

DAIMLER

CAE-Networking

A new methodology to describe a continuous product validation process contemplating networking of computer aided engineering methods [**CAE-PRO-NET**]



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27.10.10



Motivation for the Research

State of Art

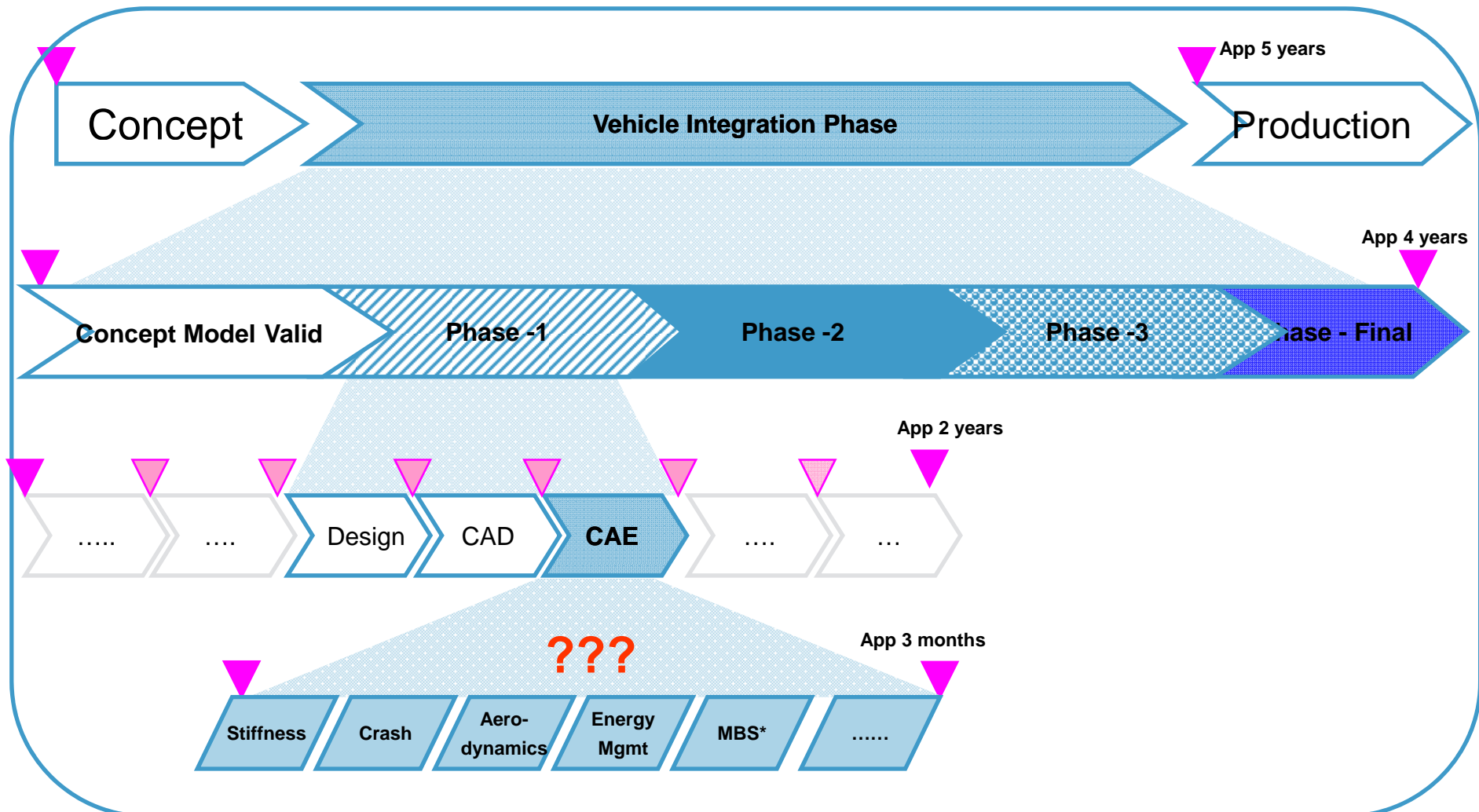
Concept of A New Methodology

Implementation

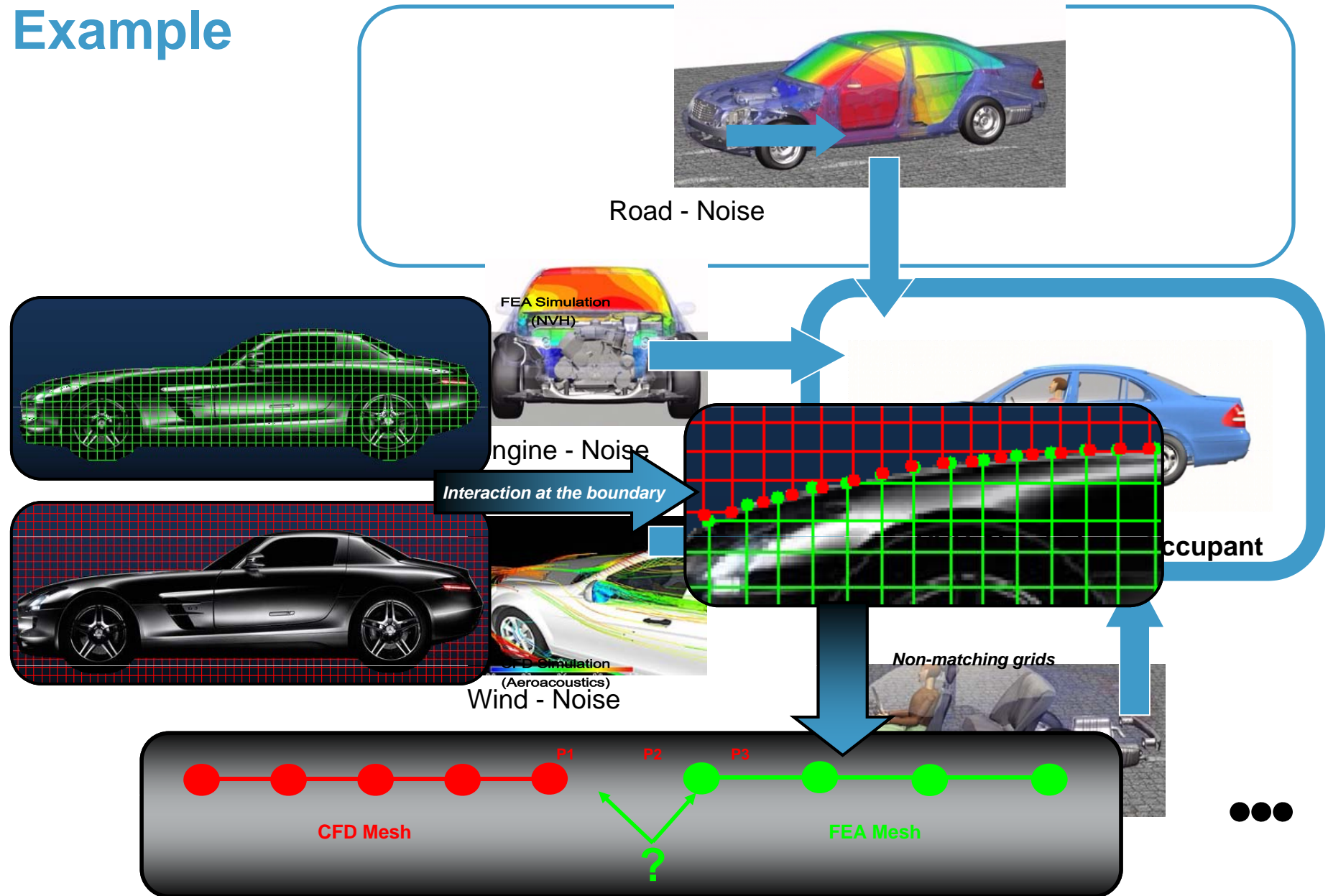
Expected benefits and Summary

Research Domain

Vehicle Development Process



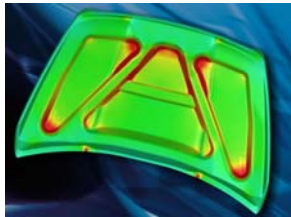
Example



More Examples



Strains / Thickness Parameter



Forming Simulation



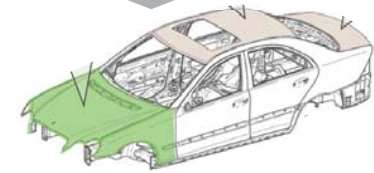
Crash Simulation

Forming and Crash Simulation

Static Pressure



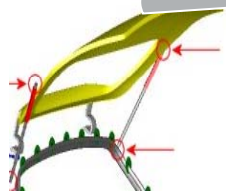
Aerodynamic Simulation



