NORDIC 2010 NAFEMS CONFERENCE

Lead Time Reduction for Virtual Testing in Automotive Engineering.

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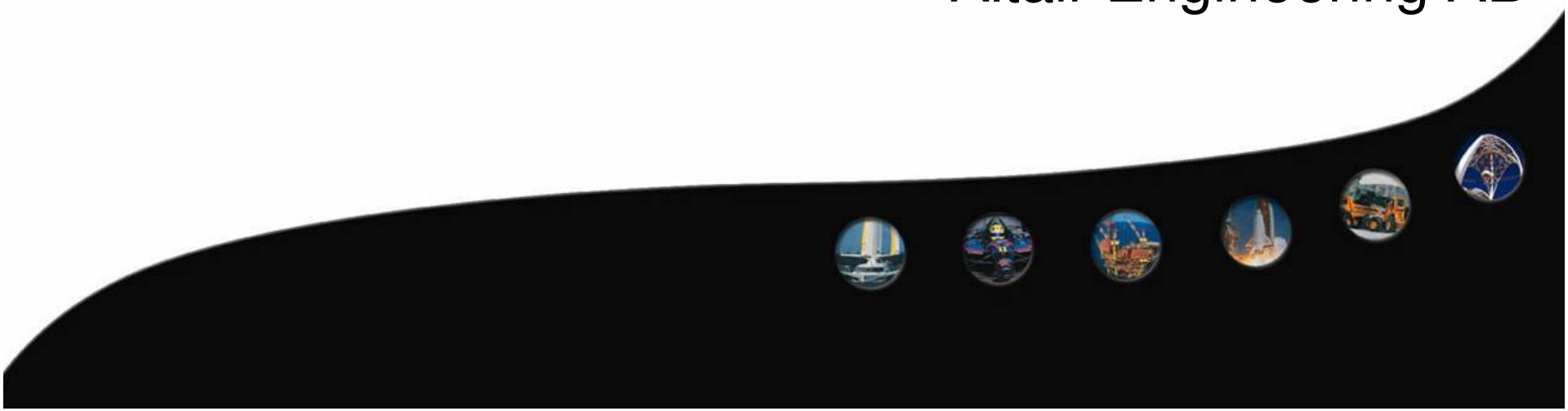

Project Partners

VINNOVA

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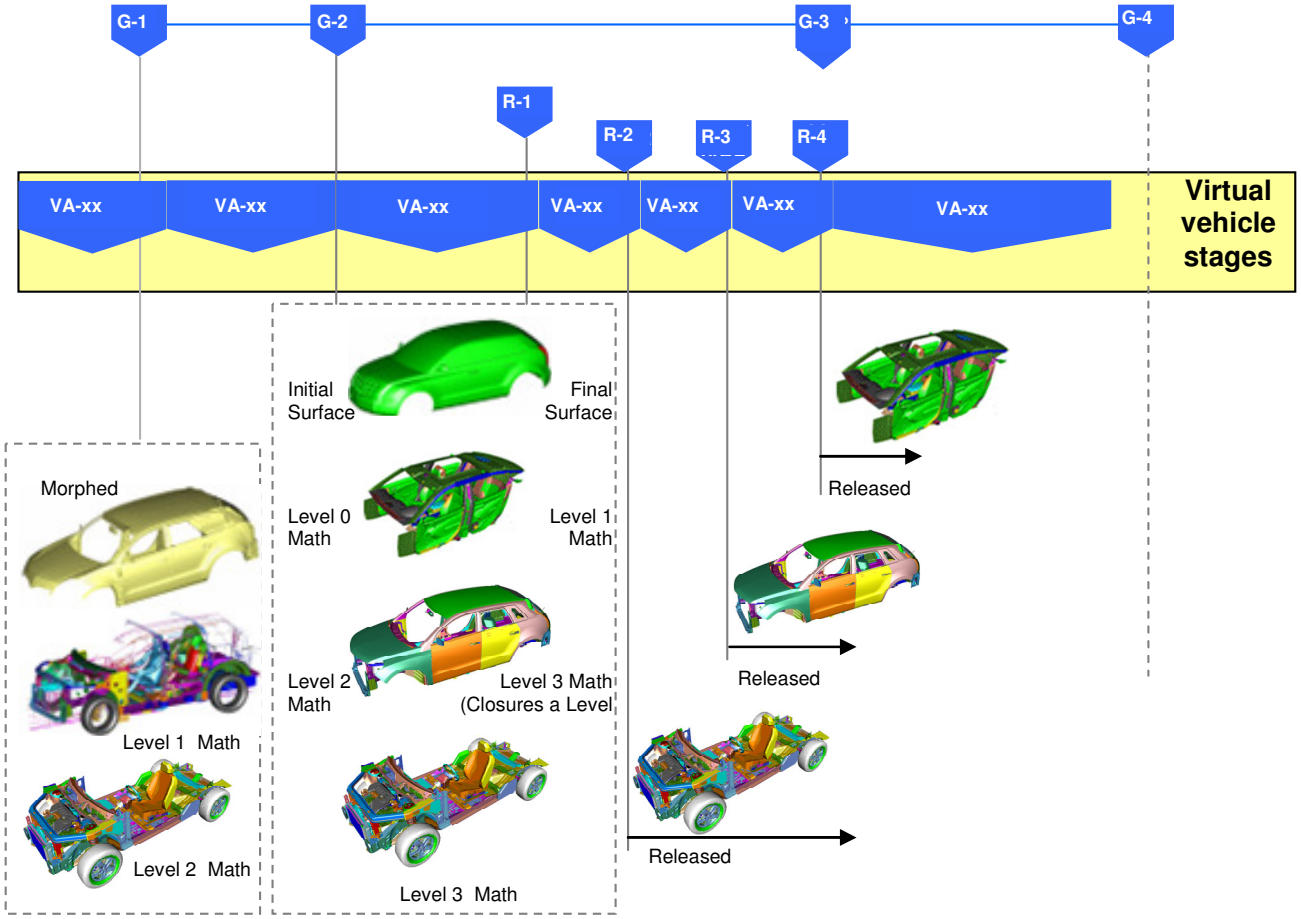
A research project within the Vinnova research program "***FFI – Strategic Vehicle Research and Innovation***" within the collaboration program "***Vehicle Development***". The project is scheduled to run between March 2009 and December 2010.

