

# Neue und geplante Entwicklungen in LoCo Ausblick auf “Next Generation” (LoCo-X)

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# Agenda

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## ■ Einführung LoCo

- Einordnung in den Gesamtprozess
- Features
- Gemeinsames arbeiten über Standorte hinweg
- Integration CAD, CAE, ...
- LiveDemo

## ■ Weiterentwicklung SCALE Produkte

- Entwicklung in Richtung eines integrierten Systems (CAx-Hub)
- RichClient vs. WebApp

## ■ Ausblick und aktueller Stand LoCoX - Entwicklung

- GUI Konzepte
- LoCoX Workshop
- Live Demo

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- Einordnung in den Gesamtprozess
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- Integration CAD, CAE, ...
- LiveDemo

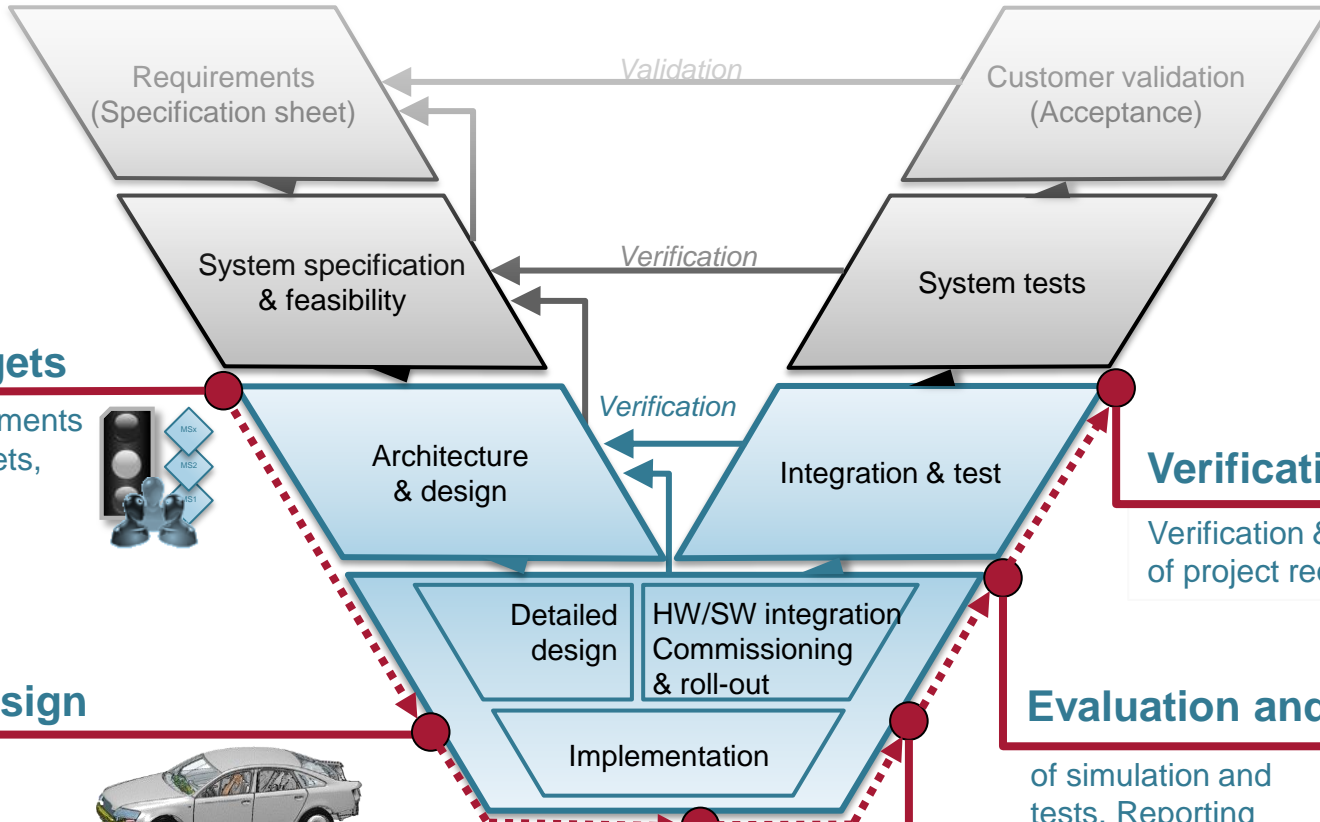
## ■ Weiterentwicklung SCALE Produkte

- Entwicklung in Richtung eines integrierten Systems (CAx-Hub)
- RichClient vs. WebApp

## ■ Ausblick und aktueller Stand LoCoX - Entwicklung

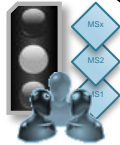
- GUI Konzepte
- LoCoX Workshop
- Live Demo

# Introduction - Systems Engineering Process



## Project targets

Setup of requirements and project targets, milestones and responsibilities



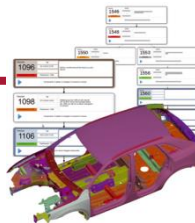
## Detailed design

CAD / DMU



## Implementation

Setup of simulation models and test prototypes



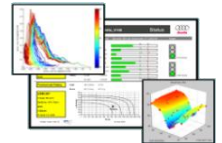
## Verification

Verification & monitoring of project requirements



## Evaluation and assessment

of simulation and tests, Reporting

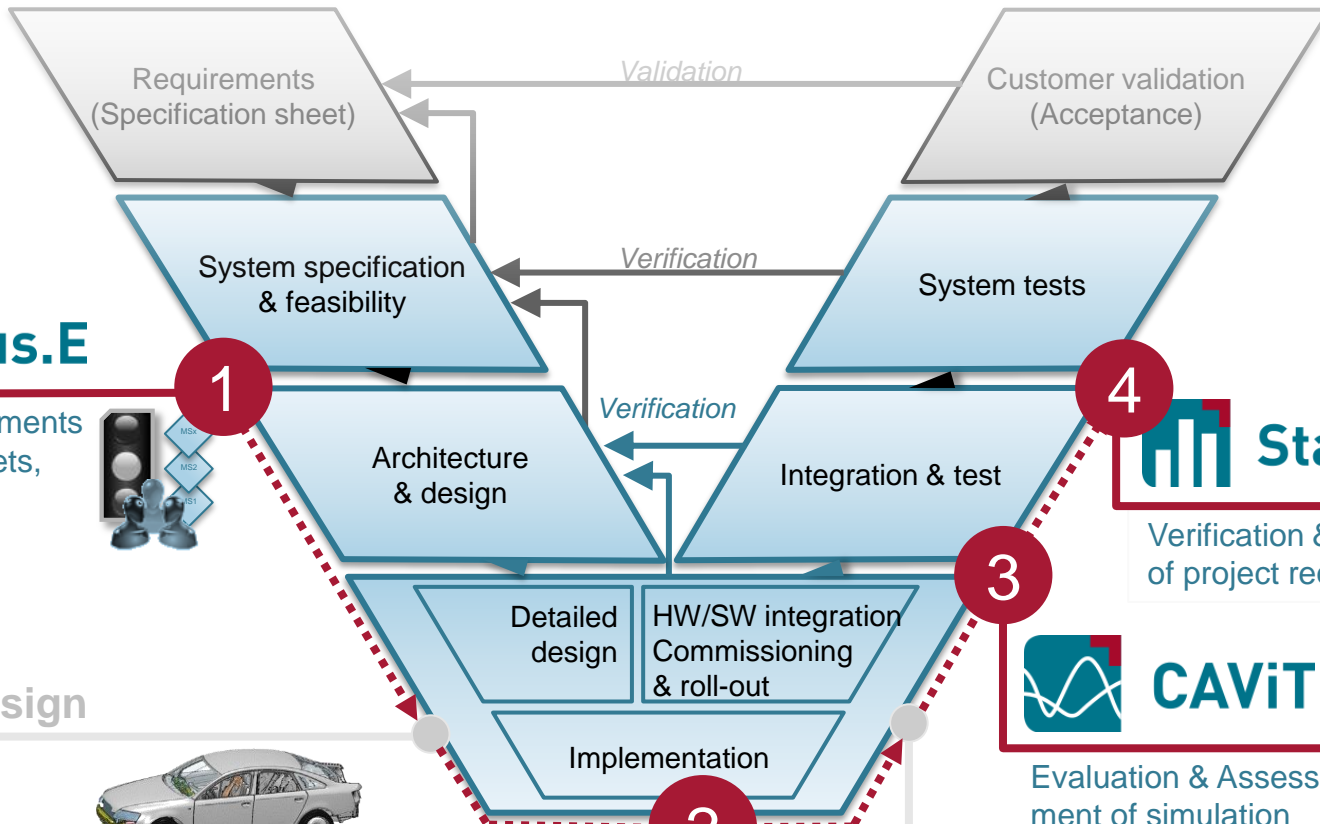


## Solving / Testing

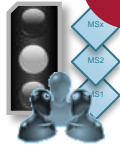
Perform simulation & test



# Introduction - Systems Engineering Process



Setup of requirements and project targets, milestones and responsibilities



Verification & monitoring of project requirements

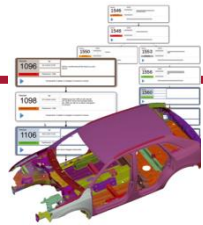


Detailed design

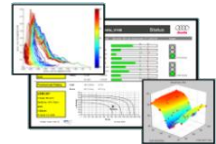
CAD / DMU



Setup of simulation models

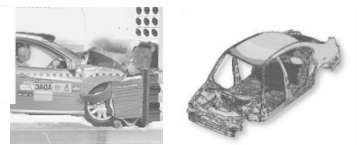


Evaluation & Assessment of simulation and tests, Reporting

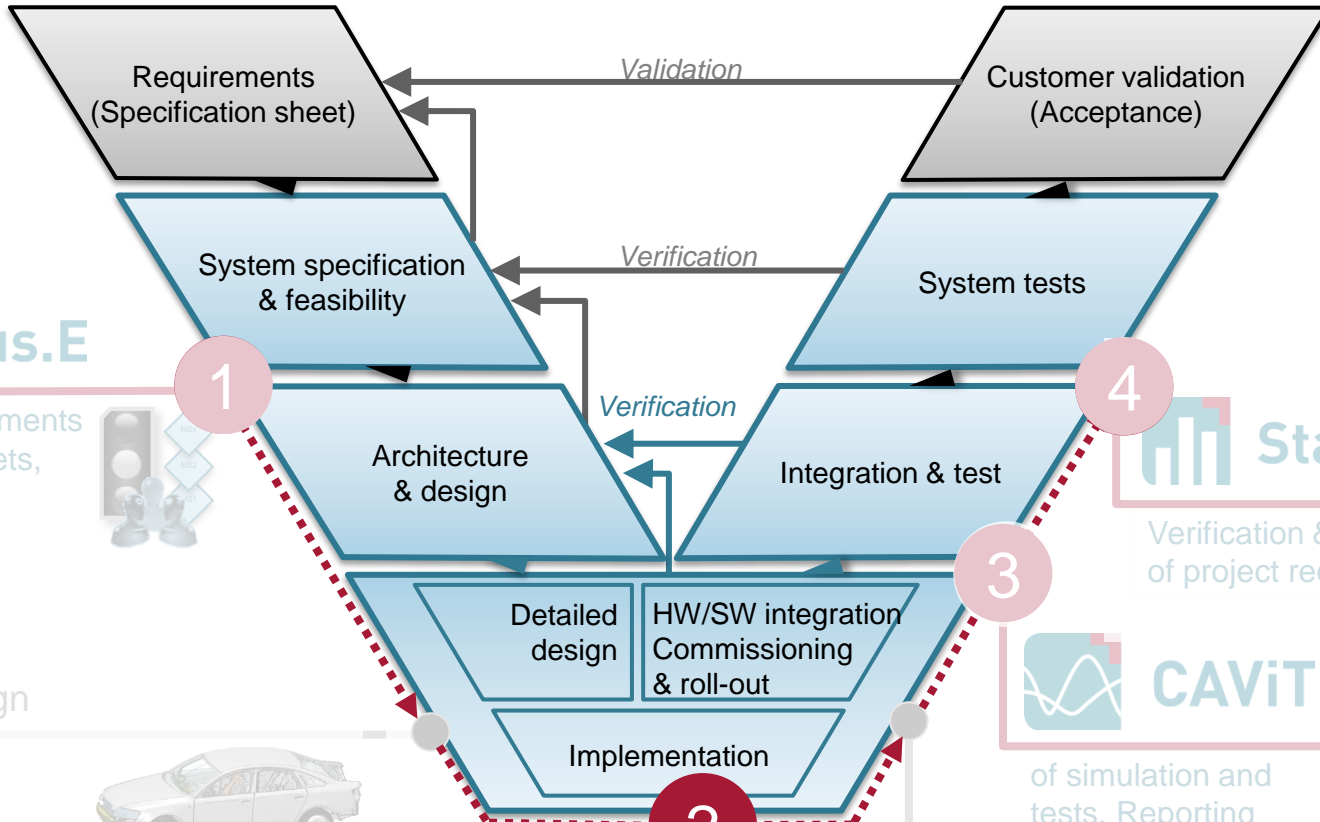


Solving / Testing

Perform simulation & test



# Systems Engineering Process



Setup of requirements and project targets, milestones and responsibilities



Verification & monitoring of project requirements

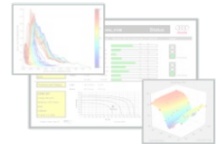


Detailed design

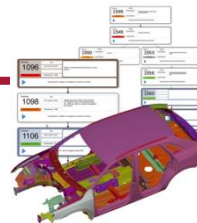
CAD / DMU



of simulation and tests, Reporting

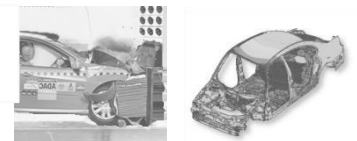


Setup of simulation models and test prototypes



Solving / Testing

Perform simulation & test



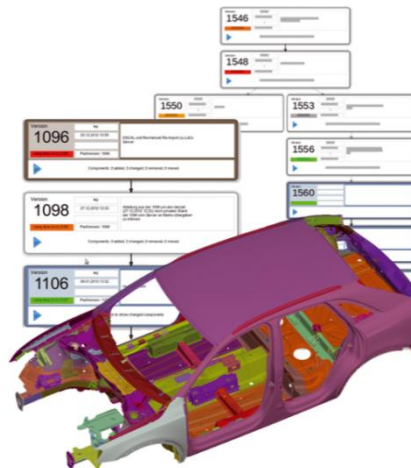
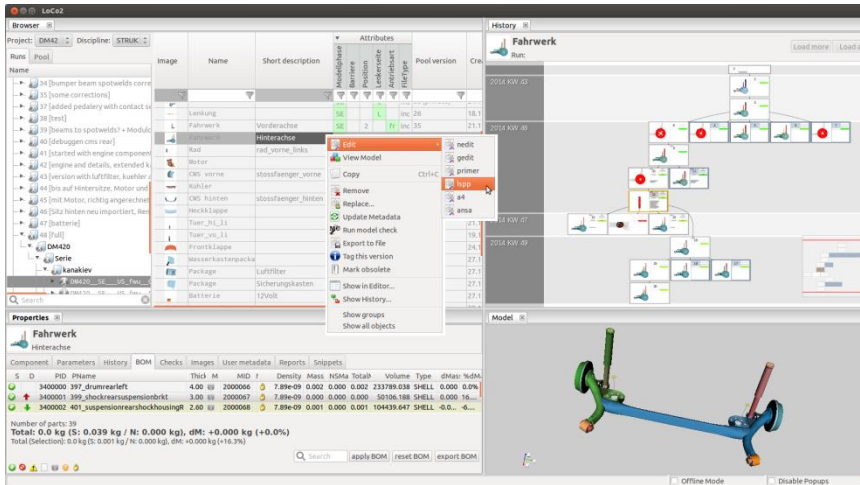
## Characterization

### ■ Simulation Data- / Variant Management

- Workbench for Simulation Engineers
- Unique RichClient/Offline-concept with sync-mechanism (*internal/external*)

### ■ Workflows / Features

- Integration of arbitrary CAE processes
- Solver: PAM-Crash, LS-DYNA, Nastran, Abaqus, ...
- Data and version management
- History tracking
- Job submit and monitoring
- Quality checks of models
- Advanced security features
  - Two factor authentication
  - Encryption
- Distributed, collaborative work environment
- Access-, roles and rights management
- Optimization, robustness, DOE, ...
- ...