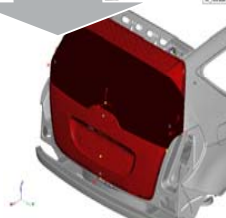
Stiffness Simulation

Aerodynamics and Stiffness Simulation
Aero acoustics and NVH Simulation

Forces Parameter



Dynamic Analysis



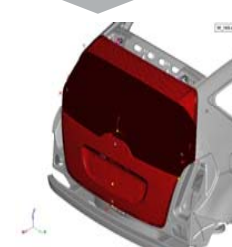
Fatigue Simulation

Dynamics and Fatigue Simulation

Temperature / Pressure



Air conditioning Simulation



Fatigue Simulation

Fatigue Simulation and A.C Simulation

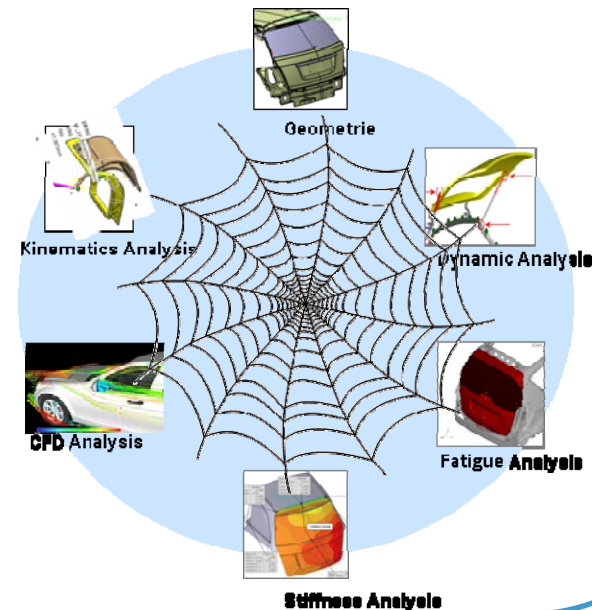
Motivation for the Research

Reducing the dependency on hardware prototype considering following points:

- quality expectations
- organizing the system complexity
- cost optimizing and
- front loading.

- Improving the quality of simulation by networking various digital validation systems.

- Reducing the hardware prototype dependent simulation and presumption based simulation.