Saab Product Development Process

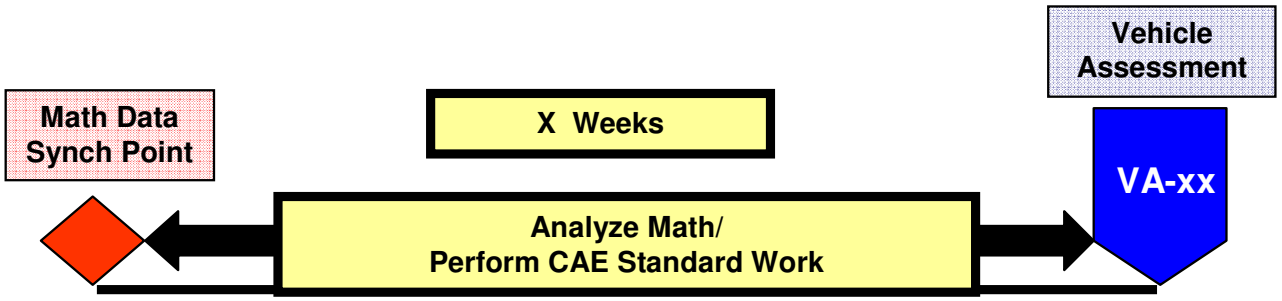
- Today's development process consists of several virtual modeling phases.
- For each phase a new base model representing the latest geometry must be generated for each load case.
- Each development phase contains two synchronization points:
  - Math data synchronization (CAD release).
  - Vehicle assessment (presentation and evaluation of simulation results).