# LoCo: scaling development by decentralization



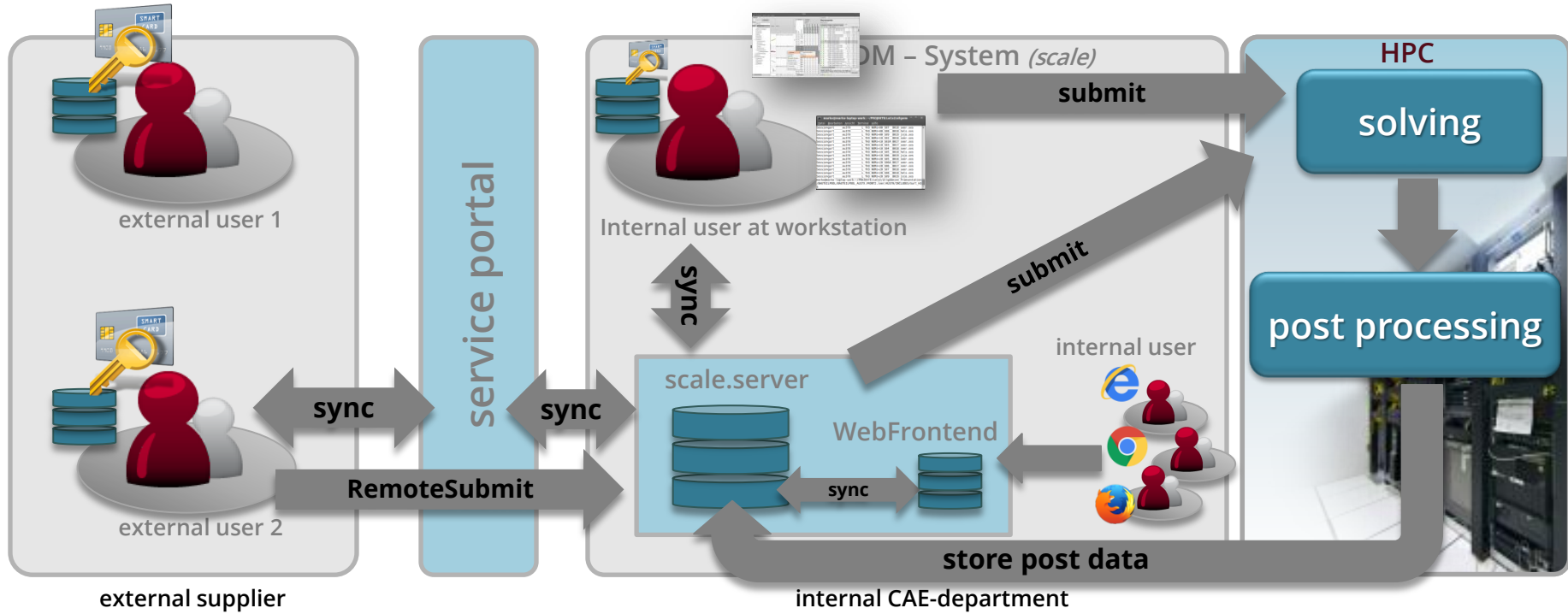
## ■ Distributed locations

- Direct integration in CAE development process of all partners
- Uniform working environment
- Automatic synchronization of relevant data
- Good performance even for poor network bandwidth
- Complying with high security requirements
  - encrypted storage
  - encrypted transfer
  - two factor authentication and encryption



- external partners
- sites





## Sync decentralized

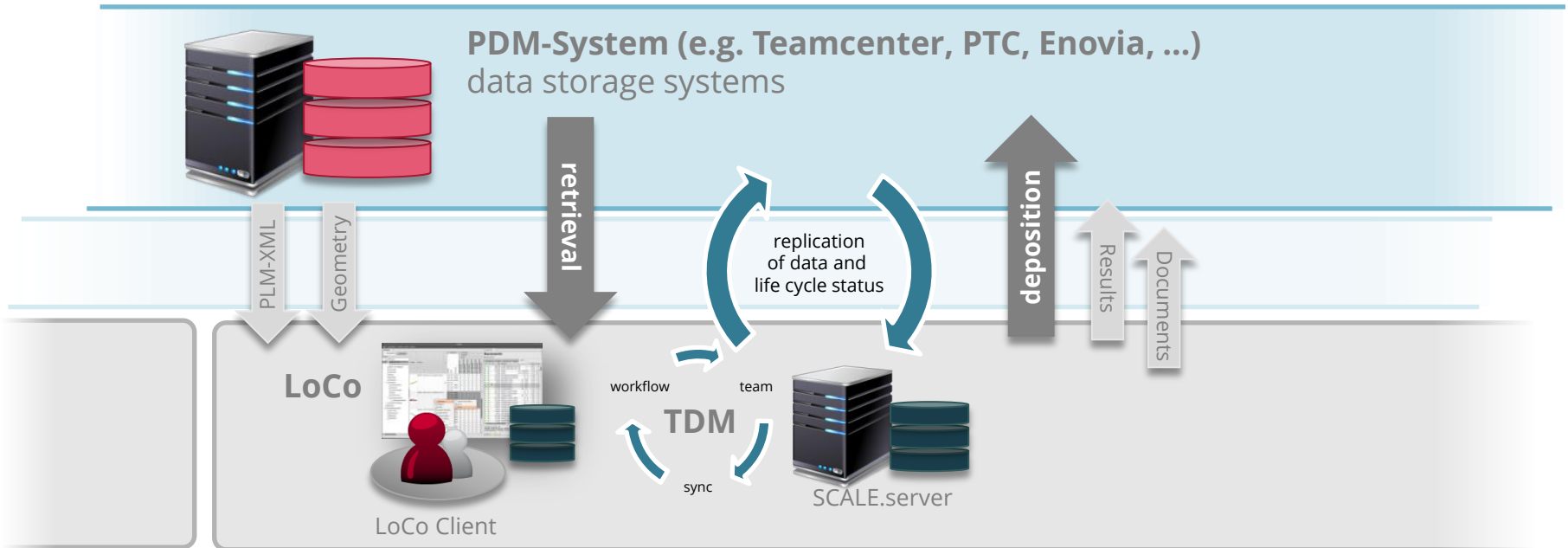
- Central data storage, synchronization with local workstations (*cloud like infrastructure*)
- Encrypted transfer, encrypted storage (*two factor authentication and encryption*)
- Offline handling of data (*RichClient*)

## Offline / Online performance

- Users/Teams are independent of servers and infrastructure
- Users work with local data
- Good performance while application of preprocessing tools

## Integration

- Integration with existing PDM Infrastructure as TDM-System (*Team Data Management*)



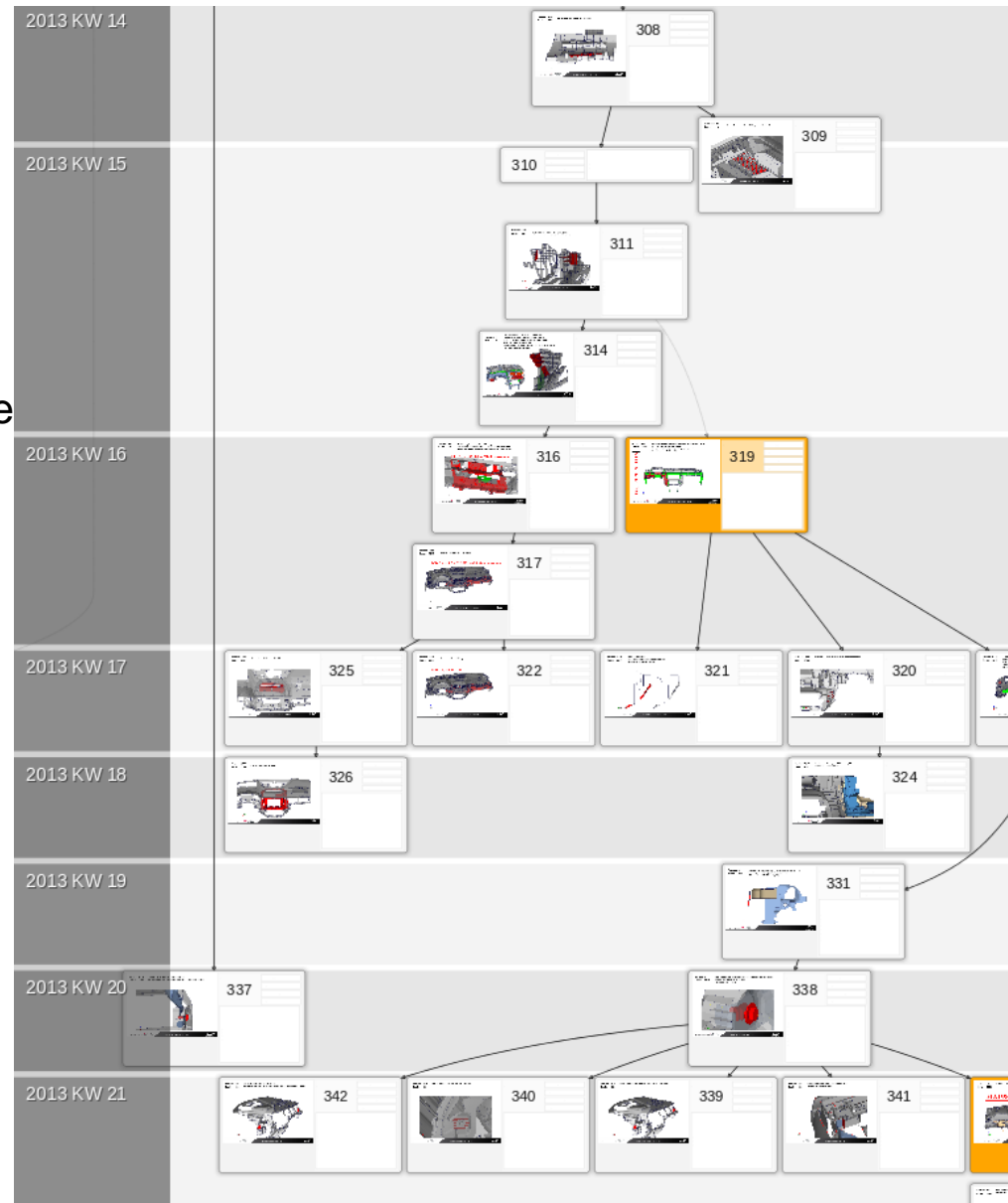
- Automated / integrated data deposition and retrieval from connected Storage and PDM-Systems
  - Automatic deposition of important variants from LoCo
  - Easy retrieval of stored variants
  - Usage of system APIs for access
- Automatic cleanup: storage space in SCALE.server might be restricted (*by time, size and/or usage*)
- Replication of life cycle status (*reference, status, ...*)

# LoCo: Version Control



- Version control is the management of changes to data
- Motivation:
  - Simulation is change driven
  - Changes need to be documented
  - Engineers need to work on the same
- In LoCo **every** object is versioned

Simulation Runs  
Scripts **Modules** Folders  
Meshes Parameters

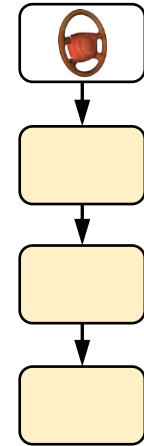


## ■ „Lock Modify Write“ (*classical PDM Systems*)



Meshing

- Components are first locked, then modified and finally unlocked again
- After the work is done users need to check in changed items
- While the component is locked, other users are prevented from modifying the same component
- Users may have to wait
- Easy to understand
- Always consistent data (*no merging of data required*)

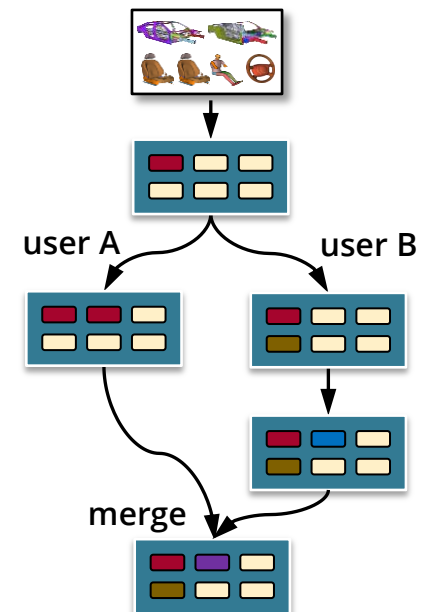


## ■ „Copy Modify Merge“ (*LoCo, git, svn, ...*)

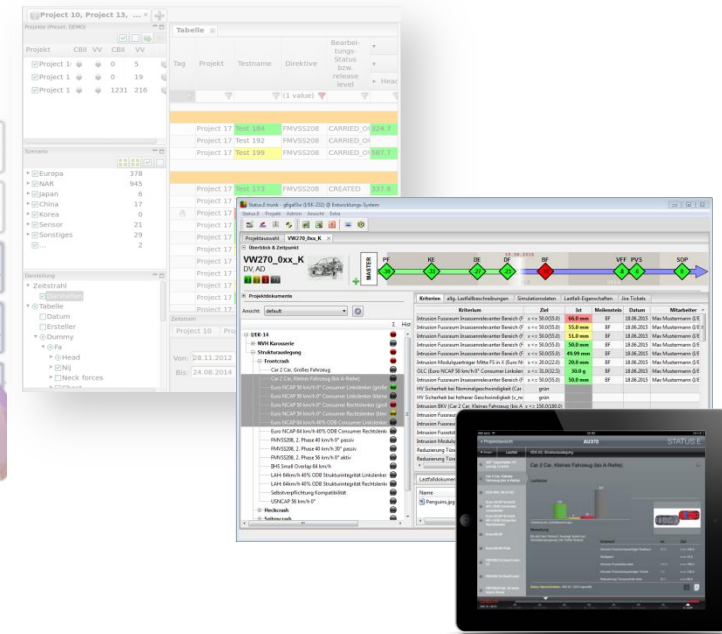
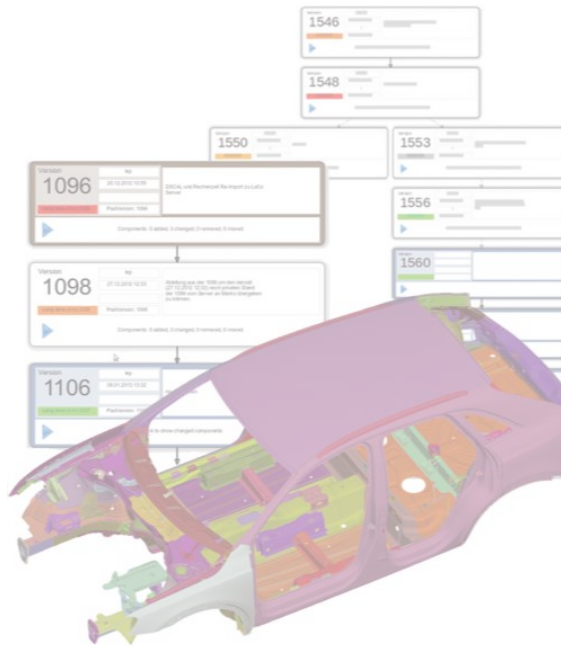
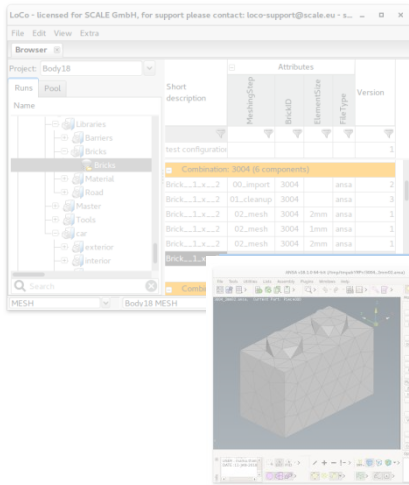
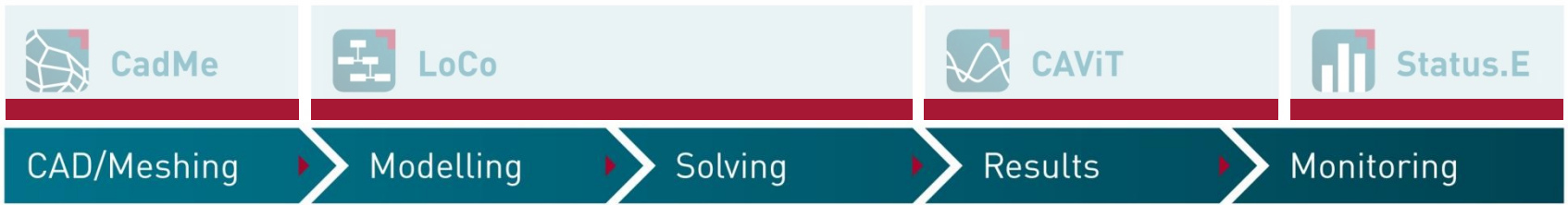