Motivation for the Research

State of Art

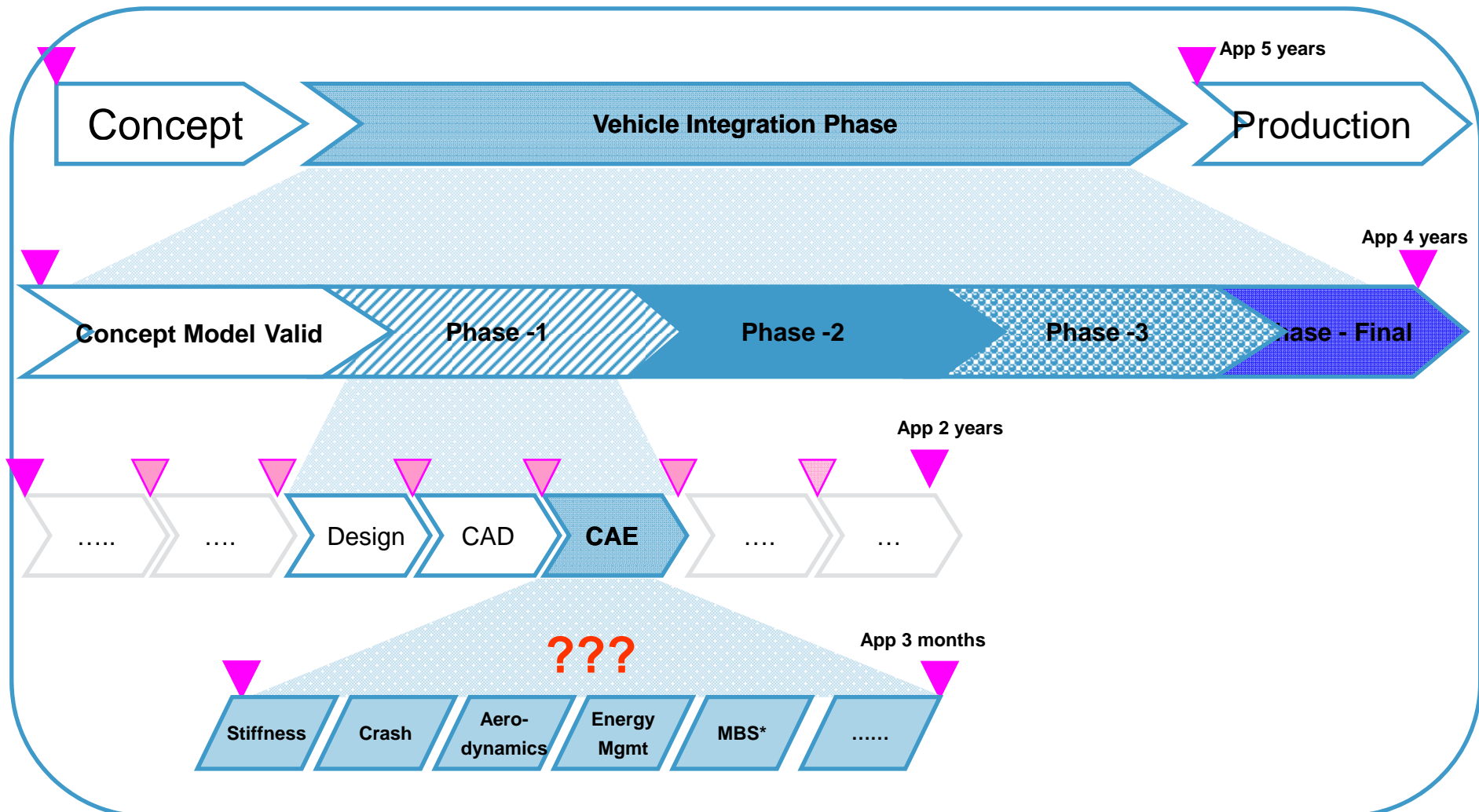
Concept of A New Methodology

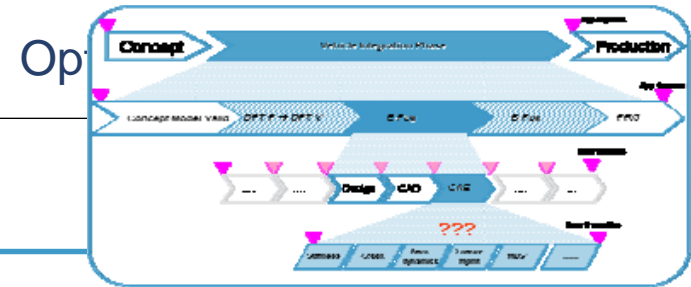
Implementation

Expected benefits and Summary

State of Art

Vehicle Development Process





State Of Art

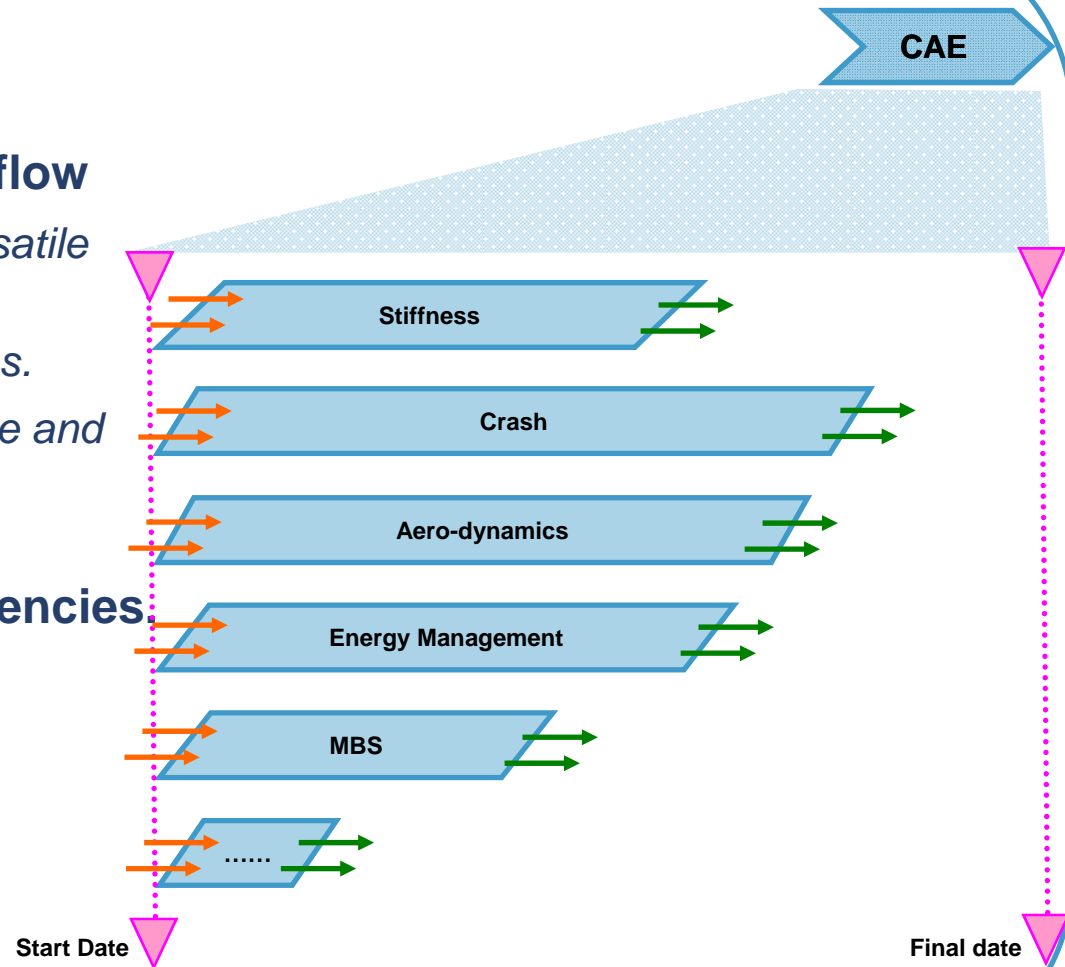
Challenges:

No digitally supported CAE Workflow

- difficult to co-ordinate the large and versatile simulations process structure.
- No efficient controlling on the Final dates.
- Manual process results to an error prone and time- Consuming process.

