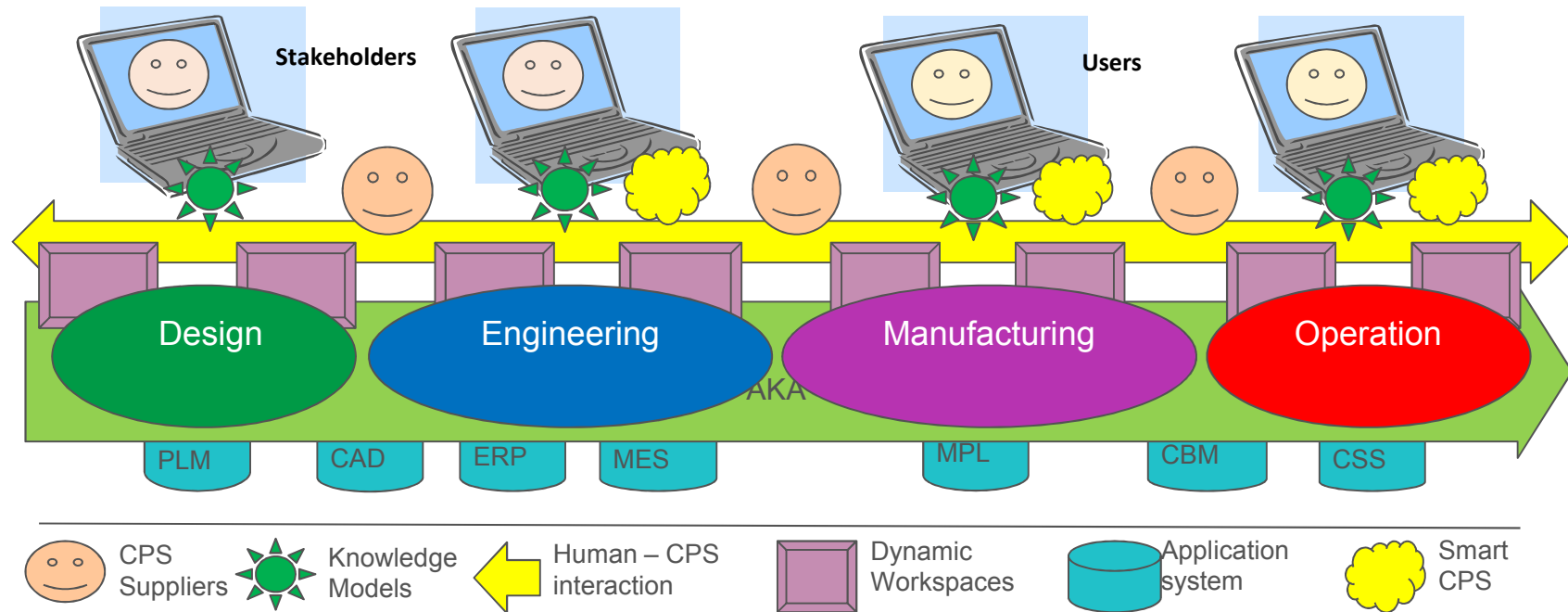
Holistic Design Methodology



Model-based, Architecture-driven Solutions

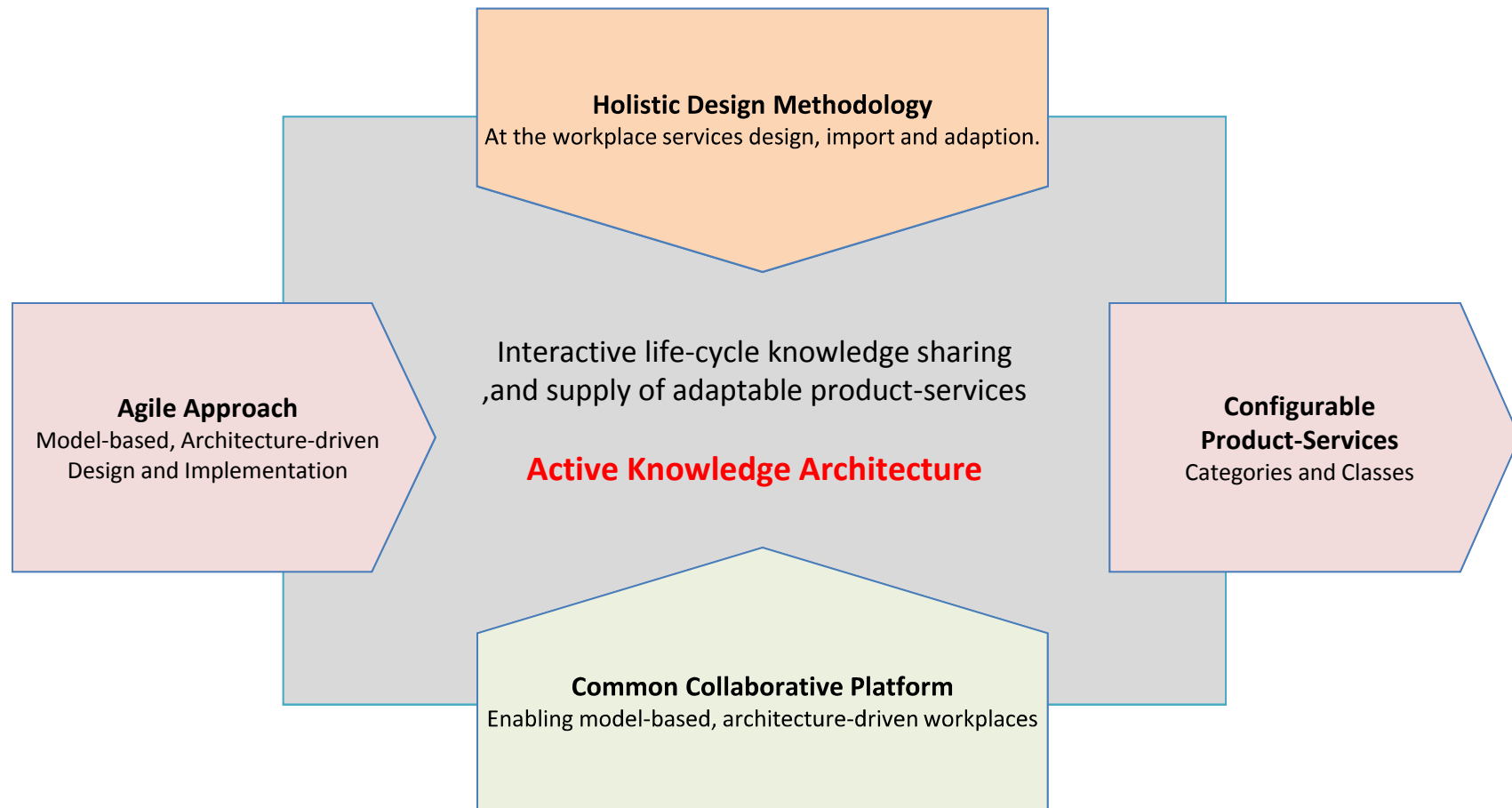


Ongoing Research - Scientific Approach



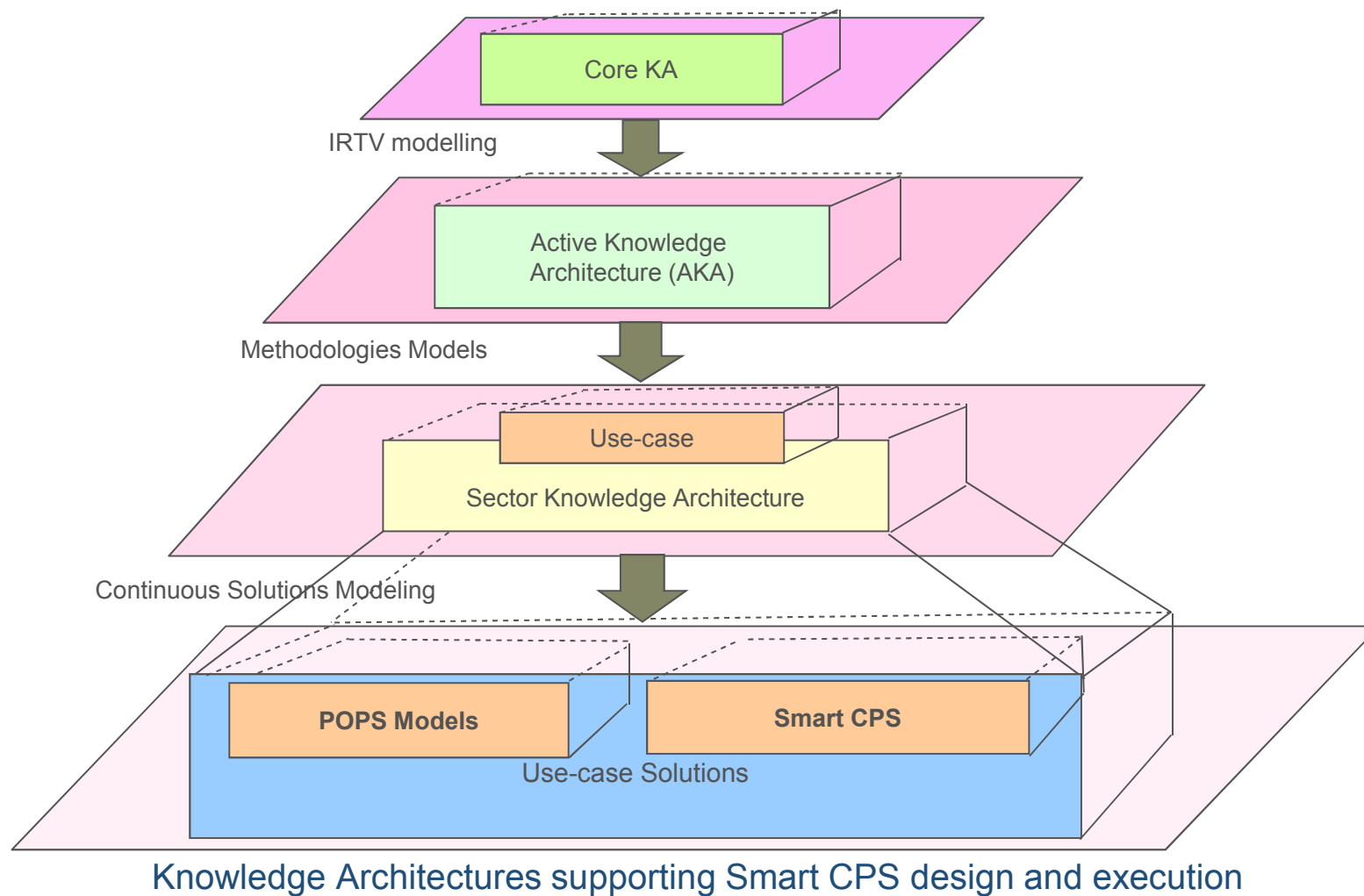
The knowledge base is the Active Knowledge Architecture (AKA)

Framework for Knowledge Modelling and Execution



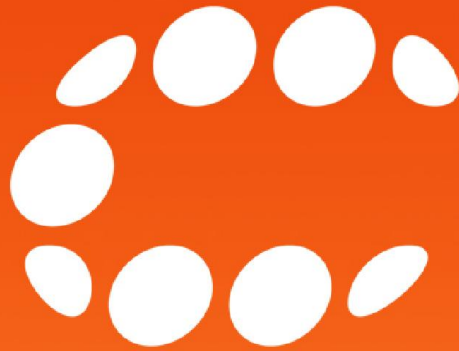
Exploiting Enterprise Knowledge Spaces and Workspaces and their properties

Enterprise Active Knowledge Architectures



Added Capabilities and Benefits

1. Enable collaborative model-based execution and design
2. Support work in context, modeling knowledge spaces
3. Support roles and model-generated workspaces
4. Capture local nuances, practices and rules and rich context
5. Giving users control over data, information flows and viewing
6. Closing the gap between design and execution
7. Extend networking platforms to invite new partners
8. Extend and integrate method base with pragmatics
9. Integrate and provide role-specific operational views
10. Give control of IT solutions and services to practitioners
11. Draw on the best from mental and digital models
12. Produce event- and situation-driven communications and views



COMMITMENT

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