Saab Product Development Process

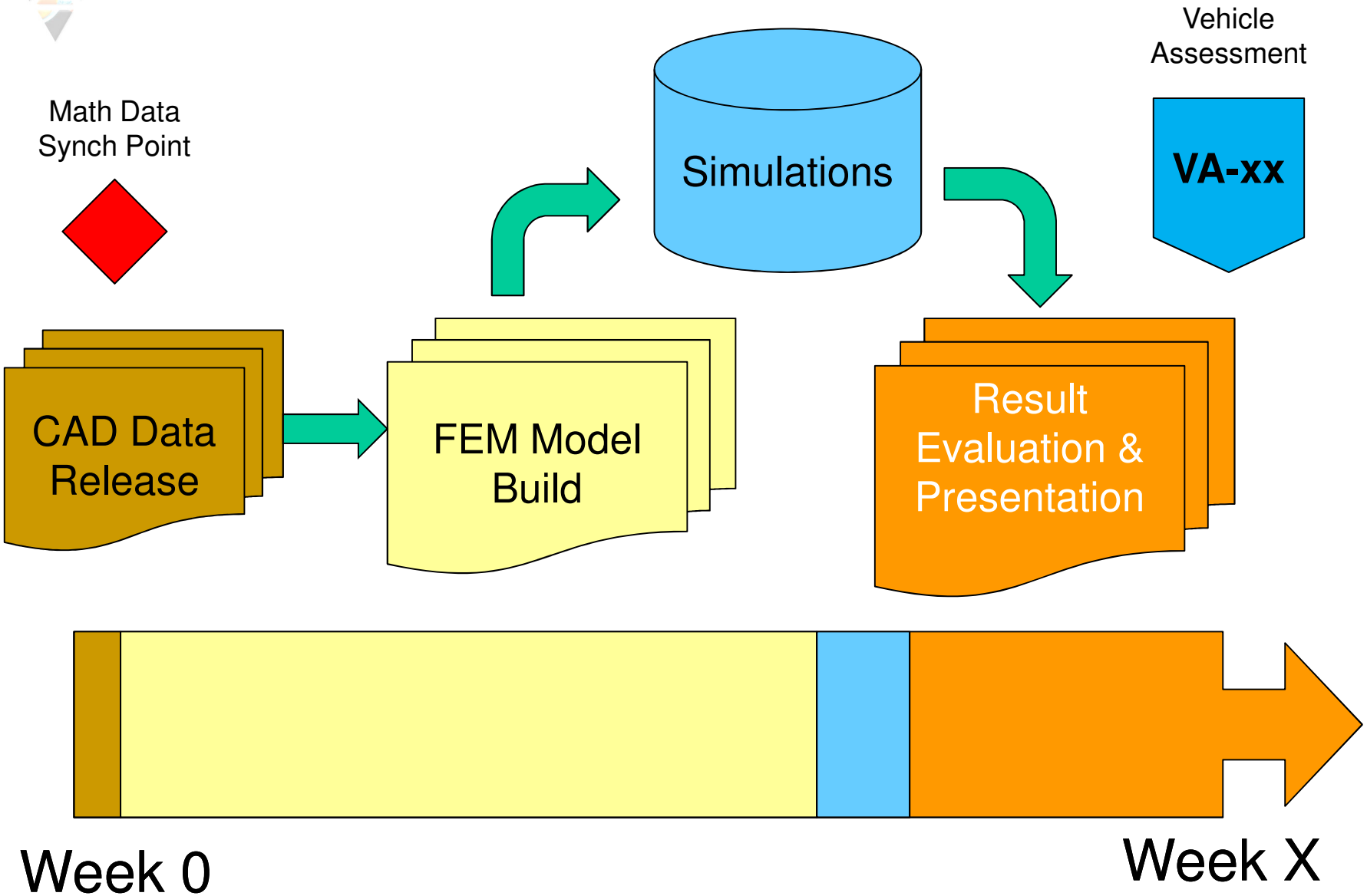


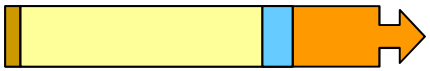
Project Goal

- The goal is to reduce the time between the “Math Data Synchronization Point” and the “Vehicle Assessment” by ca 50%.
- Many of the tools developed in the project will also lead to an improved quality of the vehicle assessment by elimination of common errors.



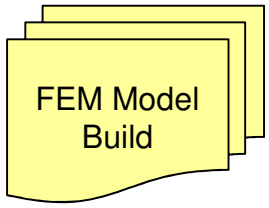
How to Reach Project Goal





How to Reach Project Goal

- Develop and optimize methods of all steps of the whole work flow between the two sync points.
- Writing a detailed and complete documentation of the whole work flow.
- Develop scripts/software to keep the manually work for the CAE-engineer at a minimum.
- Together with the CAD-department develop guidelines for the design engineers to improve the quality of the input data for the CAE-engineer.