LoCo

- Objects can be used instantly (*on changes a copy will be created*)
- No „check in“ – „check out“ necessary
- Each user works with a complete independent copy of all data
- Simultaneous work on the same objects is possible
- At some point different “branches” need to be merged



# Example CAE Workflow



- Import from PDM
- Manage geometries
- Integrate meshing tools
- Manage meshes for different solvers

- Setup models
- Integrate simulation processes
- Share model data
- Run simulations

- Browse simulation results
- Access results with postprocessors
- Run reports and evaluations

- Monitor results over time
- Evaluate and Report project status

# SDM Workflow and Process control



## Importing CAD Data

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File Edit View Extra

Browser

Project: Body18

Runs Pool

Name

- car
  - exterior
  - attatchments
    - doors
    - front-end
    - lids
    - rear-end
    - windows
  - body
  - chassis
  - engine

Attributes

Short description	PartNumber	BrickID	Version
test configuration that uses ev			1
front-bumper_02	98	50950	9
front-bumper_03	99	3023	9
front-bumper_04	100		9
headlight-left_01	101		10
headlight-left_02	102	6141	10
headlight-right_01	103	54200	10
headlight-right_02	104	6141	10
	105	2412a	9
	106	2412a	9

Search

CAD Body18 CAD Offline Mode

CAD meta data

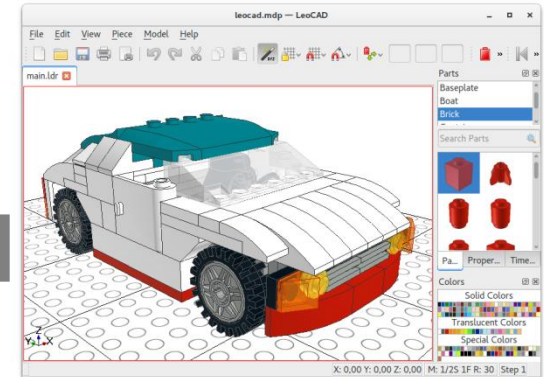
Import of CAD data  
e.g. PLMXML

CAD parts

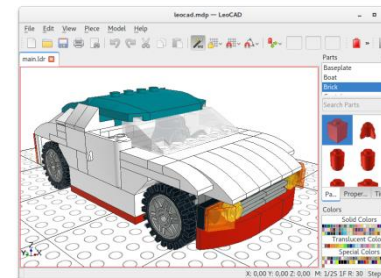
product structure

discipline

## PDM/CAD System



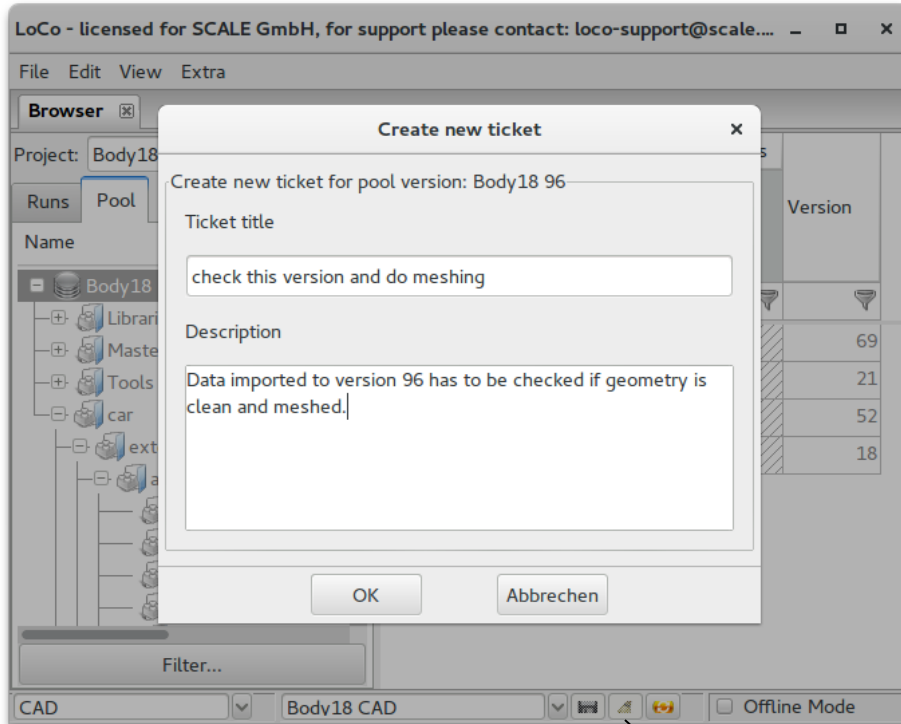
working with  
CAD data



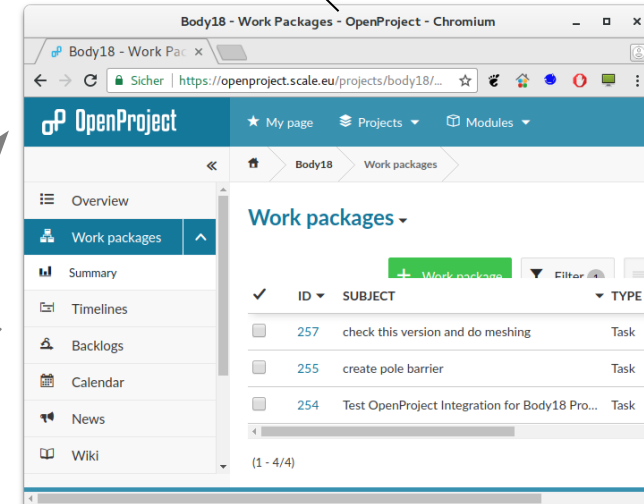
# SDM Workflow and Process control



## Creating a task for meshing



Tasks are managed in project management system



create new tasks related to data

# SDM Workflow and Process control



meshing the CAD data

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File Edit View Extra

Browser

Project: Body18

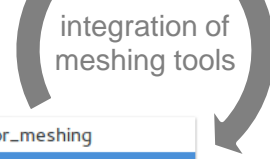
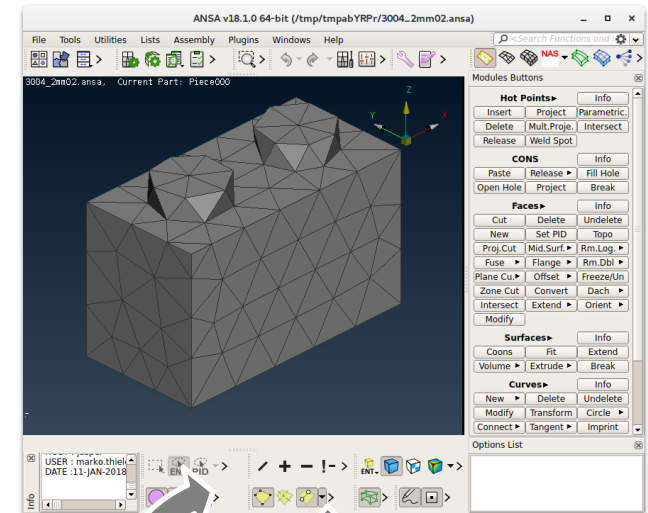
Attributes

	MeshingStep	BrickID	ElementSize	FileType	Version
test configuration					1
Combination: 3004 (6 components)					
Brick__1_x__2	00_import	3004		ansa	2
Brick__1_x__2	01_cleanup	3004		ansa	3
Brick__1_x__2	02_mesh	3004	2mm	ansa	1
Brick__1_x__2	02_mesh	3004	1mm	ansa	1
Brick__1_x__2	02_mesh	3004	2mm	ansa	1
Brick__1_x__2					

MESH Body18 MESH

discipline: meshing

container with data for several meshing steps and representations



- 00\_import\_bricks\_for\_meshing
- 01\_mesh\_with\_ANSA
- 02\_complement\_solver\_cards\_to\_brick
- 03\_create\_solver\_representation
- CAD (leocad)

integration of tasks, scripts and applications



# SDM Workflow and Process control



deliver meshing results

PartNumber	BrickID	ElementSize	File Type	Impact location
		2mm		
Bracket...1_x...2_--	93274		ansa	
Bracket...1_x...2_--	93274	2mm	ansa	
Bracket...1_x...2_--	93274	1mm	ansa	
Bracket...1_x...2_--	93274	1mm	key	
Bracket...1_x...2_--	93274	2mm	key	

create load cases

discipline: FEM

create solver representations

set data public

notification through project management system

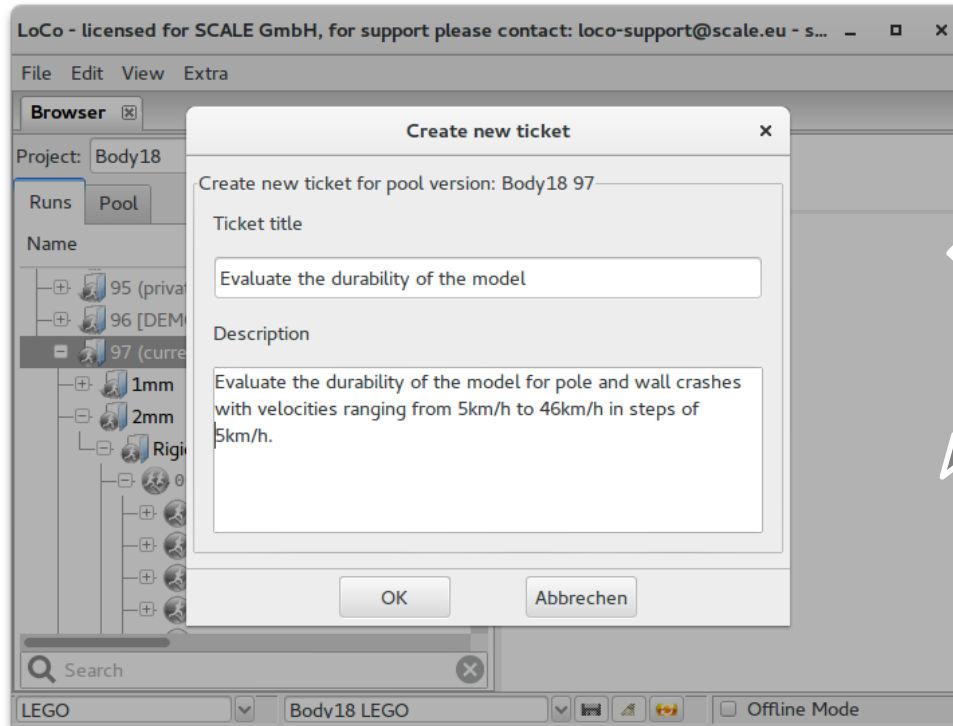


resolve task if done

# SDM Workflow and Process control

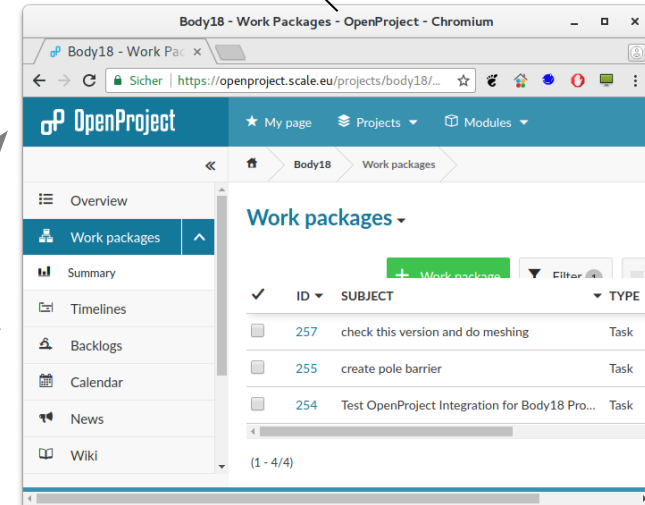


creating a task for simulation



Tasks are managed in project management system

Integration with project management system



# SDM Workflow and Process control



## Submitting simulation jobs

The screenshot displays the LoCo software interface with several key components highlighted by callouts:

- multi simulation run automatically created:** Points to the 'Runs (PV:102)' tree on the left, showing a hierarchy of simulation configurations under 'LEGO' and 'Pole'.
- simulation finished and results downloaded:** Points to the 'Jobs' panel on the right, showing a list of completed jobs with status icons and download links.
- individual simulation run:** Points to a specific entry in the 'Runs' tree.
- detailed state of currently running simulations:** Points to a progress bar in the 'Jobs' panel for a currently running job, showing 'Solving: 13.5ms of 50.0ms computed'.
- list of all pending simulations:** Points to the 'Jobs' panel, which lists all pending and running simulation jobs.

Short description	PartNumber	BrickID	ElementSize	File Type	ImpactLocation
test configuration that			2mm		
Combination: 11477 (6 d					
Slope_Brick_Curved...	11477		ansa		
Slope_Brick_Curved...	11477		ansa		
Slope_Brick_Curved...	11477	1mm	ansa		
Slope_Brick_Curved...	11477	2mm	ansa		
Slope_Brick_Curved...	11477	1mm	key		
Slope_Brick_Curved...	11477	2mm	key		
Combination: 122c03 (3					
Plate_2_x_2_with_I	122c03		ansa		
Plate_2_x_2_with_I	122c03		dat		
Plate_2_x_2_with_I	122c03		stl		

# SDM Workflow and Process control

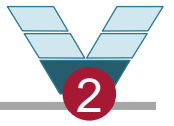


access to results

The screenshot displays two software windows. The top window is 'LoCo - licensed for SCALE GmbH, for support please contact: loco-support@scale.eu - scale'. It features a 'Browser' panel on the left with a tree view of simulation versions. A callout box points to this list with the text 'show list with all conducted simulations'. The bottom window is 'LS-PrePost(R) V4.3 (Beta) - 31Oct2015(23:00)-64bit J/0092\_FEM\_scale\_car\_p\_...46kmh\_0\_grad\_100\_2mm/MOV...'. It shows a 3D finite element model of a car chassis with a complex mesh. A callout box points to the bottom of this window with the text 'Open result data directly from application'. The bottom window also shows a toolbar and a status bar with 'state 1;' and 'Normal Ren...'. The top window's browser panel contains the following list of simulation versions:

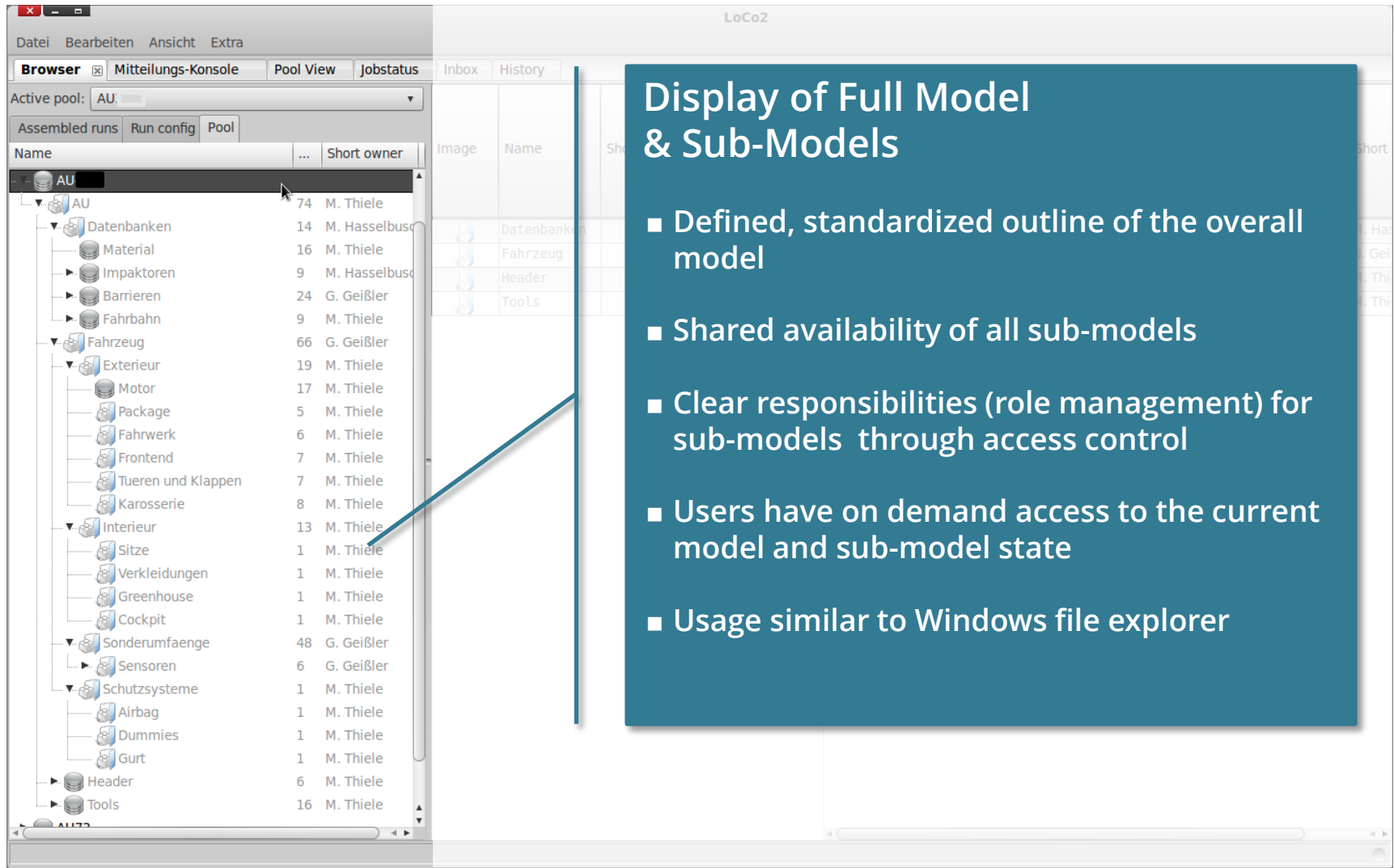
Version	Description	Status
87	[Test mit niedrigerer Geschw...]	
88	[Merge]	
90	(private) [Weiter mit Pfahba...]	
91	[Übernahme der Skripte vor...]	
92	[Weiter an Pfahbarriere]	
93	[Progress Feedback LS-DYN...]	
94	(private) [Snippet Test]	
95	[Merge]	
96	[DEMO Faurecia]	
97	(private) [Evaluate the durib...]	
98	(private) [Feedback Datei]	
99	(private) [DEMO Faurecia]	

Open result data directly from application



look and feel...