No standardized generic dependencies

- Inefficient use of existing data.
- Presumption based simulation.
- Decreases the simulation quality.
- Reduces the efficiency



Motivation for the Research

State of Art

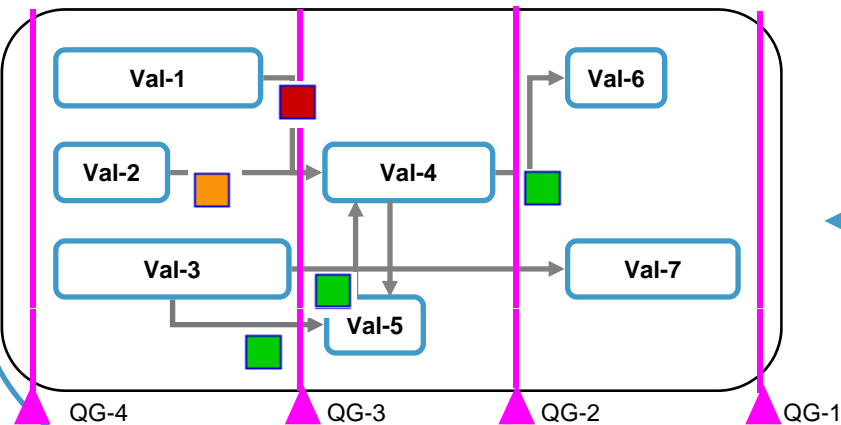
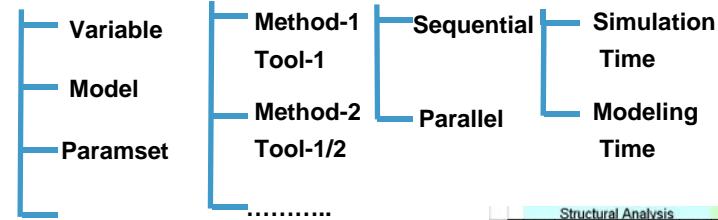
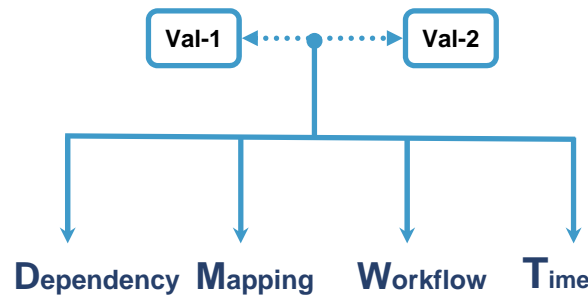
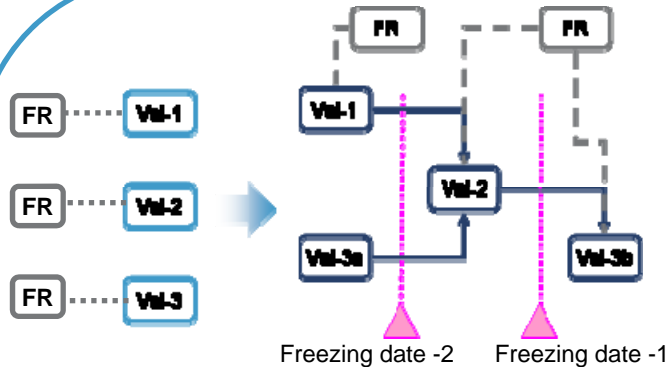
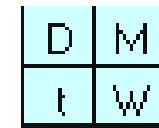
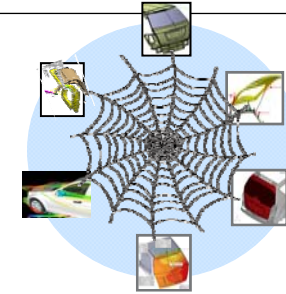
Concept of A New Methodology