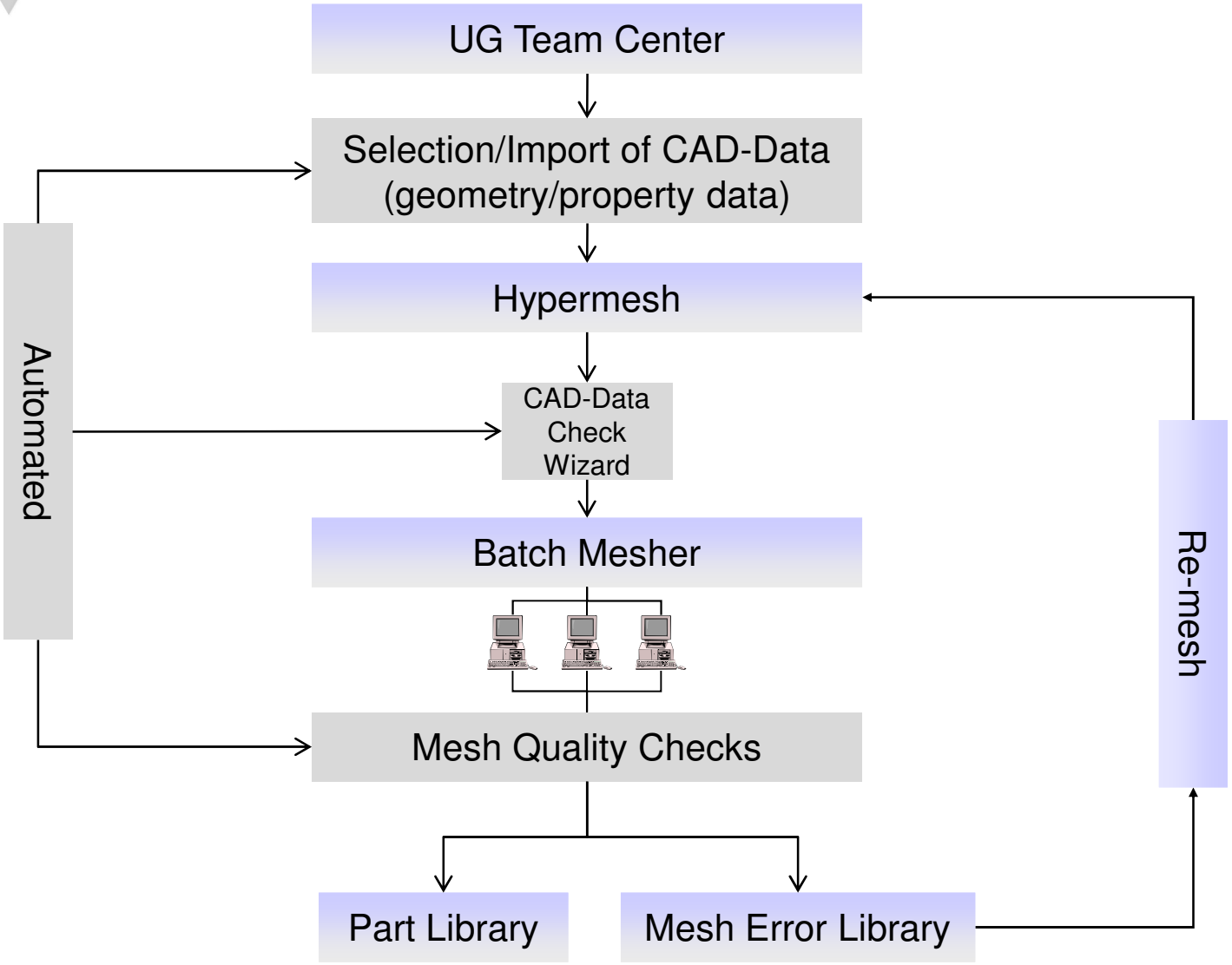
How to Reach Project Goal

- Automation of the CAD-TO-FEM Model Building Process:
  - Selection/Information gathering of the CAD-data necessary to build a good FEM-Model (unnecessary data/parts must be filtered out).
  - Systematic process for converting CAD-data to FEM-data (meshing/setting properties/building a part library).
  - Systematic quality checks of the converted data.
  - The assembly process from building sub modules to whole load case specific total vehicle models (includes welding, adhesives, bolts, and connecting different sub systems).

How to Reach Project Goal

- Automation of Result Evaluation:
  - Automatic and systematic extraction of simulation results.
  - Automatic creation of simulation documentation.
  - Automation gives the engineer more time to understand the product and the simulation results.