## Live Demo LoCo2



**Display of Full Model & Sub-Models**

- Defined, standardized outline of the overall model
- Shared availability of all sub-models
- Clear responsibilities (role management) for sub-models through access control
- Users have on demand access to the current model and sub-model state
- Usage similar to Windows file explorer

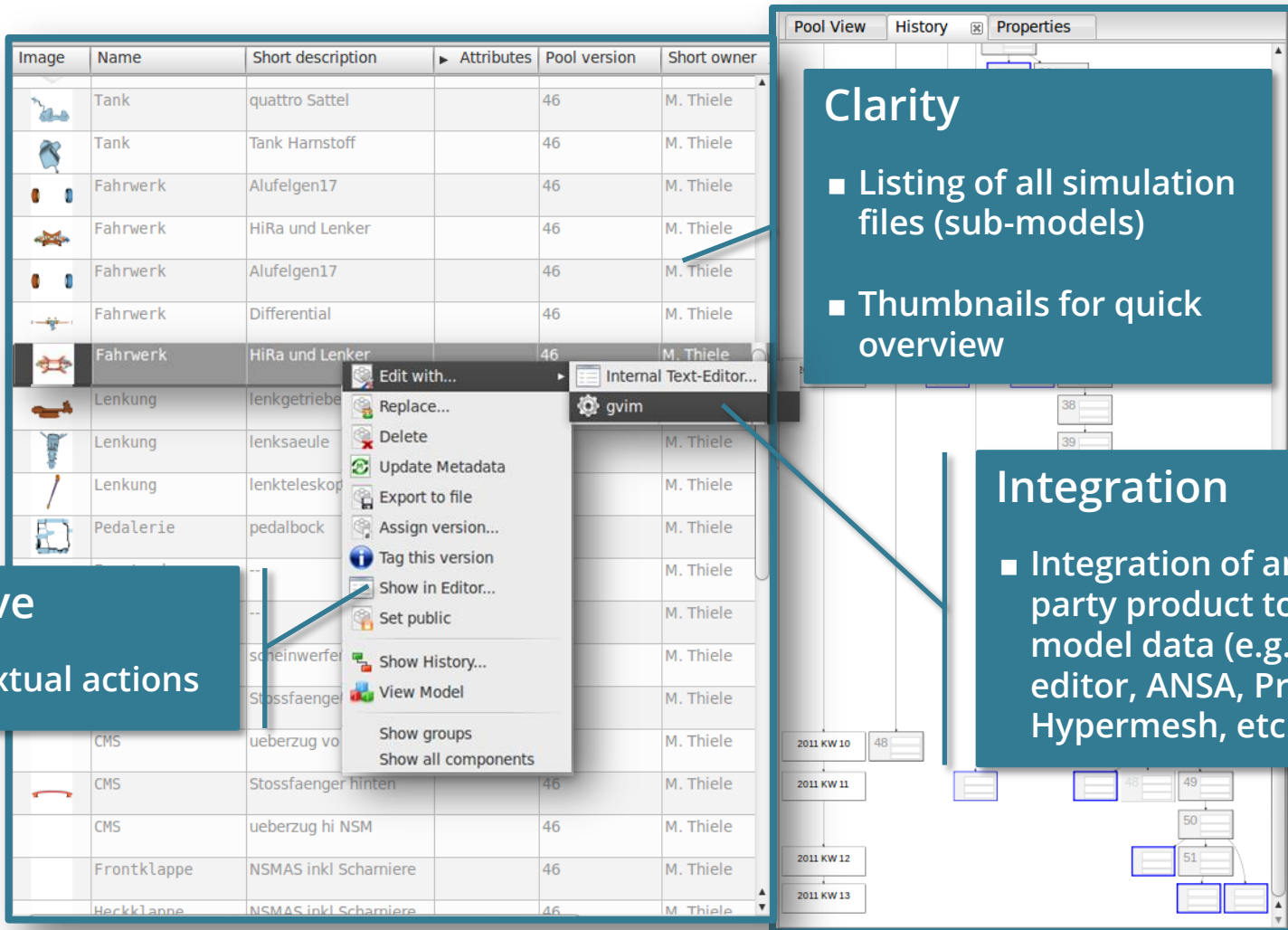


Image	Name	Short description	Attributes	Pool version	Short owner
	Tank	quattro Sattel		46	M. Thiele
	Tank	Tank Hamstoff		46	M. Thiele
	Fahrwerk	Alufelgen17		46	M. Thiele
	Fahrwerk	HiRa und Lenker		46	M. Thiele
	Fahrwerk	Alufelgen17		46	M. Thiele
	Fahrwerk	Differential		46	M. Thiele
	Fahrwerk	HiRa und Lenker		46	M. Thiele
	Lenkung	lenkgetriebe			
	Lenkung	lenksaeule			M. Thiele
	Lenkung	lenkteleskop			M. Thiele
	Pedalerie	pedalbock			M. Thiele
	scheinwerfer				M. Thiele
	Stoßfaenger				M. Thiele
	ueberzug vo				M. Thiele
	Stoßfaenger hinten			46	M. Thiele
	ueberzug hi NSM			46	M. Thiele
	Frontklappe	NSMAS inkl Scharniere		46	M. Thiele
	Heckklappe	NSMAS inkl Scharniere		46	M. Thiele

**Intuitive**

- Contextual actions

**Clarity**

- Listing of all simulation files (sub-models)
- Thumbnails for quick overview

**Integration**

- Integration of any 3rd party product to edit model data (e.g. any text editor, ANSA, Primer, Hypermesh, etc.)

# LoCo: Workbench for Simulation Engineers



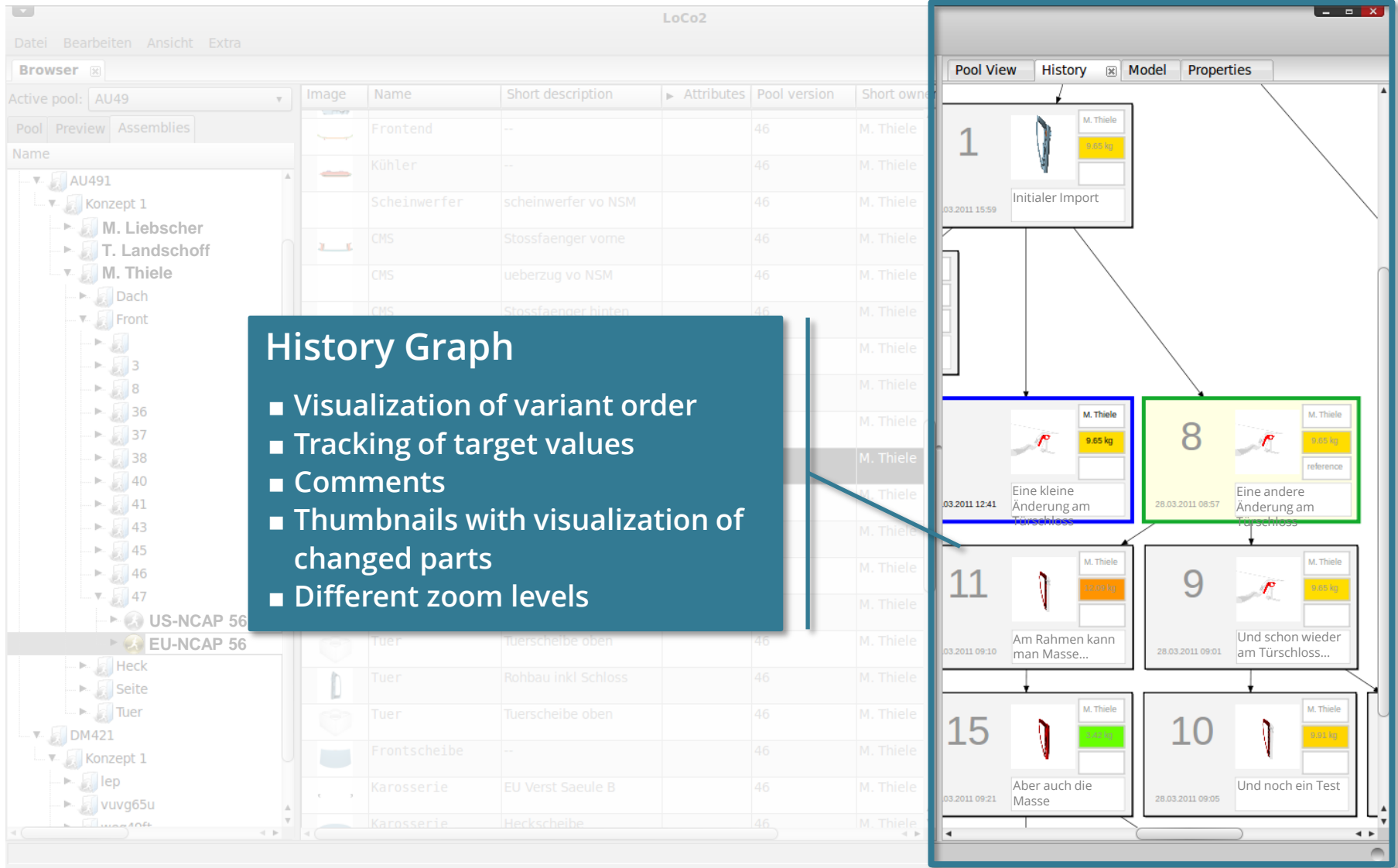
The screenshot displays the LoCo Workbench interface. On the left, a tree view shows the project structure under 'Studies' and 'Runs'. The main area shows a table of components grouped into categories like 'Front end', 'Mass', 'Master', 'Material', and 'Packages'. A context menu is open over the 'Radiator' component, with 'Export to file' highlighted. A blue callout box points to the 'Radiator' component with the text 'Choose a component'. Another blue callout box points to the 'Export to file' menu item with the text 'Easy export of the component to a file'. On the right, the 'Radiator' component properties panel is visible, showing thumbnails and a BOM view.

**Choose a component**

**Easy export of the component to a file**

Name	Short description	Region	Impact_Art	Barrier	Hand Drive	Position	FileType	Disziplin	Z_Position	Version
<b>Front end (3 components)</b>										
18	Radiator						key			
14	Crash Management						2 key			
15	Crash Management						2 key			
<b>Mass (1 component)</b>										
1	Additional Ma						key			
<b>Master (1 component)</b>										
0	Master						key			
<b>Material (1 component)</b>										
17	Material						key			
<b>Packages (4 components)</b>										
10	Battery						key			
20	Water Tank						key			
	Air Filter						key			





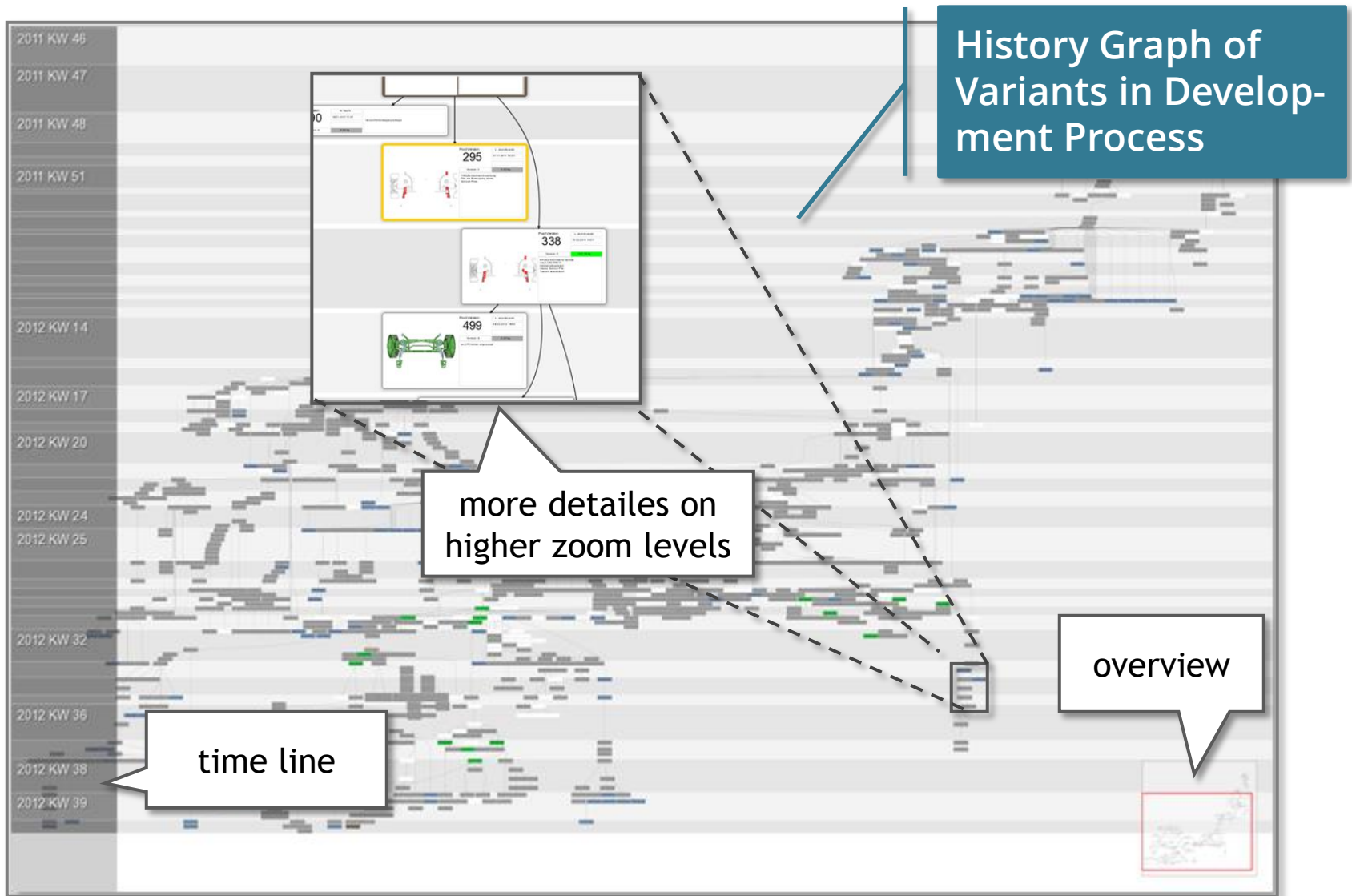
**History Graph**

- Visualization of variant order
- Tracking of target values
- Comments
- Thumbnails with visualization of changed parts
- Different zoom levels