Implementation

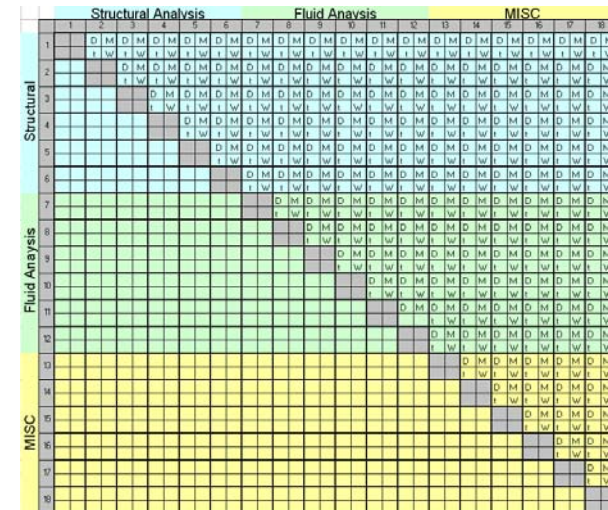
Expected benefits and Summary

Concept

Methodology to describe CAE process



- Product Oriented
- Phase Oriented
- Priority Oriented



Matrices

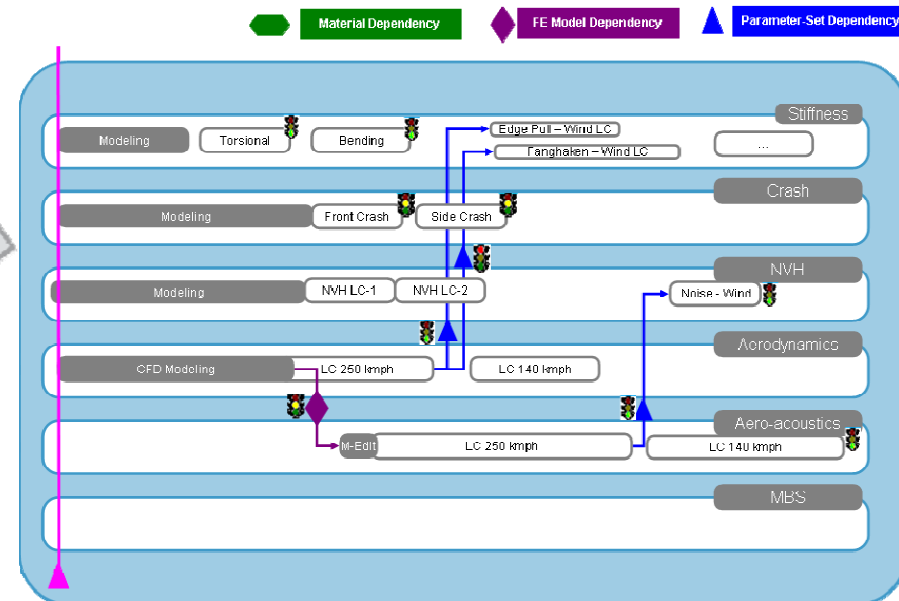
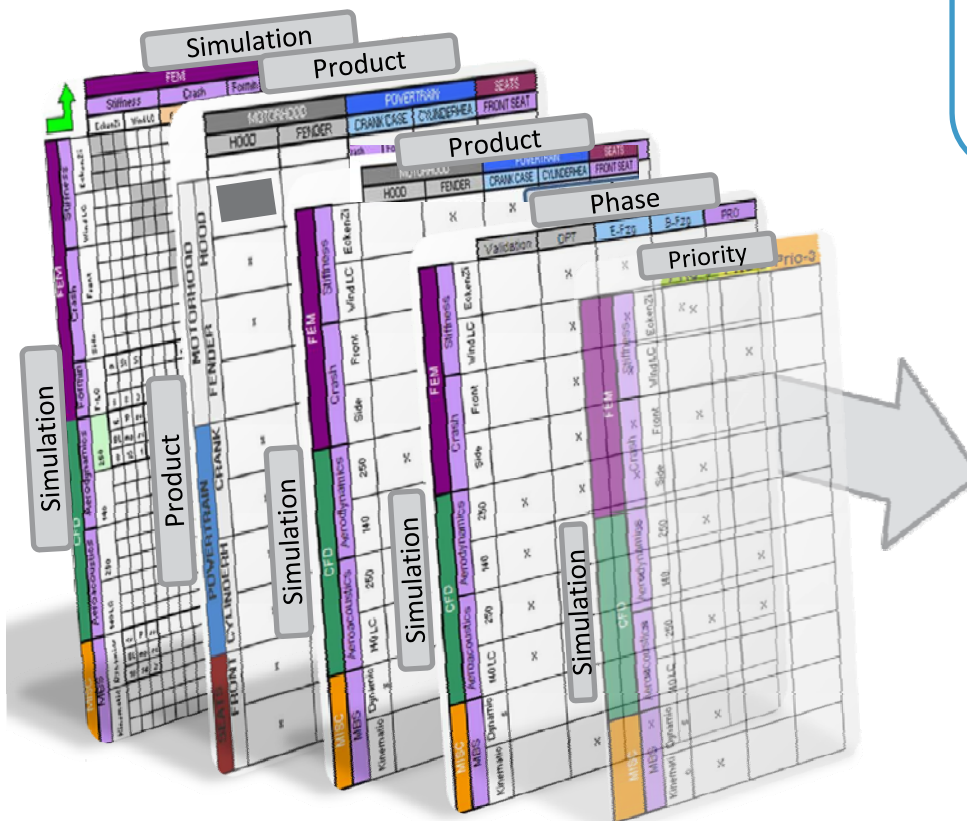
MATRICES

- **Simulation - Simulation** (e.g Aerodynamics - Stiffness)
- **Simulation - Product** (e.g Aerodynamics - Exterior)
- **Product - Product** (e.g Engine - Motorhood by Temp.)
- **Simulation - Phase** (e.g Crash – Later Phase)
- **Simulation – Priority** (e.g Crash – Prio -1)

Simulation – Simulation relation matrix is 100% generic matrix.

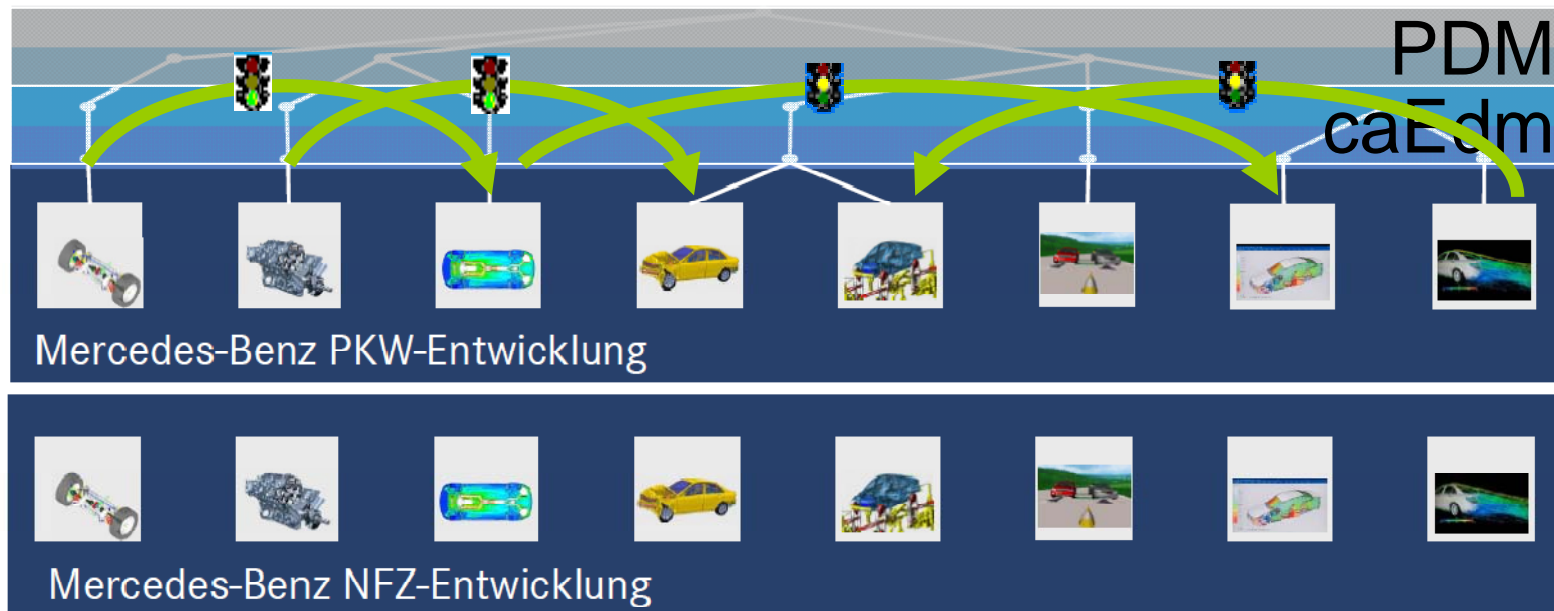
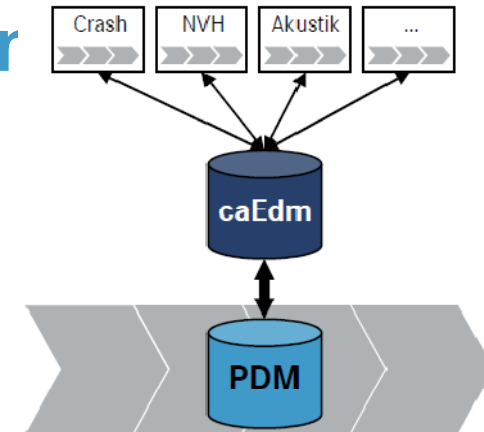
Sim-Prod and Prod-Prod relation matrix is generic w.r.t automobile industry