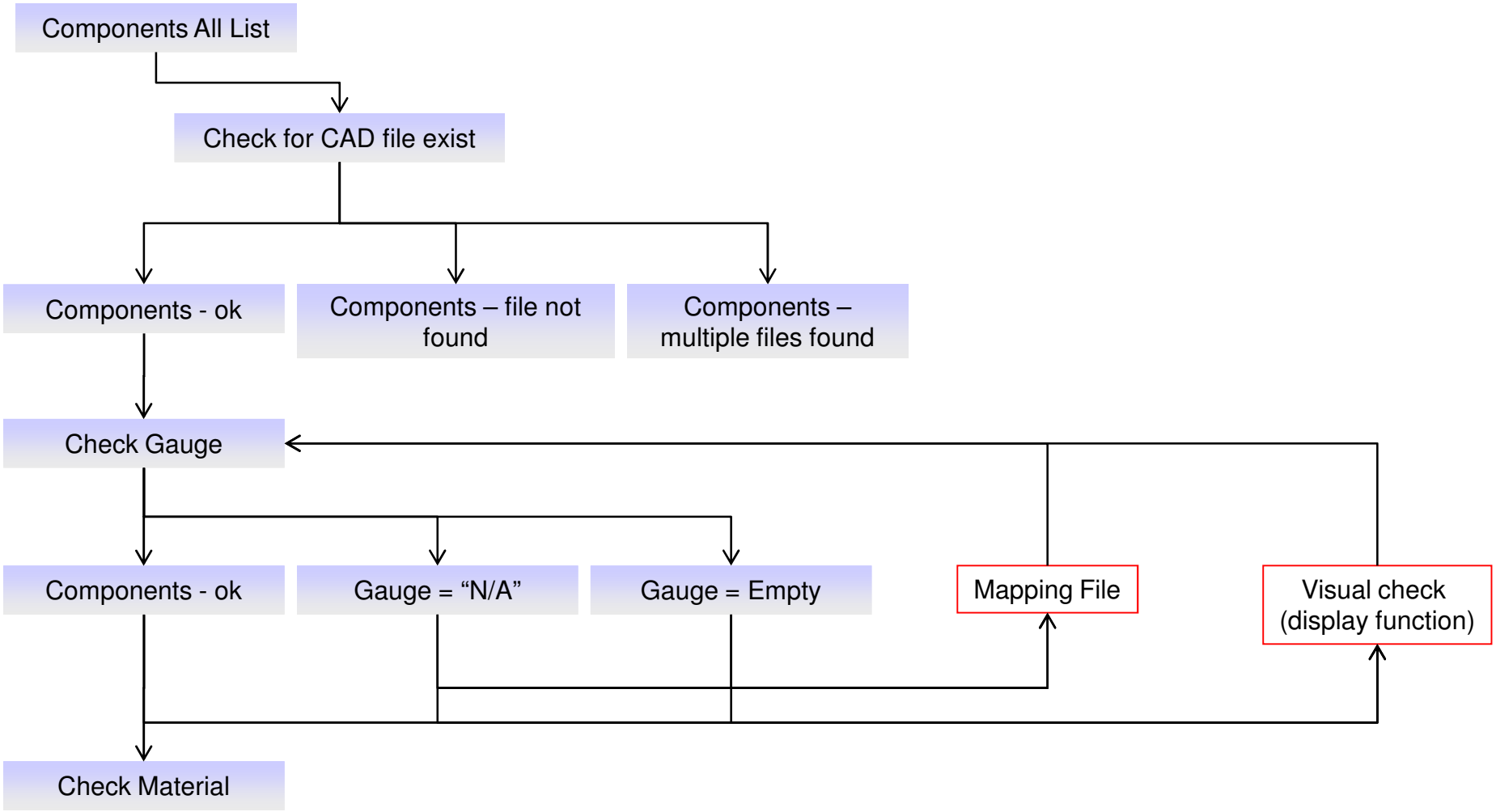
Example: Building a FE-Part Library



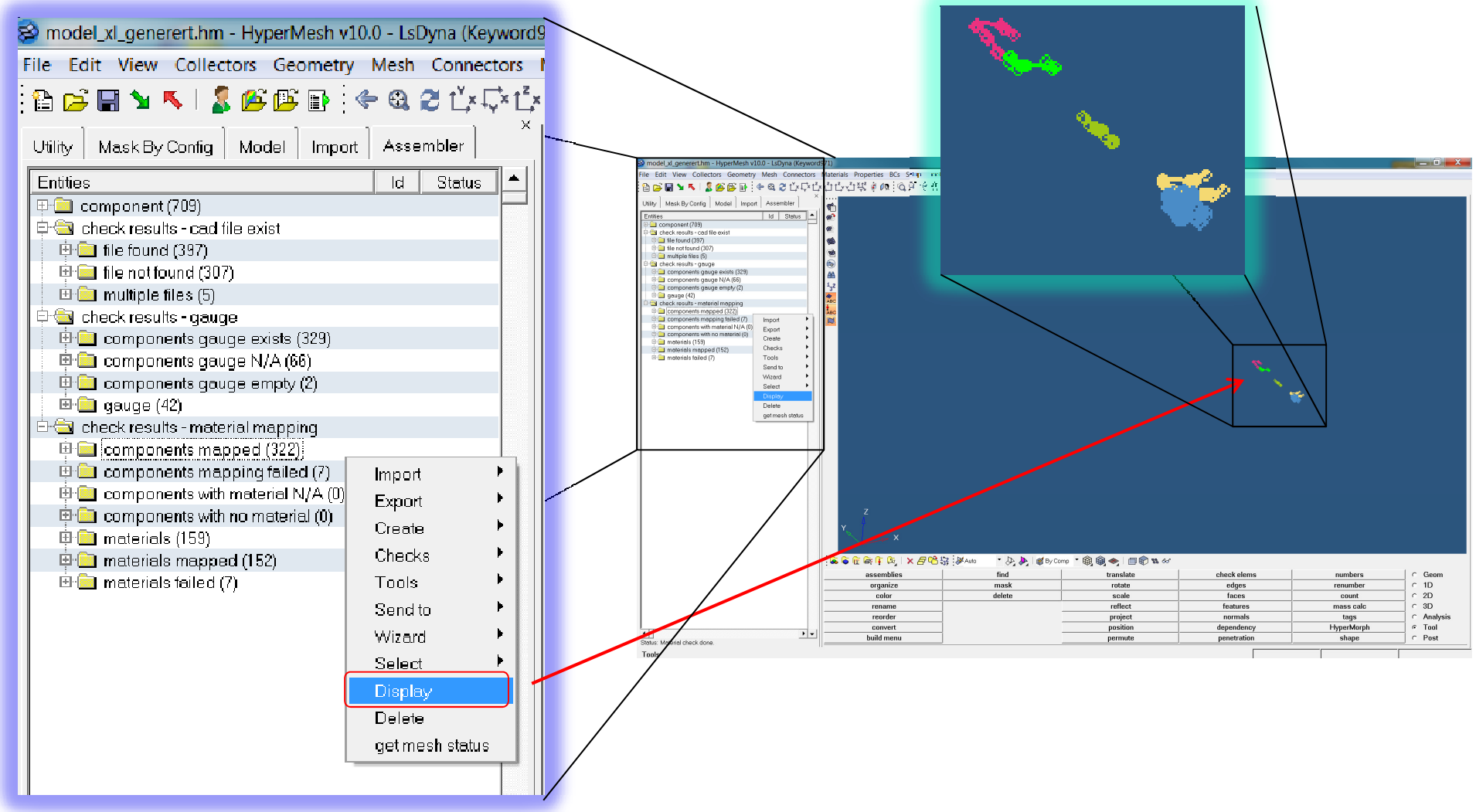
Example: CAD-Data Check Wizard

- Easy combination of automatic checks with visible checking. Important for the quality (no black-box).
- Systematic checking by following a pre-defined check-wizard.
- Easy to create mapping files for missing data via Excel (export from HyperMesh to Excel directly).