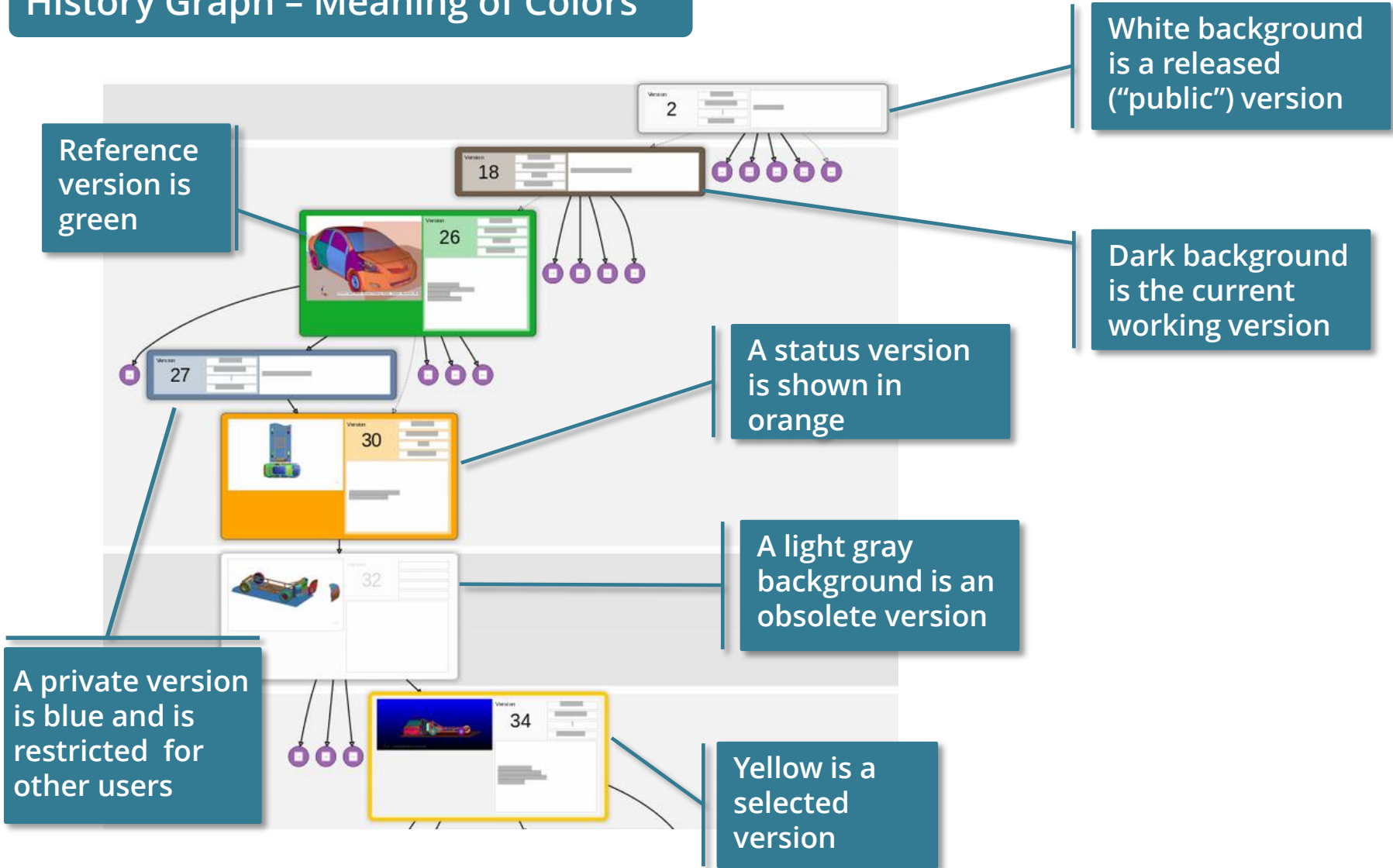
Pool	Preview	Assemblies	Name	Image	Name	Short description	Attributes	Pool version	Short owner
			Frontend		Frontend	--		46	M. Thiele
			Kühler		Kühler	--		46	M. Thiele
			Scheinwerfer		Scheinwerfer	scheinwerfer vo NSM		46	M. Thiele
			CMS		CMS	Stossfaenger vorne		46	M. Thiele
			CMS		CMS	ueberzug vo NSM		46	M. Thiele
			CMS		CMS	Stossfaenger hinten		46	M. Thiele
			Tuer		Tuer	Tuerscheibe oben		46	M. Thiele
			Tuer		Tuer	Rohbau inkl Schloss		46	M. Thiele
			Tuer		Tuer	Tuerscheibe oben		46	M. Thiele
			Frontscheibe		Frontscheibe	--		46	M. Thiele
			Karosserie		Karosserie	EU Verst Saeule B		46	M. Thiele
			Karosserie		Karosserie	Heckscheibe		46	M. Thiele

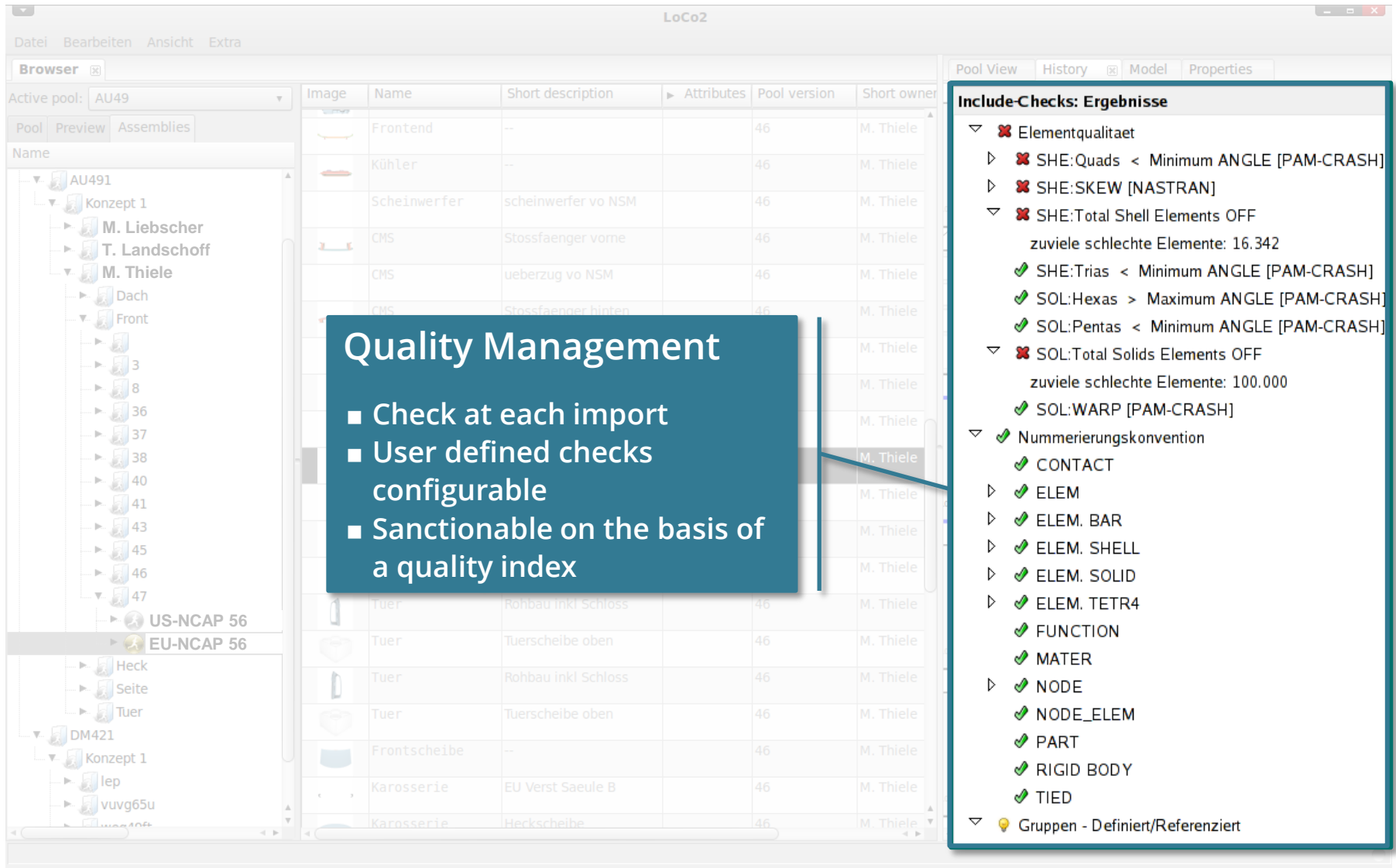
**History Graph Details:**

- Node 1:** Initialer Import (03.2011 15:59)
- Node 8:** Eine andere Änderung am Türschloss (28.03.2011 08:57) - highlighted in green
- Node 9:** Und schon wieder am Türschloss... (28.03.2011 09:01)
- Node 10:** Und noch ein Test (28.03.2011 09:05)
- Node 11:** Am Rahmen kann man Masse... (03.2011 09:10) - highlighted in blue
- Node 15:** Aber auch die Masse (03.2011 09:21)



## History Graph – Meaning of Colors





The screenshot displays the LoCo2 software interface. On the left, a 'Browser' pane shows a hierarchical tree of simulation components, including 'AU491', 'Konzept 1', and 'M. Thiele'. The main area features a table with columns for 'Image', 'Name', 'Short description', 'Attributes', 'Pool version', and 'Short owner'. The table lists various components like 'Frontend', 'Kühler', 'Scheinwerfer', 'CMS', 'Tuer', and 'Karosserie'. On the right, a 'Pool View' pane titled 'Include-Checks: Ergebnisse' displays a list of quality checks with their status (pass/fail) and details. A blue callout box is overlaid on the table, containing the text 'Quality Management' and three bullet points.

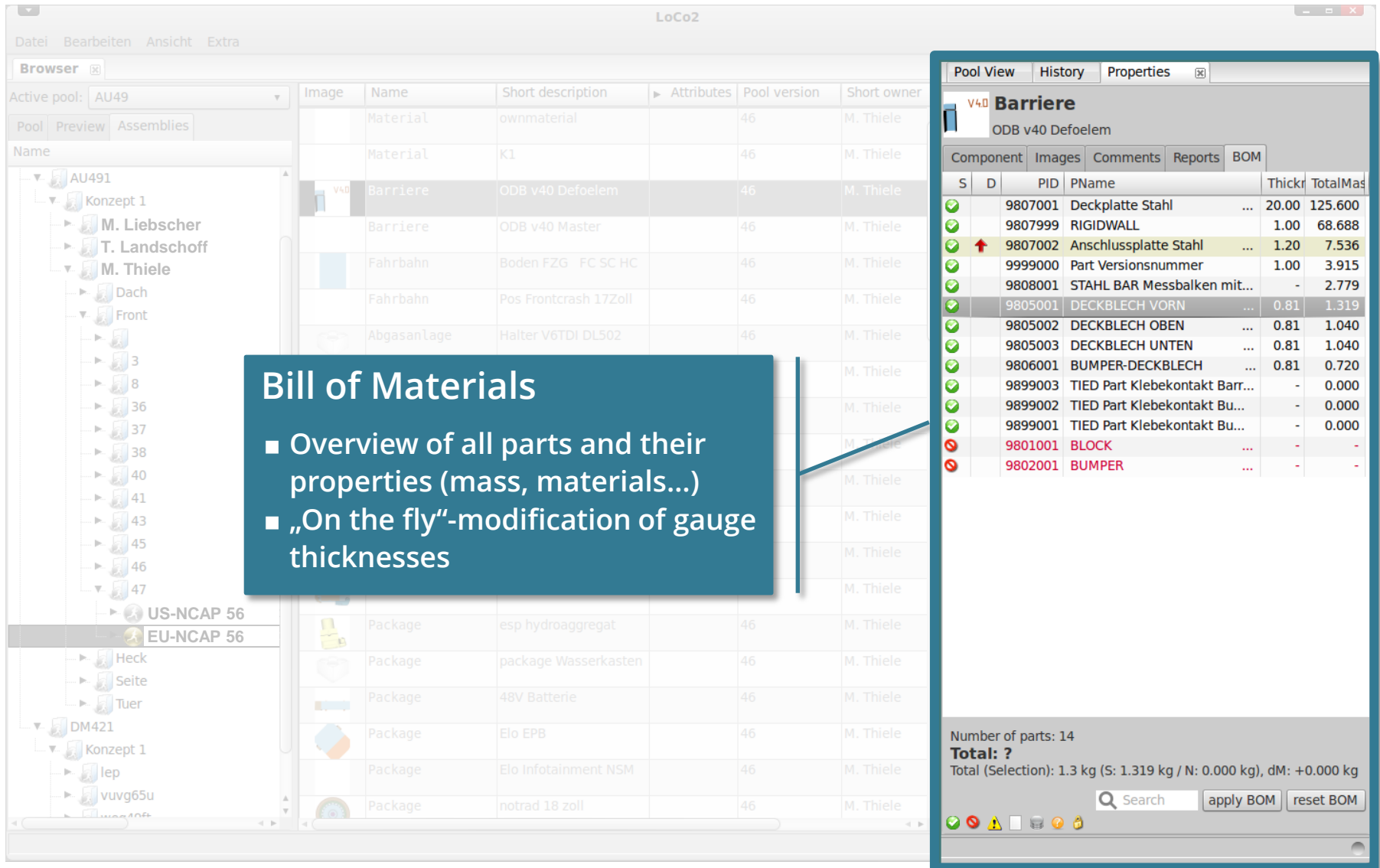
Image	Name	Short description	Attributes	Pool version	Short owner
	Frontend	--		46	M. Thiele
	Kühler	--		46	M. Thiele
	Scheinwerfer	scheinwerfer vo NSM		46	M. Thiele
	CMS	Stossfaenger vorne		46	M. Thiele
	CMS	ueberzug vo NSM		46	M. Thiele
	CMS	Stossfaenger hinten		46	M. Thiele
	Tuer	Rohbau inkl Schloss		46	M. Thiele
	Tuer	Tuerscheibe oben		46	M. Thiele
	Tuer	Rohbau inkl Schloss		46	M. Thiele
	Tuer	Tuerscheibe oben		46	M. Thiele
	Frontscheibe	--		46	M. Thiele
	Karosserie	EU Verst Saeule B		46	M. Thiele
	Karosserie	Heckscheibe		46	M. Thiele

**Quality Management**

- Check at each import
- User defined checks configurable
- Sanctionable on the basis of a quality index

**Include-Checks: Ergebnisse**

- ✗ Elementqualitaet
  - ✗ SHE:Quads < Minimum ANGLE [PAM-CRASH]
  - ✗ SHE:SKEW [NASTRAN]
  - ✗ SHE:Total Shell Elements OFF
    - zu viele schlechte Elemente: 16.342
  - ✓ SHE:Trias < Minimum ANGLE [PAM-CRASH]
  - ✓ SOL:Hexas > Maximum ANGLE [PAM-CRASH]
  - ✓ SOL:Pentas < Minimum ANGLE [PAM-CRASH]
  - ✗ SOL:Total Solids Elements OFF
    - zu viele schlechte Elemente: 100.000
  - ✓ SOL:WARP [PAM-CRASH]
- ✓ Nummerierungskonvention
  - ✓ CONTACT
  - ✓ ELEM
  - ✓ ELEM. BAR
  - ✓ ELEM. SHELL
  - ✓ ELEM. SOLID
  - ✓ ELEM. TETR4
  - ✓ FUNCTION
  - ✓ MATER
  - ✓ NODE
  - ✓ NODE\_ELEM
  - ✓ PART
  - ✓ RIGID BODY
  - ✓ TIED
- 💡 Gruppen - Definiert/Referenziert



The screenshot displays the LoCo software interface. On the left, a tree view shows the assembly structure under 'AU491'. The main area shows a table of parts. A blue callout box highlights the 'Bill of Materials' section, listing its key features:

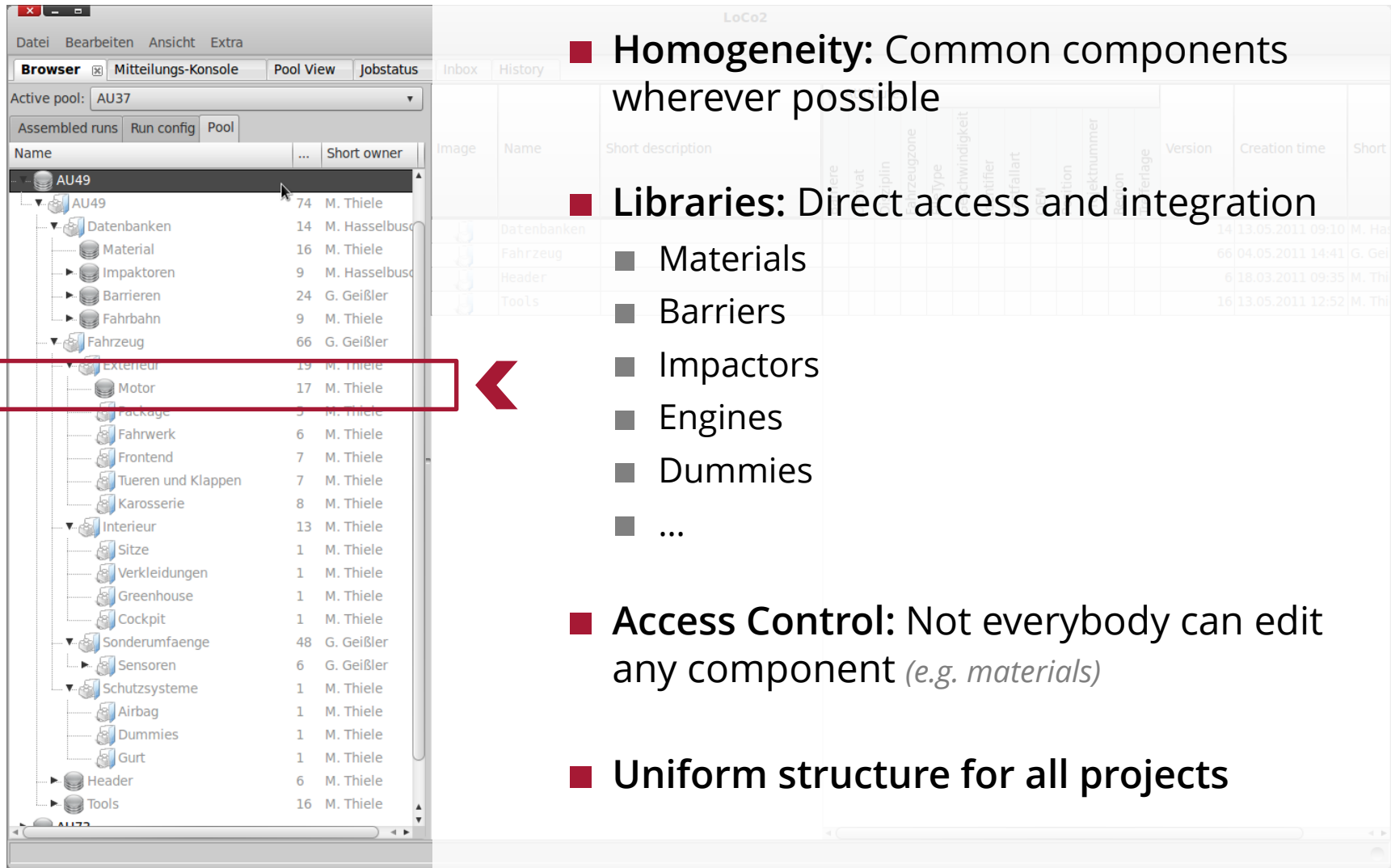
- Overview of all parts and their properties (mass, materials...)
- „On the fly“-modification of gauge thicknesses

The detailed view on the right shows the 'BOM' for component 'V40 Barriere'. The table below is a reproduction of the data shown in the software's BOM table.

S	D	PID	PName	Thickr	TotalMas
✓		9807001	Deckplatte Stahl	...	125.600
✓		9807999	RIGIDWALL	1.00	68.688
✓	↑	9807002	Anschlussplatte Stahl	1.20	7.536
✓		9999000	Part Versionsnummer	1.00	3.915
✓		9808001	STAHL BAR Messbalken mit...	-	2.779
✓		9805001	DECKBLECH VORN	0.81	1.319
✓		9805002	DECKBLECH OBEN	0.81	1.040
✓		9805003	DECKBLECH UNTEN	0.81	1.040
✓		9806001	BUMPER-DECKBLECH	0.81	0.720
✓		9899003	TIED Part Klebekontakt Barr...	-	0.000
✓		9899002	TIED Part Klebekontakt Bu...	-	0.000
✓		9899001	TIED Part Klebekontakt Bu...	-	0.000
✗		9801001	BLOCK	-	-
✗		9802001	BUMPER	-	-

Summary statistics from the BOM view:

- Number of parts: 14
- Total: ?
- Total (Selection): 1.3 kg (S: 1.319 kg / N: 0.000 kg), dM: +0.000 kg



The screenshot shows the LoCo2 software interface. On the left, a tree view displays a hierarchy of components under 'AU49'. The 'Motor' component is highlighted with a red box. On the right, a table lists various components with columns for Name, Short description, and others. A red arrow points from the 'Motor' component in the tree to the 'Libraries' list.

Name	Short description	Version	Creation time	Short
Datenbanken		14	13.05.2011 09:10	M. Ha
Fahrzeug		66	04.05.2011 14:41	G. Gei
Header		6	18.03.2011 09:35	M. Thi
Tools		16	13.05.2011 12:52	M. Thi

- **Homogeneity:** Common components wherever possible
- **Libraries:** Direct access and integration
  - Materials
  - Barriers
  - Impactors
  - Engines
  - Dummies
  - ...
- **Access Control:** Not everybody can edit any component (*e.g. materials*)
- **Uniform structure for all projects**

## ■ Job Submit

*Instant start of jobs on the HPC-cluster*

- Models are assembled directly in the datacenter at the HPC-cluster
- A minimum of data has to be transferred
- Jobs start instantly

## ■ Job Control

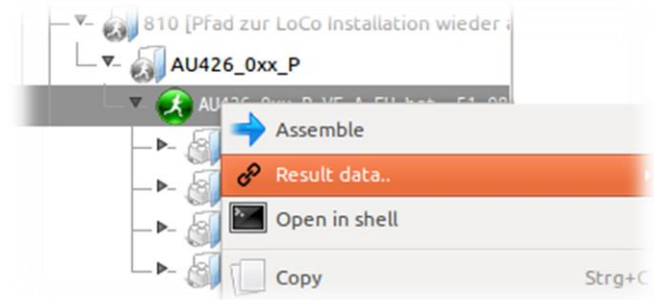
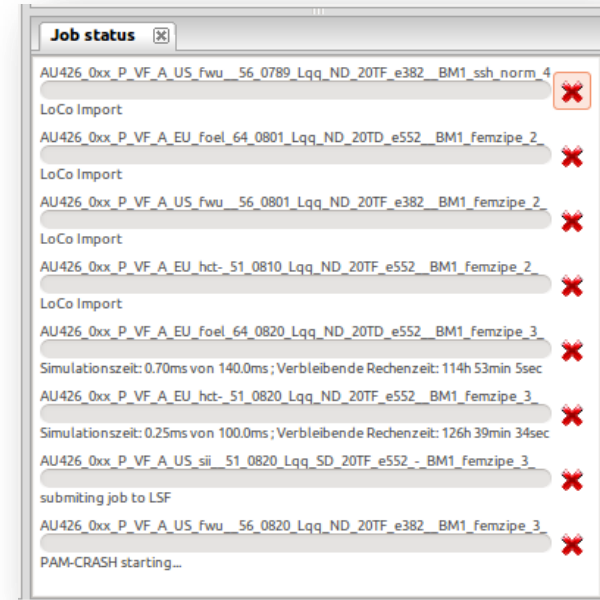
*Monitoring job progress on the HPC-cluster*

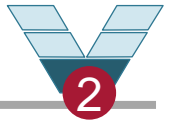
- Continuous feedback on job progress
- Stopping of jobs

## ■ Result Access

*Retrieving and accessing result data*

- Automatic download of result data
- Access to result data of other users
- Direct integration with post processors





- VAVID: Data Deduplication
  - Reduktion der Datenmengen um ca. Faktor 6-8
  - Vollständig für Datenablage und Transfer implementiert und im Einsatz
- Löschrregeln
  - Kunden können Regeln definieren ab wann Daten im System gelöscht werden sollen
  - z.B.: „Lösche alle Daten die mehr als 5 Jahre nicht mehr verwendet worden sind“
- StagedTree Navigation
  - Grundlegende Änderung an der Bediensystematik
  - Intuitivere, konsistentere Bedienung
  - Weniger Klicks nötig in typischen Anwendungsfällen

**Multi Stage Assembly**  
Result List **Live Mode** LPACK  
**Multi RunConfig** Parameter Compare



# Agenda

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## ■ Einführung LoCo

- Einordnung in den Gesamtprozess
- Features
- Gemeinsames arbeiten über Standorte hinweg
- Integration CAD, CAE, ...
- LiveDemo

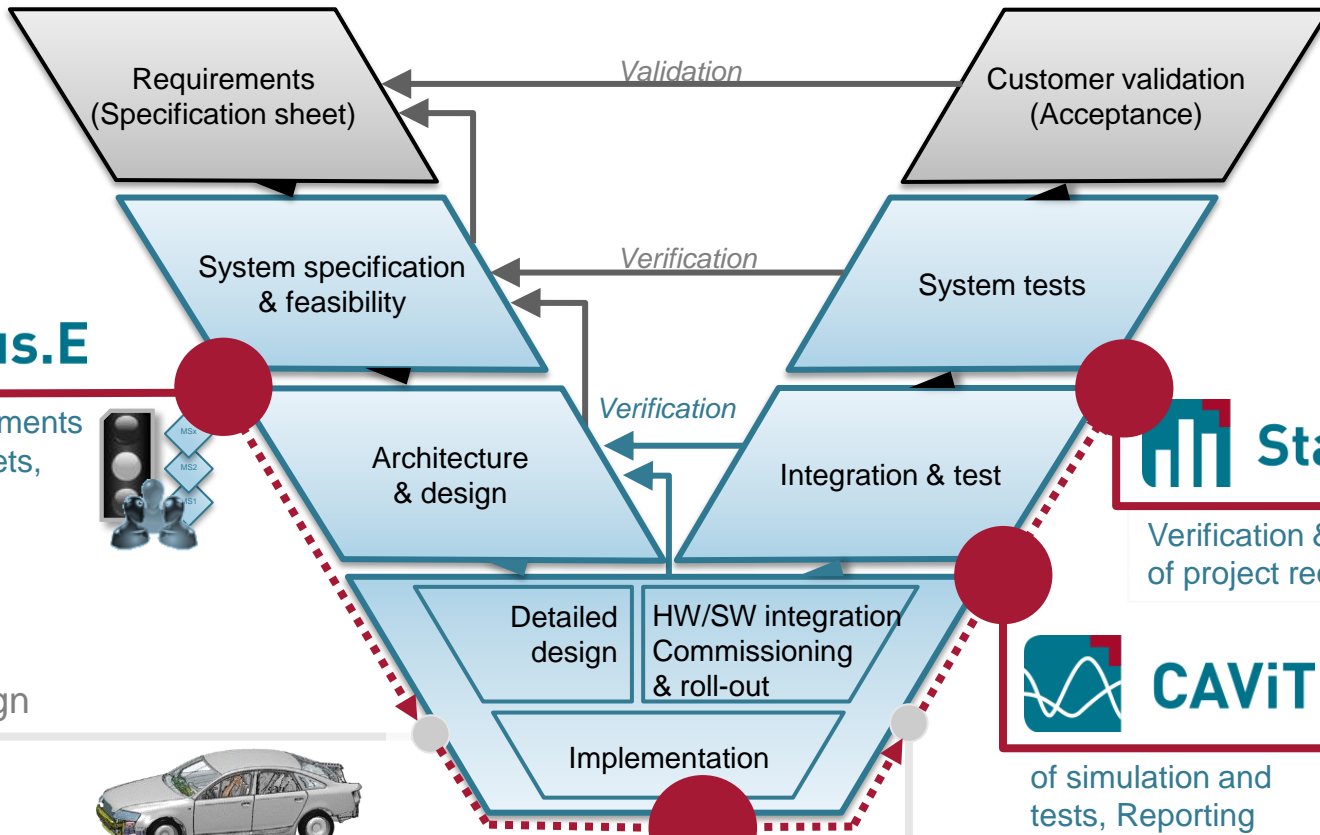
## ■ Weiterentwicklung SCALE Produkte

- Entwicklung in Richtung eines integrierten Systems (CAx-Hub)
- RichClient vs. WebApp

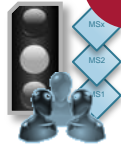
## ■ Ausblick und aktueller Stand LoCoX - Entwicklung

- GUI Konzepte
- LoCoX Workshop
- Live Demo

# Systems Engineering Process



Setup of requirements and project targets, milestones and responsibilities



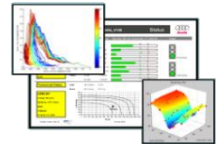
Verification & monitoring of project requirements