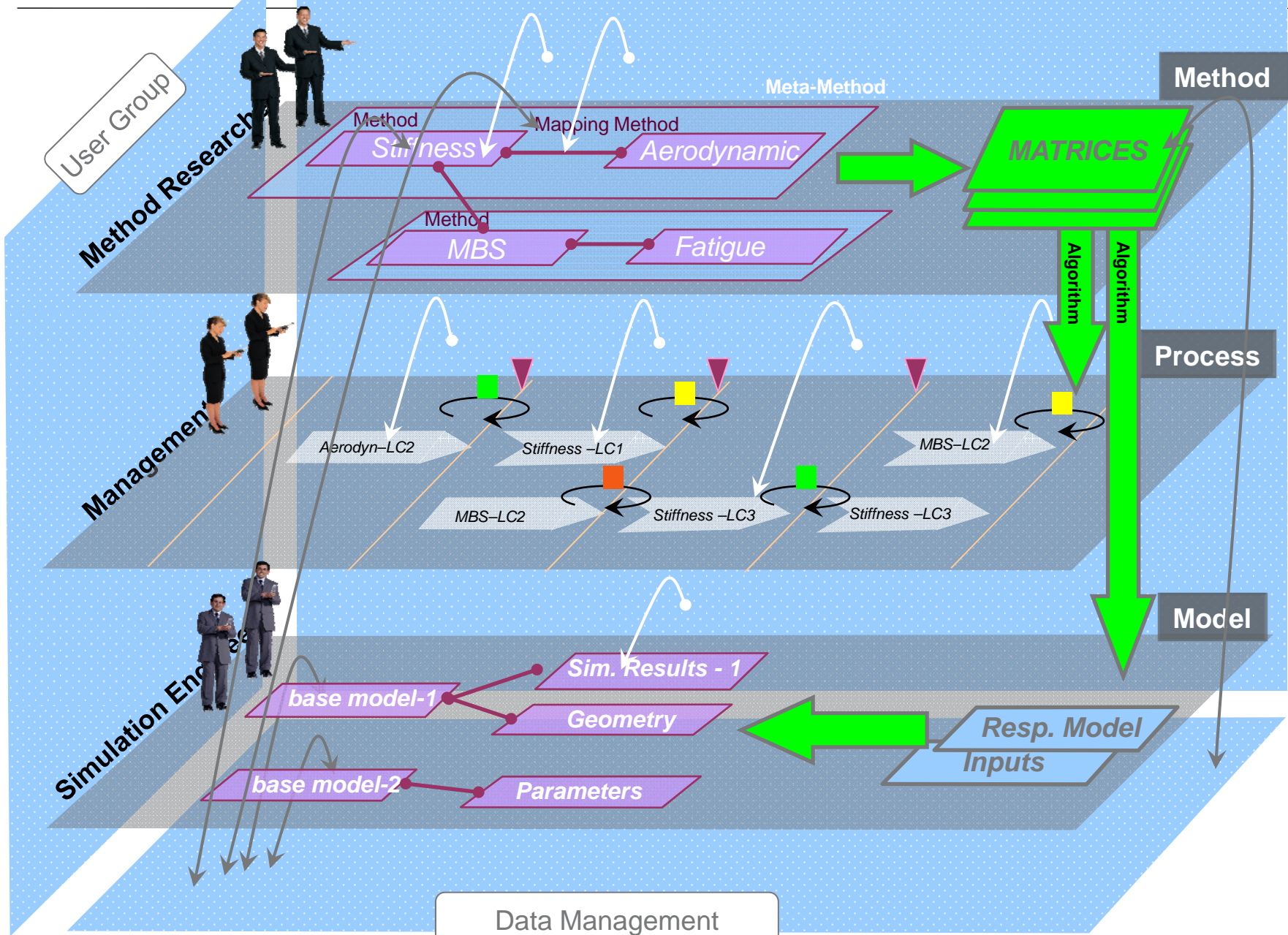
Rest matrices are depends on company requirements.



Link to Simulation Data Manager

- Focus of dissertation is to develop the process between various simulation on the basis of dependencies.
- Prerequisite is a Simulation Data Management (SDM).
- A digital solution for the CAE workflow.
- Visualizing the Generic dependencies.
- CAE Process controlling with time-line and assessment of quality of simulation results with color coding.





Motivation for the Research

State of Art

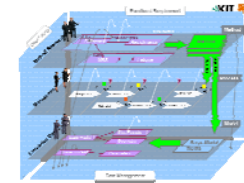
Concept of A New Methodology

Implementation

Expected benefits and Summary

Implementation - Application Demo

Users are classified in two parts: **ADMIN User & END User.**

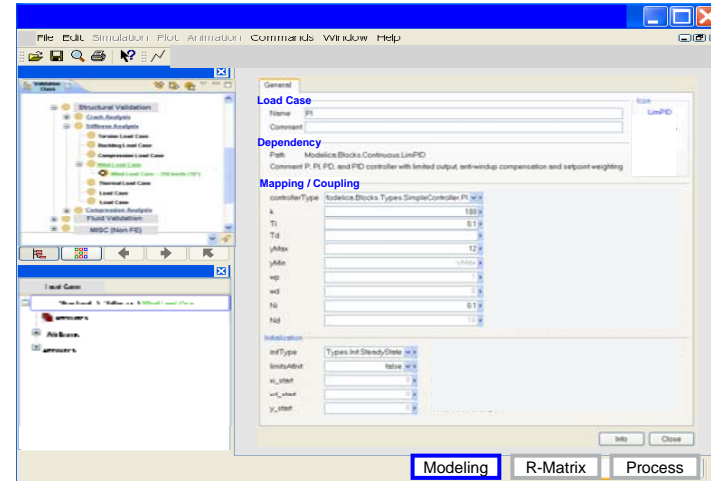


ADMIN USER :

Admin user will develop the CAE Network in the form of GVRM (Generic Validation Relation Matrix) and retrieves an explicit product, phase and priority oriented CAE process from an algorithm.