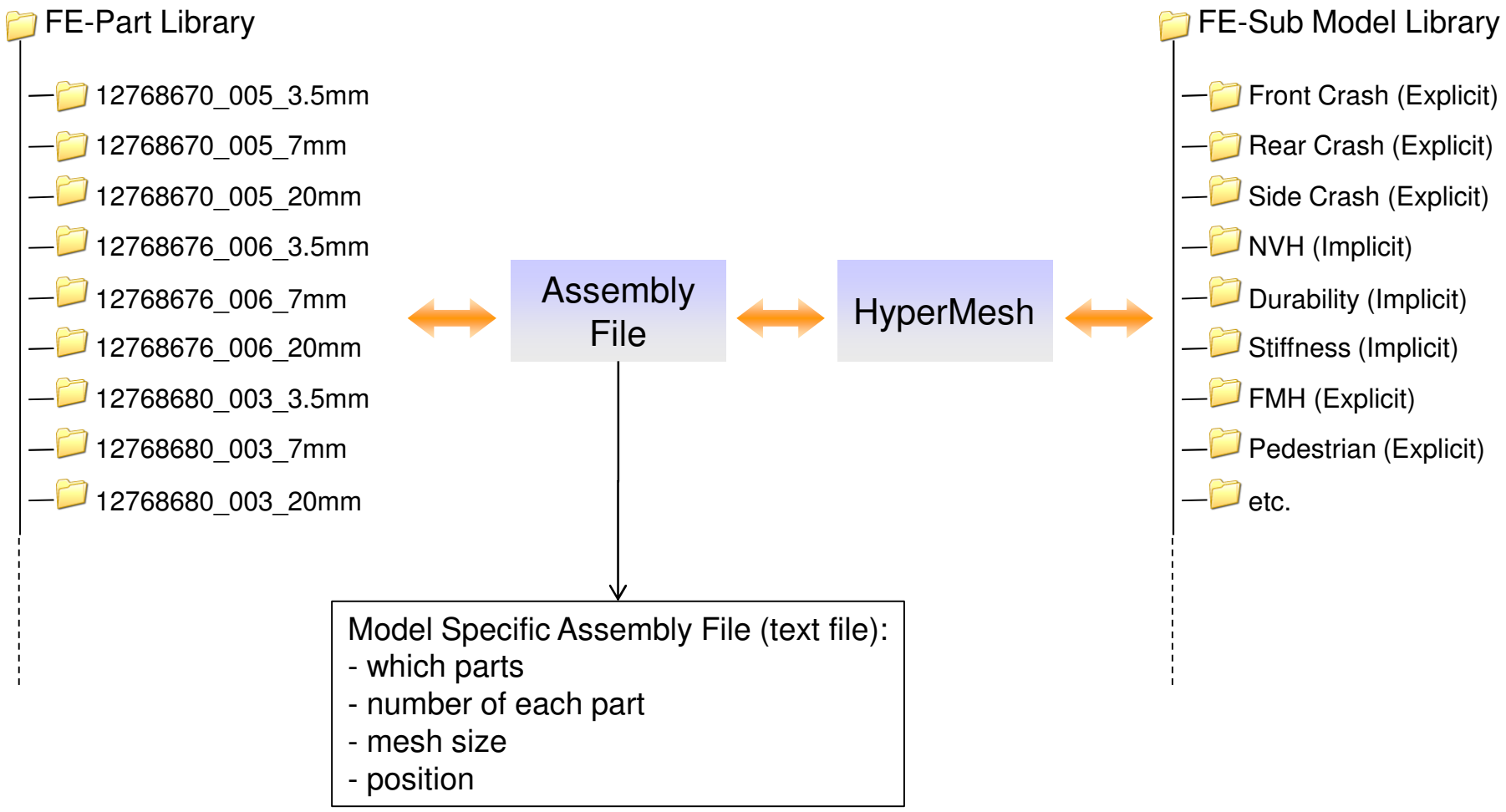
Example: CAD-Data Check Wizard for Systematic checking