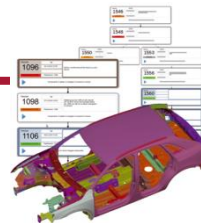
Detailed design  
CAD / DMU



of simulation and tests, Reporting

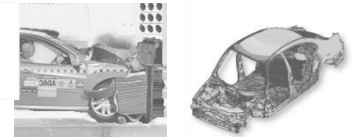


Setup of simulation models

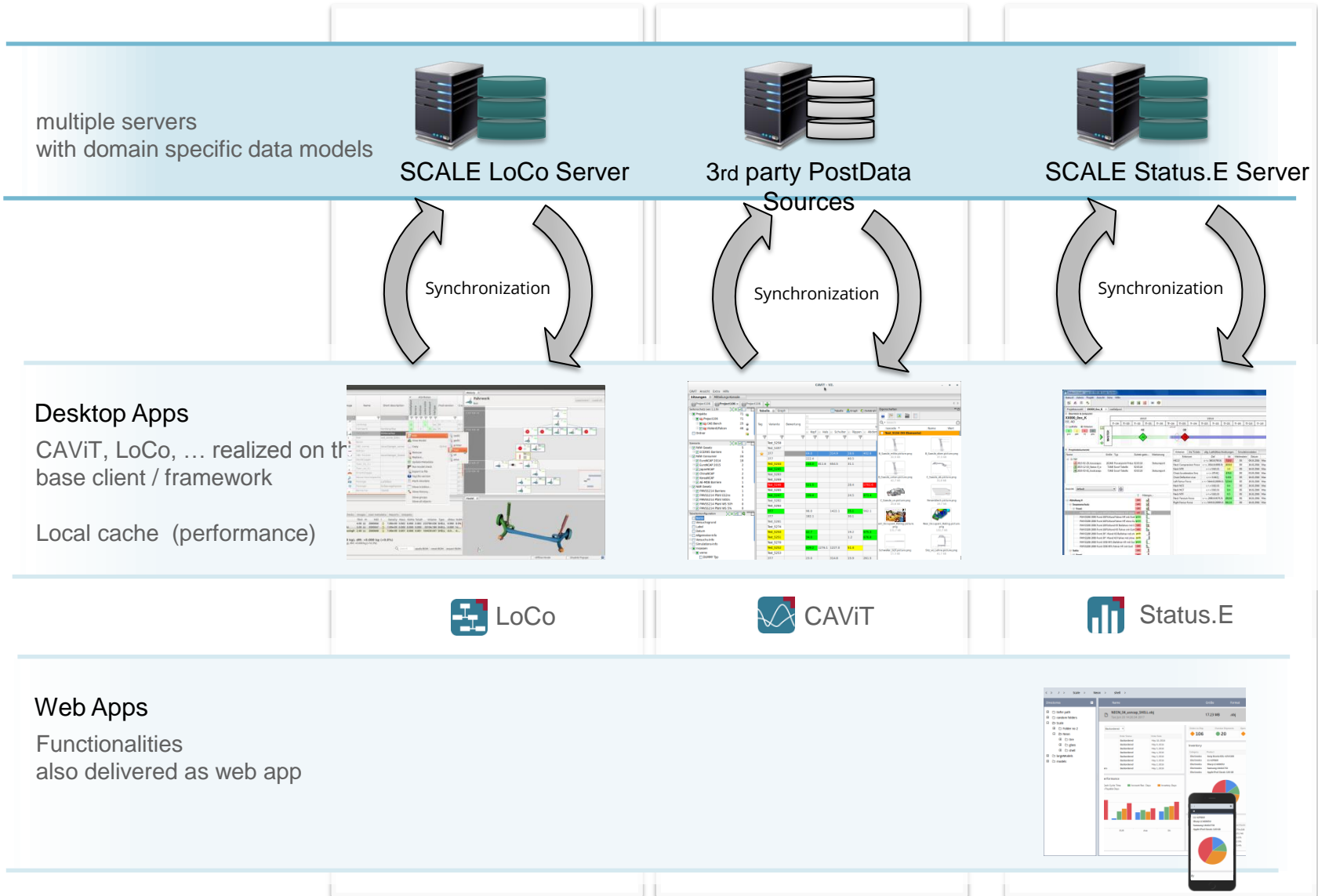


Solving / Testing

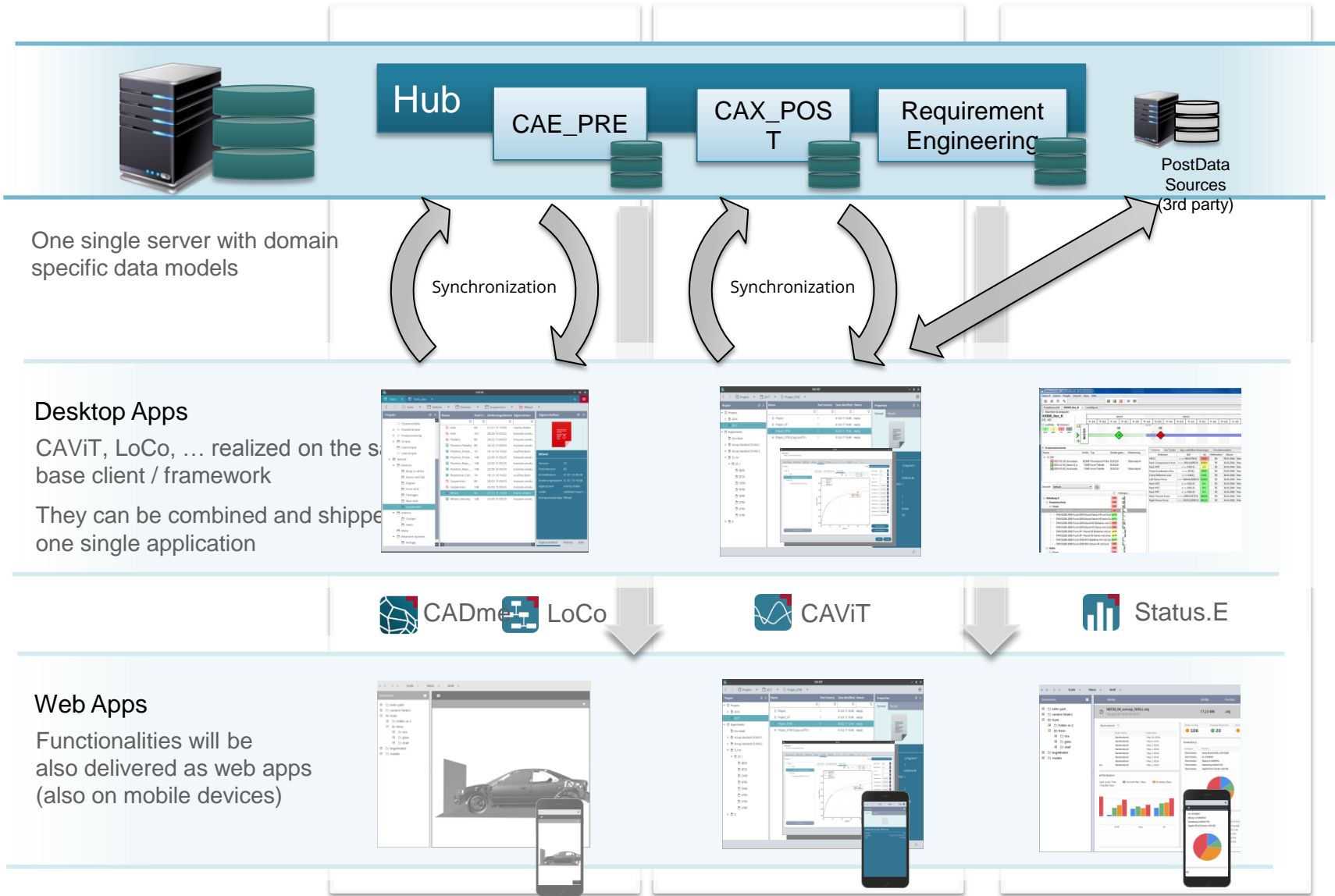
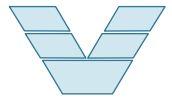
Perform simulation & test



# SCALE Products Today



# Tomorrow: SCALE CAX-Hub



One single server with domain specific data models

## Desktop Apps

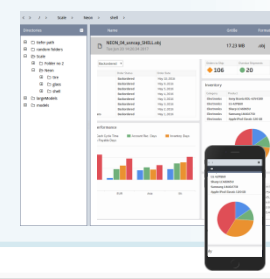
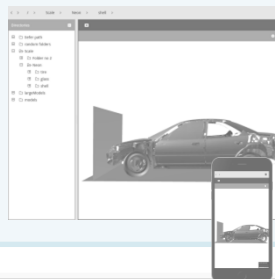
CAViT, LoCo, ... realized on the s base client / framework

They can be combined and shipped one single application

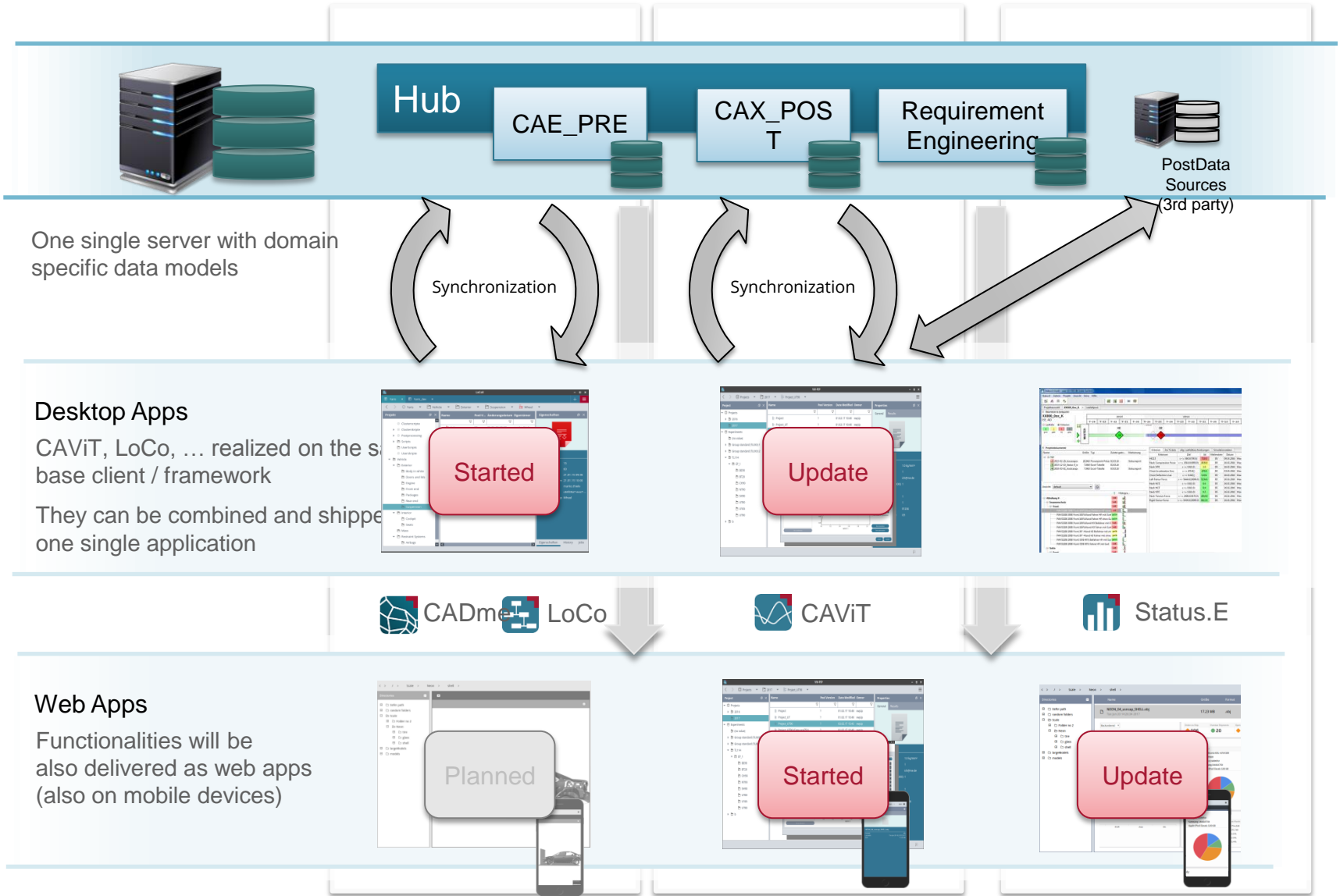


## Web Apps

Functionalities will be also delivered as web apps (also on mobile devices)



# Tomorrow: SCALE CAX-Hub

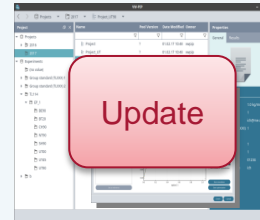
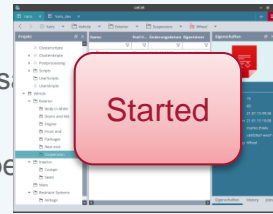


One single server with domain specific data models

## Desktop Apps

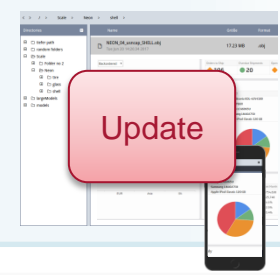
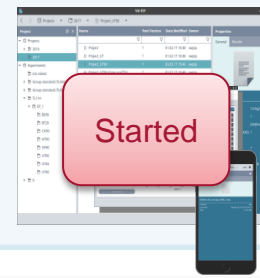
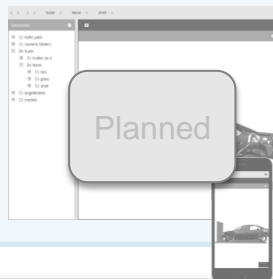
CAViT, LoCo, ... realized on the same base client / framework

They can be combined and shipped as one single application



## Web Apps

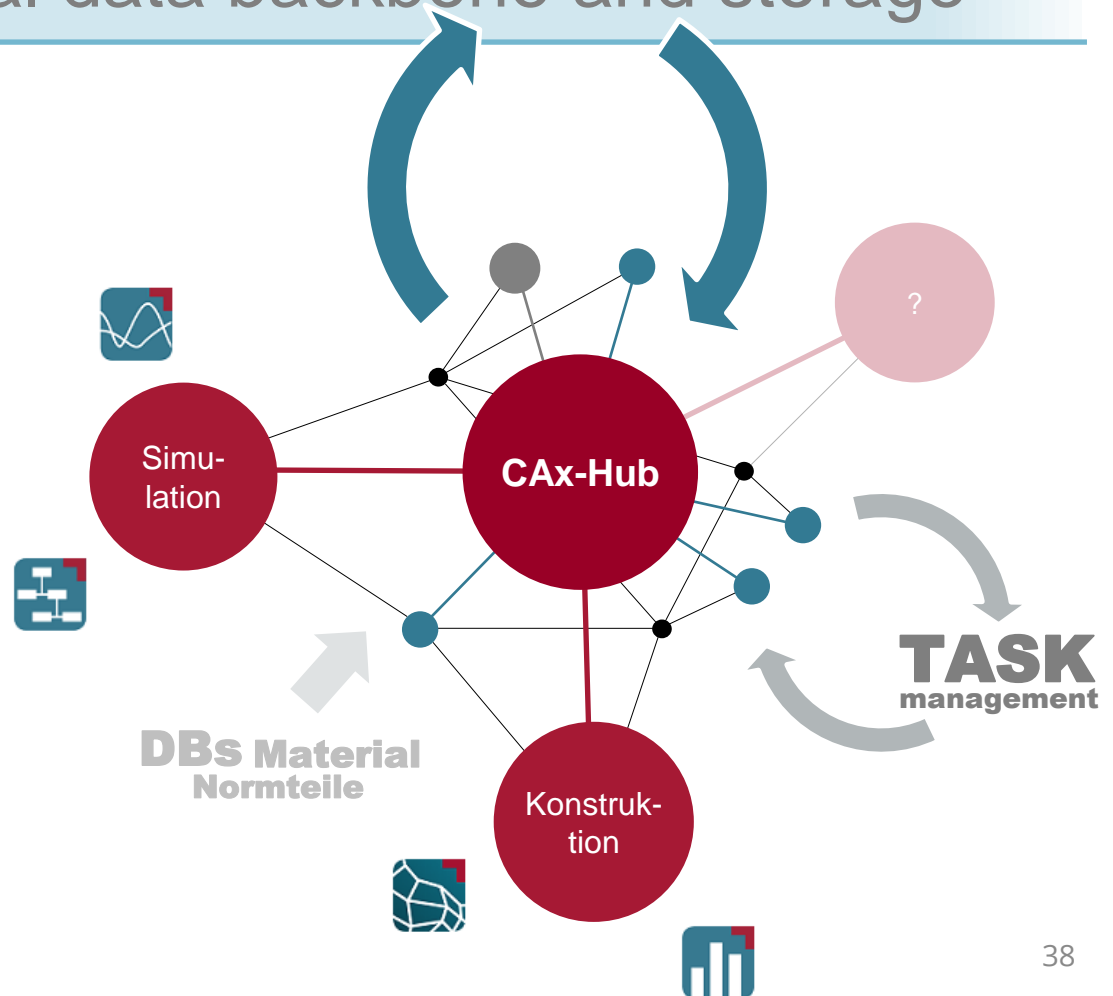
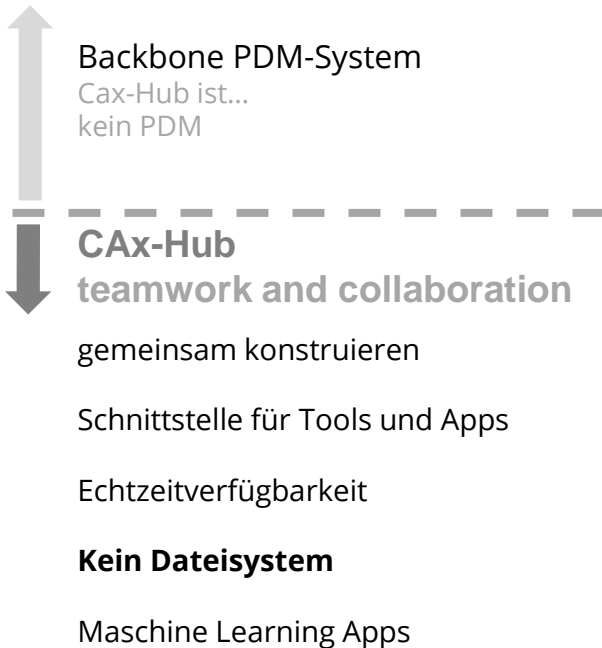
Functionalities will be also delivered as web apps (also on mobile devices)





## PDM-System

central data backbone and storage



# Agenda

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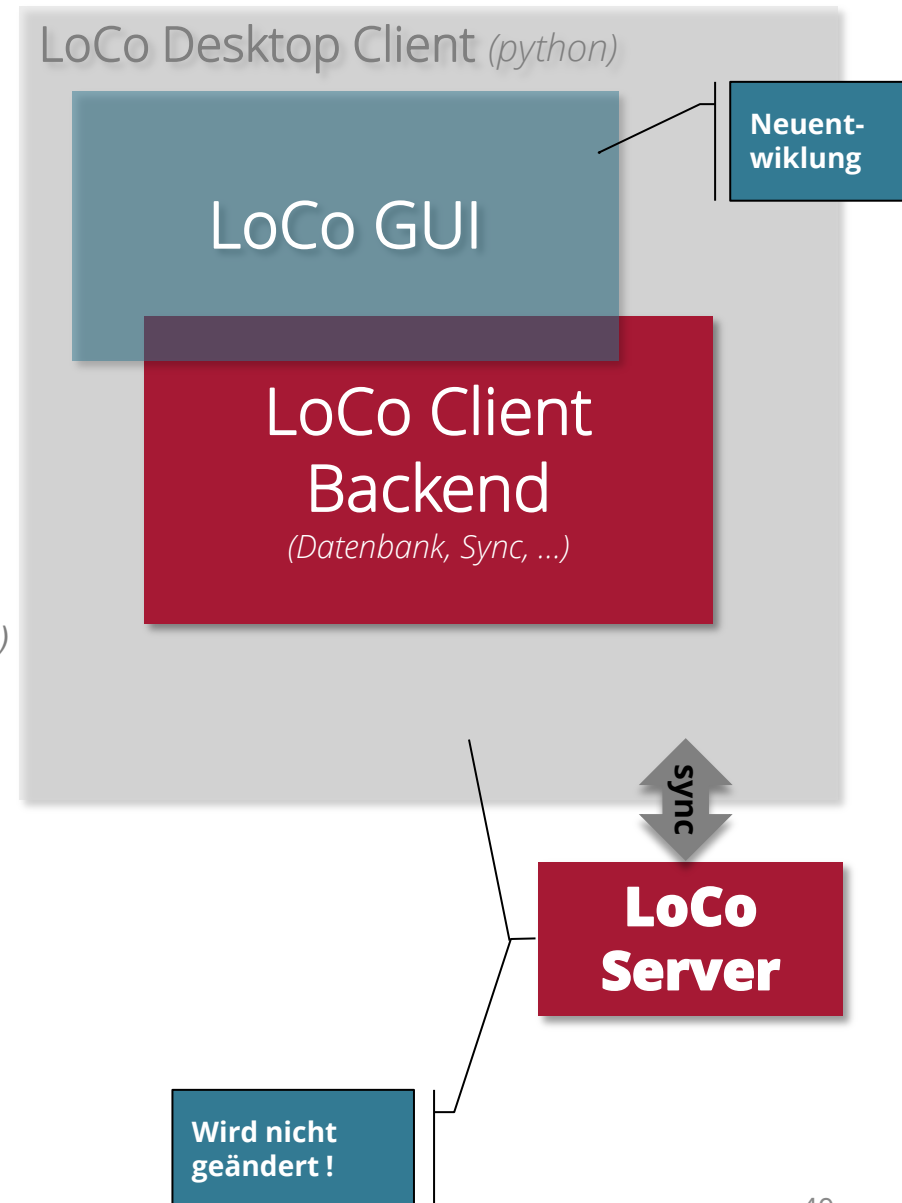
- GUI Konzepte
- LoCoX Workshop
- Live Demo

## ■ Gründe zur Neuentwicklung

- Veraltete Softwarekomponenten  
*(Python 2.7 nur noch bis 2020, wxWidgets, ...)*
- Optimierung der Bedienparadigmen  
*(mehr Konsistenz, weniger Redundanz, ...)*
- Integration aller SCALE Produkte  
*(Einheitliches Datenmodell, WebApps, ...)*

## ■ Kompatibilität zu LoCo2

- Interne stärkere Kapselung zwischen GUI und Backend  
*(Kapselung in separate Klassen)*
- Neuentwicklung von LoCoX GUI
- Basis von LoCo2 und LoCoX GUI bleibt identisch  
*(Anwender kann GUI bel. wechseln)*





# Entwicklung LoCoX - Konzept



Pool und Tree werden nur über "Breadcrumbs" angewählt

Braucht man einen eigenen Stage für Pool und Tree?