Responsible:

- Method Engineers (in Simulation Department)
- Process Engineers (in MDS Department)

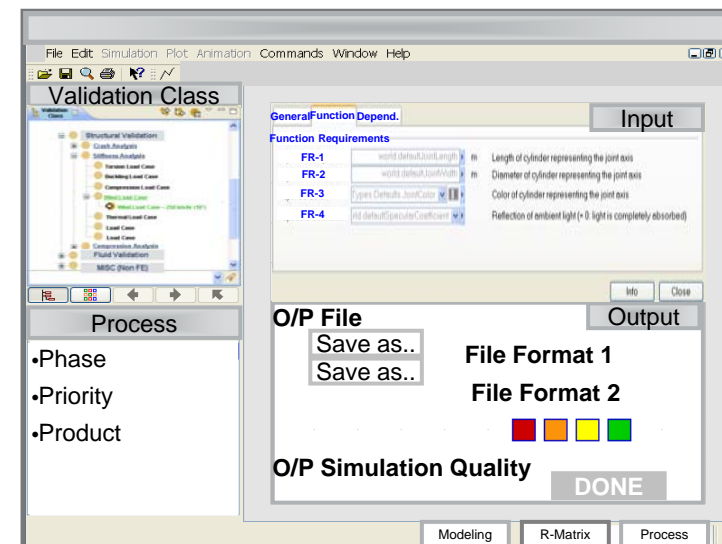


END USER :

End User will work on an explicit CAE process. The user get access to all the existing useful model, input data in the form of dependencies, coupling methods, simulation workflow type, functional requirement etc.

Responsible:

- Simulation Engineers
- Managers
- Process Engineers
- Method Engineers



Motivation for the Research

State of Art

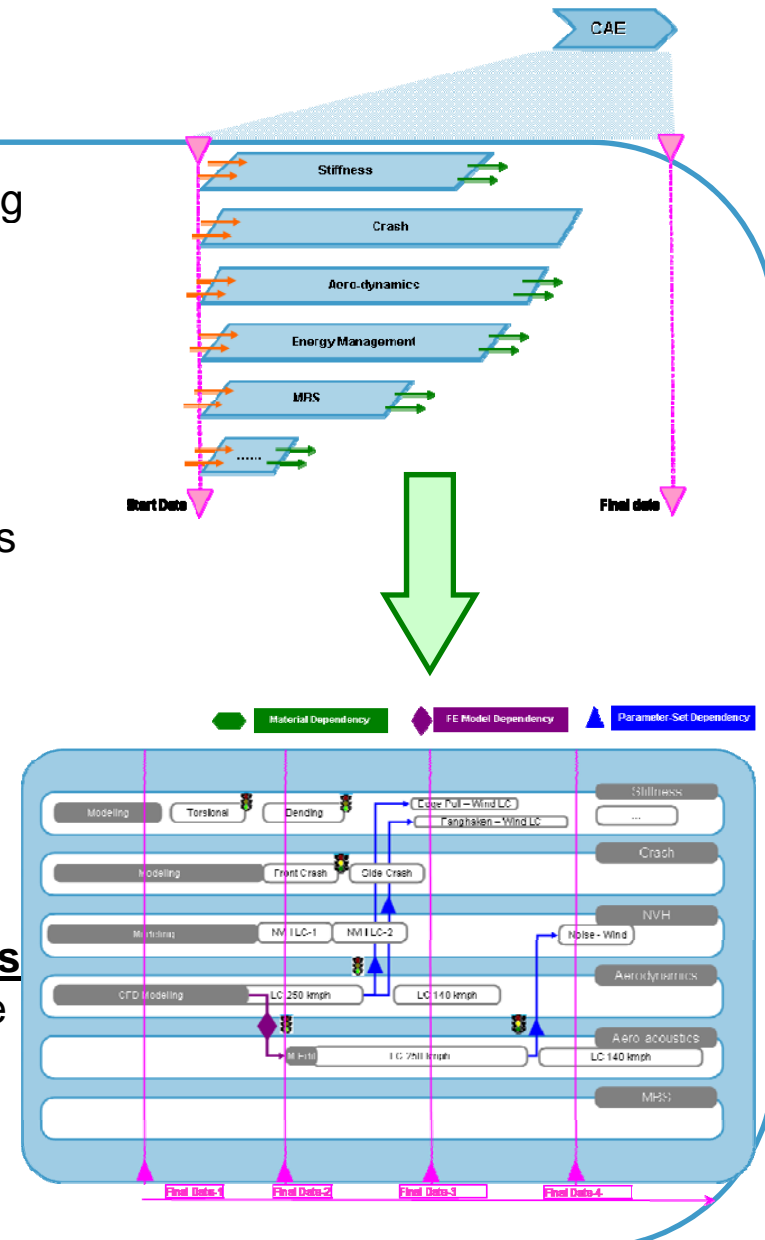
A New Methodology

Related Projects

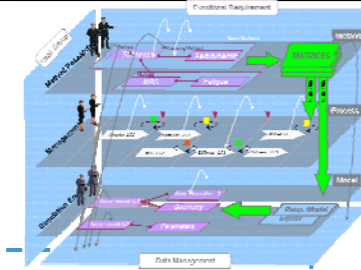
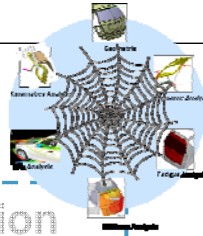
Expected benefits and Summary

Expected Benefits

- **Improves the Development Process** by improving efficiency, faster information exchange, data consistency and data transparency.
- **Better System Organization** - The system responsible get an overview about all relevant validations, dependencies, mapping and the process related to the considered system.
- **Controlling on dead lines** - Coordinating of huge simulation structure is possible which helps to validation a complete system within the time span.
- **Reducing dependencies on Physical Prototypes** Better simulation results which helps to reducing the hardware prototype.
- **Reducing redundant** mapping tool and data exchange.