Example: CAD-Data Check Wizard Display Component Check Lists



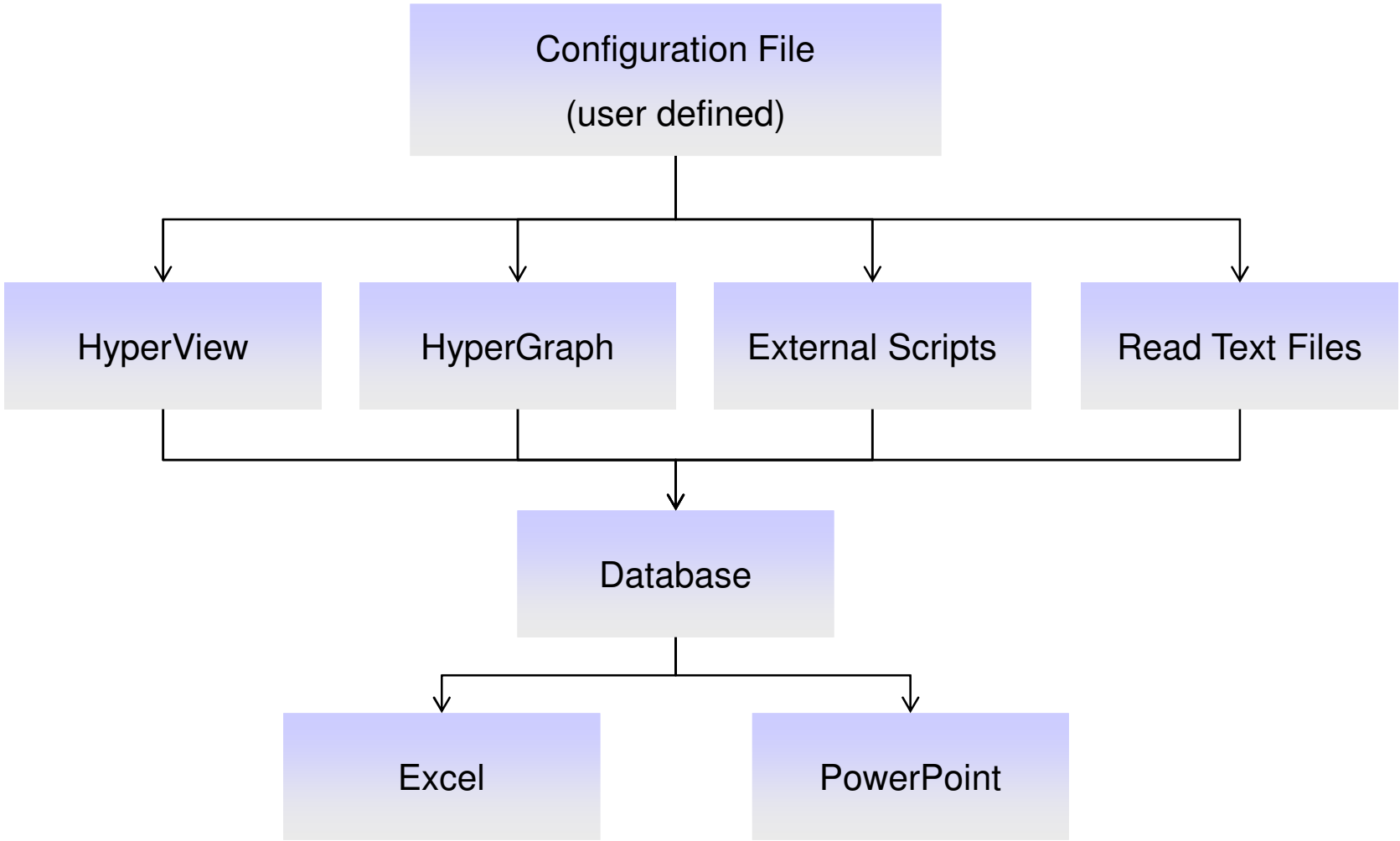
Example: Automatic sub assembly model building



Example: Automatic generation of load case specific reports.

- One user defined configuration file controlling the whole evaluation process for each load case.
- One database with all post-processing scripts.
- Automatic generation of Excel sheets and PowerPoint documents based on a system of templates and a common result database where each result value has a unique variable name.

Example: Automatic generation of load case specific reports.



Winnings in first evaluation test at a full project sync at Saab Automobile

- Subsystem modelling is done in the same time as earlier but 3 times more models have been built (several load case specific mesh densities).
- The time for assembling complete car models is reduced by 50%.
- Simulation running time is reduced by 15% owing to the load case specific mesh densities.
- The first time OK is increased (less changes to FE-models after first revision is released).

Winnings in first evaluation test at a full project sync at Saab Automobile

- The quality of the models is increased.
- This project makes is possible to build more models in-house (saving cost).

Summary of Project Progress

- Project is on-going
- Pre Processing:
  - Significant reduction in modeling time as well as increased model quality have been achieved.
  - Establishment of a well defined process. Easier to hand over work to new employees/consultants. Not so dependent on „key persons“.
- Post Processing:
  - Automation saves most time for load cases with many simulation runs or lots of result values.
  - Leaves more time for the user to understand the product and the simulation results.