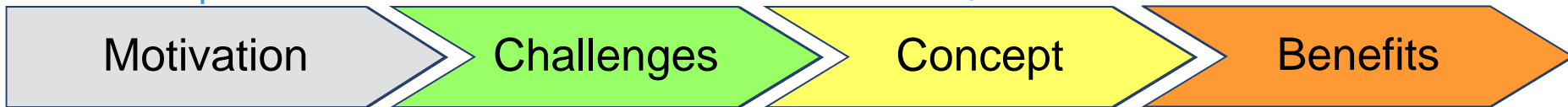


Summary

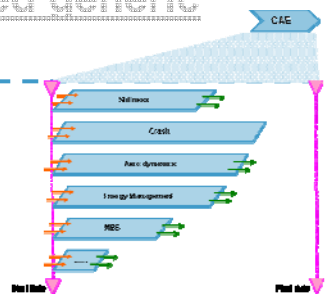


- Improving the quality of simulation by networking various digital validation systems.
- Reducing presumption based simulation.

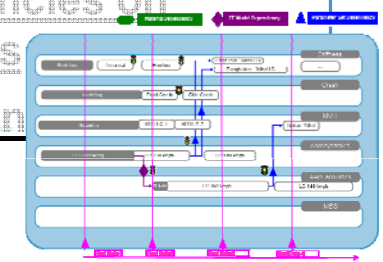
- Defining the Generic validation relation to develop Generic matrix.
- Retrieving a product, phase, priority oriented process.



- No digitally supported CAE Workflow
- No standardized generic dependencies

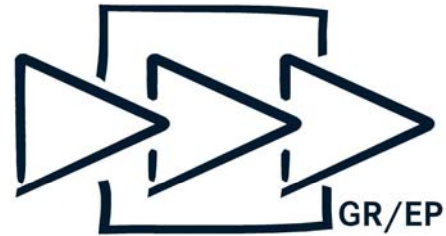


- Improves the Development Process
- Better System Organization
- Reducing dependencies on Physical Prototypes
- Reducing redundan



Thanks

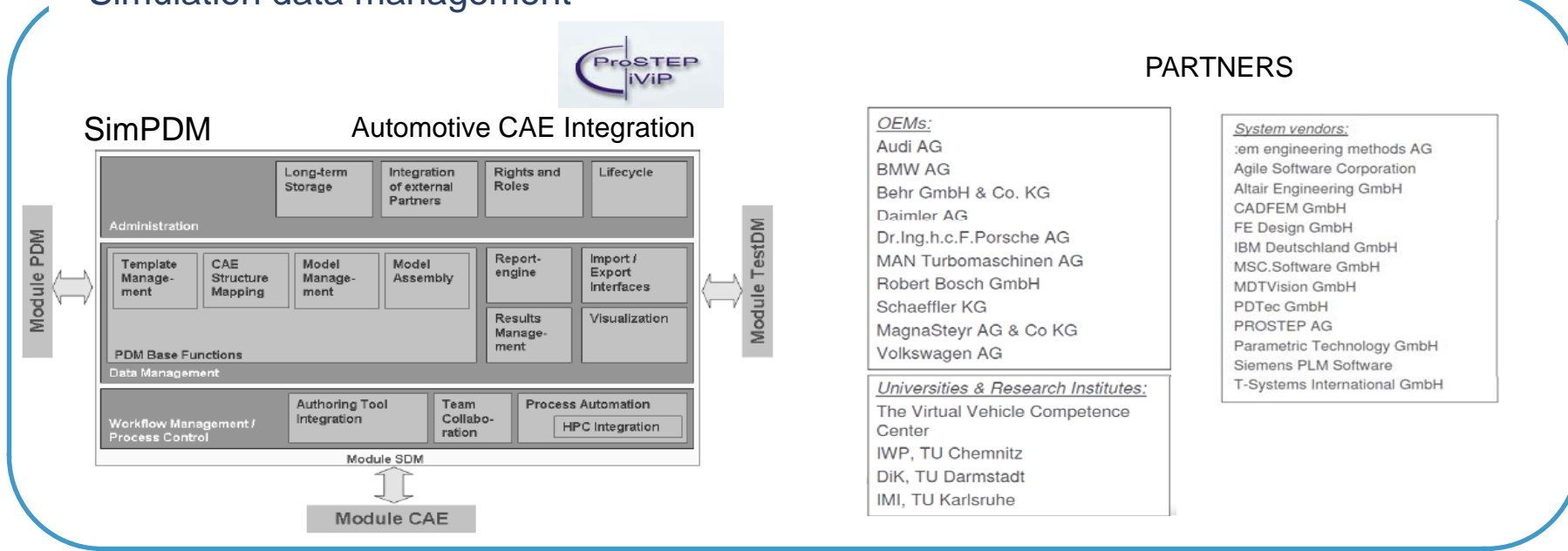




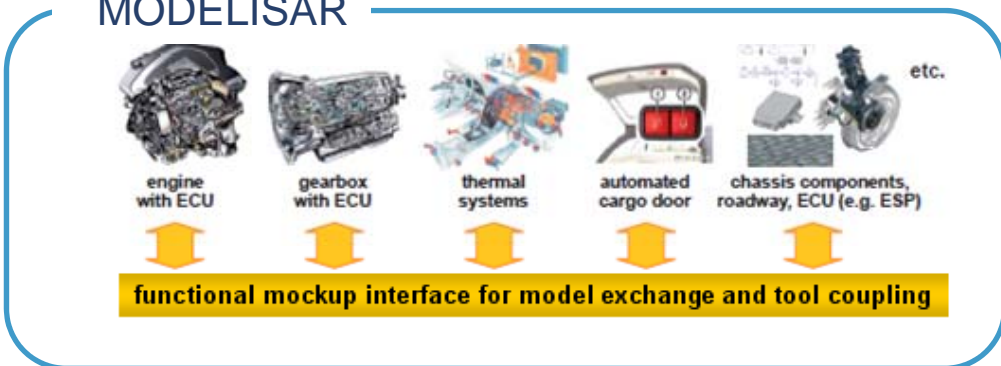
Product Creation & Information Technologies

Related Projects

Simulation data management



MODELISAR



Corepro