Kompletter Pfad der Selektion über "Breadcrumbs"

Gruppierungs-ebenen im PoolVersion Stage?

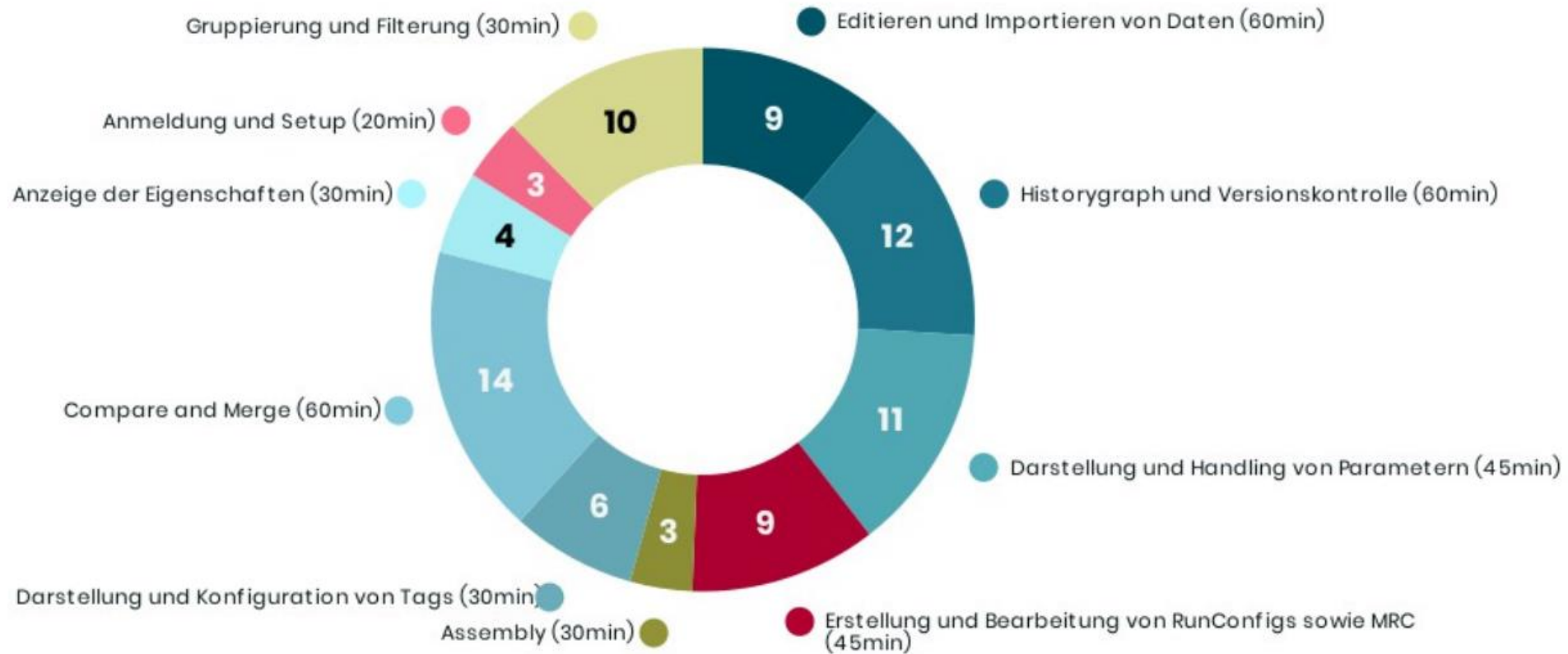
PoolVersion kann über "Breadcrumbs" oder PoolVersion Stage angewählt

RunConfig und Gruppierungsebenen der RunConfigs werden über den RunConfig Stage oder die "Breadcrumbs" selektiert

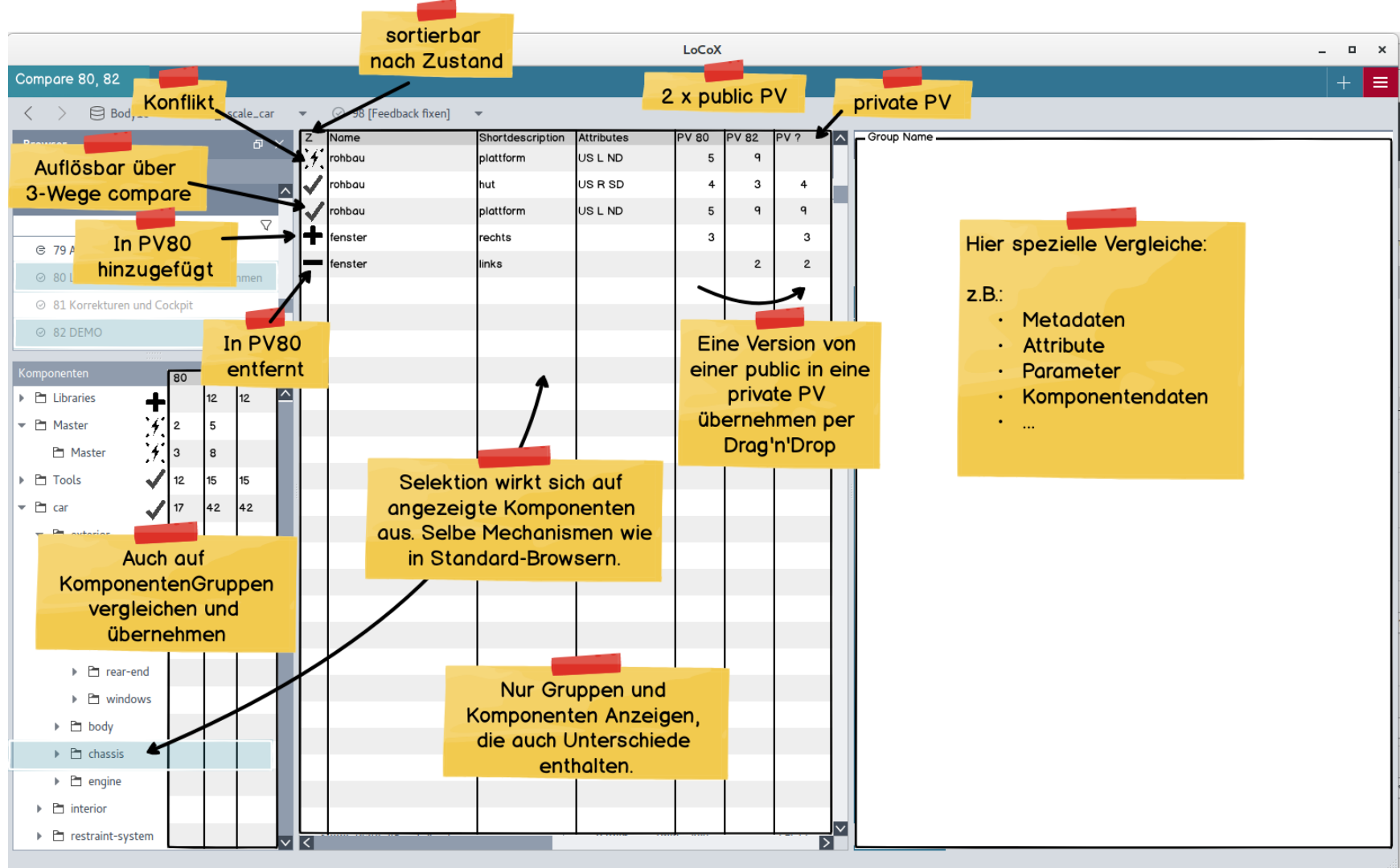
Was ist die richtige Reihenfolge? Konsistent mit "Breadcrumbs"!

KomponentenGruppen und Komponenten werden sowohl in den "Breadcrumbs" als auch in der Komponenten Stage abgebildet und können dort selektiert werden.

Name	Kurzbeschreibung	Attribute	Version
		Project Ve.. Disziplin A... Ba.. Ha.. Re.. Im.. Regulation Im..	
Air F			8
rear			11
front			18
Batt			8
RL		rhd EU	10
US_BIW		US d US	14
LL		d EU	2
front		EU	10
front		US	5
rear		US	1
rear		EU	9
front_left			24
rear_left			
Engine			
Fuse Box			
Hatch			
Hood			
Pedalry			
Position Pedalry			



## ■ Nahtlose Integration mit Standard Bedienelementen



**sortierbar nach Zustand**

**Konflikt**

**Auflösbar über 3-Wege compare**

**In PV80 hinzugefügt**

**In PV80 entfernt**

**2 x public PV**

**private PV**

Name	Shortdescription	Attributes	PV 80	PV 82	PV ?
rohbau	plattform	US L ND	5	9	
rohbau	hut	US R SD	4	3	4
rohbau	plattform	US L ND	5	9	9
fenster	rechts		3		3
fenster	links			2	2

**Hier spezielle Vergleiche:**

**z.B.:**

- Metadaten
- Attribute
- Parameter
- Komponentendaten
- ...

**Eine Version von einer public in eine private PV übernehmen per Drag'n'Drop**

**Selektion wirkt sich auf angezeigte Komponenten aus. Selbe Mechanismen wie in Standard-Browsern.**

**Nur Gruppen und Komponenten Anzeigen, die auch Unterschiede enthalten.**

**Auch auf KomponentenGruppen vergleichen und übernehmen**

# Gleisgraph als Ergänzung zum Historygraphen



- In jedem Versionsselektor verfügbar
- Bezug der Versionen jederzeit sofort sichtbar

Gleisgraph ermöglicht Darstellung der Vorgängerbeziehungen im VersionSelector

Nur Bahnen aktuell sichtbarer Versionen werden dargestellt. Graph wird nach dem scrollen angepasst.

Sortierung kann angepasst werden

Schnellfilter auf aktuellen Inhalt des VersionSelectors

VersionSelector ist ein Widget welches an allen Stellen im LOCOX verwendet wird, wo Versionen ausgewählt werden müssen.  
z.B. auch bei "Jump2Version"

# Fokus regulärer Historygraph



- Mehr Filtermöglichkeiten
- Einstellbare Gruppierungen / Rankings
- Schnellfilter, Suche
- Plugins für spezielle Anforderungen

The screenshot shows the YARIS History graph interface. At the top, there are filter controls for 'General Quick Filter' (Username, Tag, Tree: YARIS dev, Date, Status, Apply) and 'Personal Quick Filter' (Frontcrash, Sidecrash, My PoolVersions, Apply). A 'Rankings' section on the right includes 'Calendar week', 'Impact location', and 'Apply' buttons, along with 'Pin View', 'Load more', 'Load all', and 'Export...' options. Below these are 'Run MPL Plugin' and 'Run Heatmap Plugin' buttons. The main area is a grid with columns for 'Front Crash', 'Side Crash', and 'Rear Crash', and rows for 'KW3', 'KW4', and 'KW5'. Each cell contains a node with a number (e.g., 1002, 1010, 2481, 3099, 3382, 3367) and 'Update component x'. Nodes are connected by solid arrows and dashed lines. A yellow box on the right explains that ranking can be defined and switched between vertical and horizontal. Another yellow box explains that horizontal ranking allows for quick assignment of pool versions to load cases. A third yellow box at the bottom explains that pool versions used in multiple columns are connected by dashed lines.

Ranking kann wie Schnellfilter definiert und über Rankingleiste jeweils für vertikales oder horizontales Ranking ein- oder ausgeschaltet werden.

Horizontales Ranking ermöglicht z.B. die schnelle Zuordnung von PoolVersionen zu Lastfällen, die mit diesen PoolVersionen bewertet worden sind.

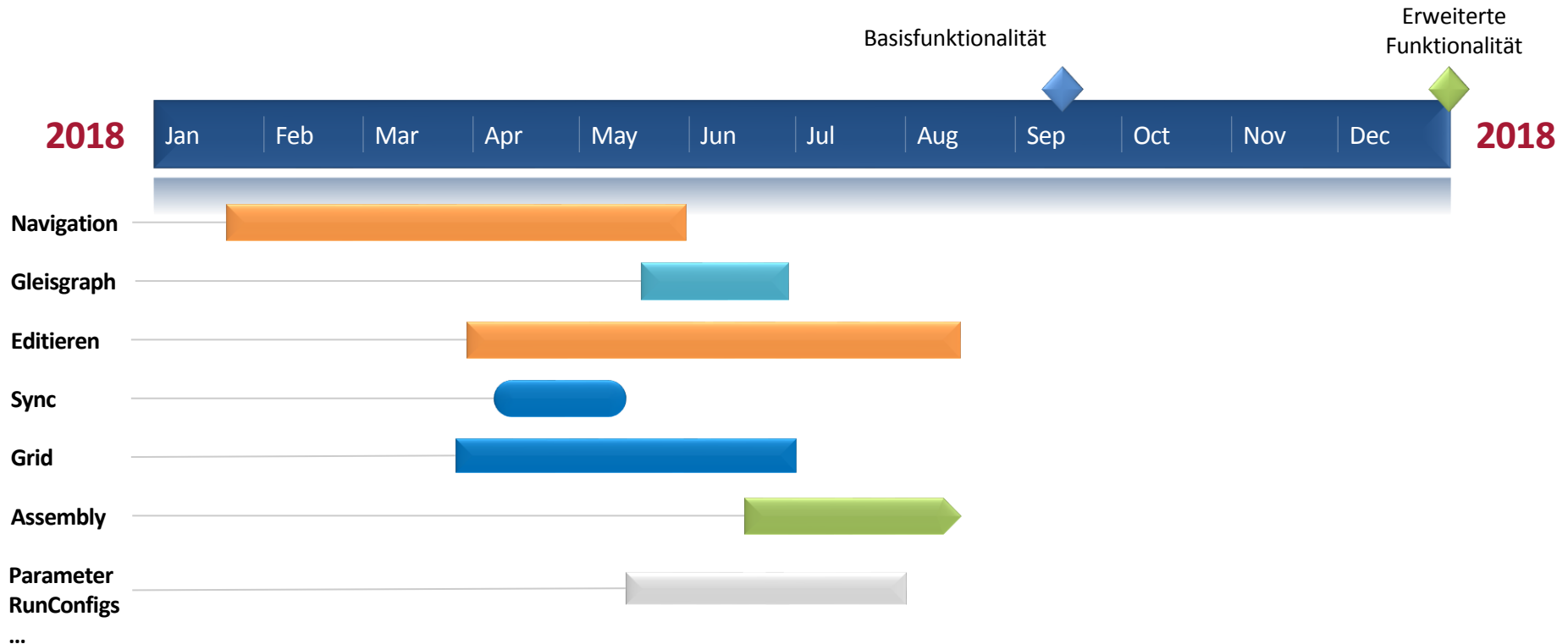
Ranking kann anhand von Attributen / Attributkombinationen erfolgen. Ähnlich der Gruppierungsebenen im RunConfig Stage.

PoolVersionen, welche in mehrere Spalten einsortiert werden, werden durch gestrichelte Linien verbunden.

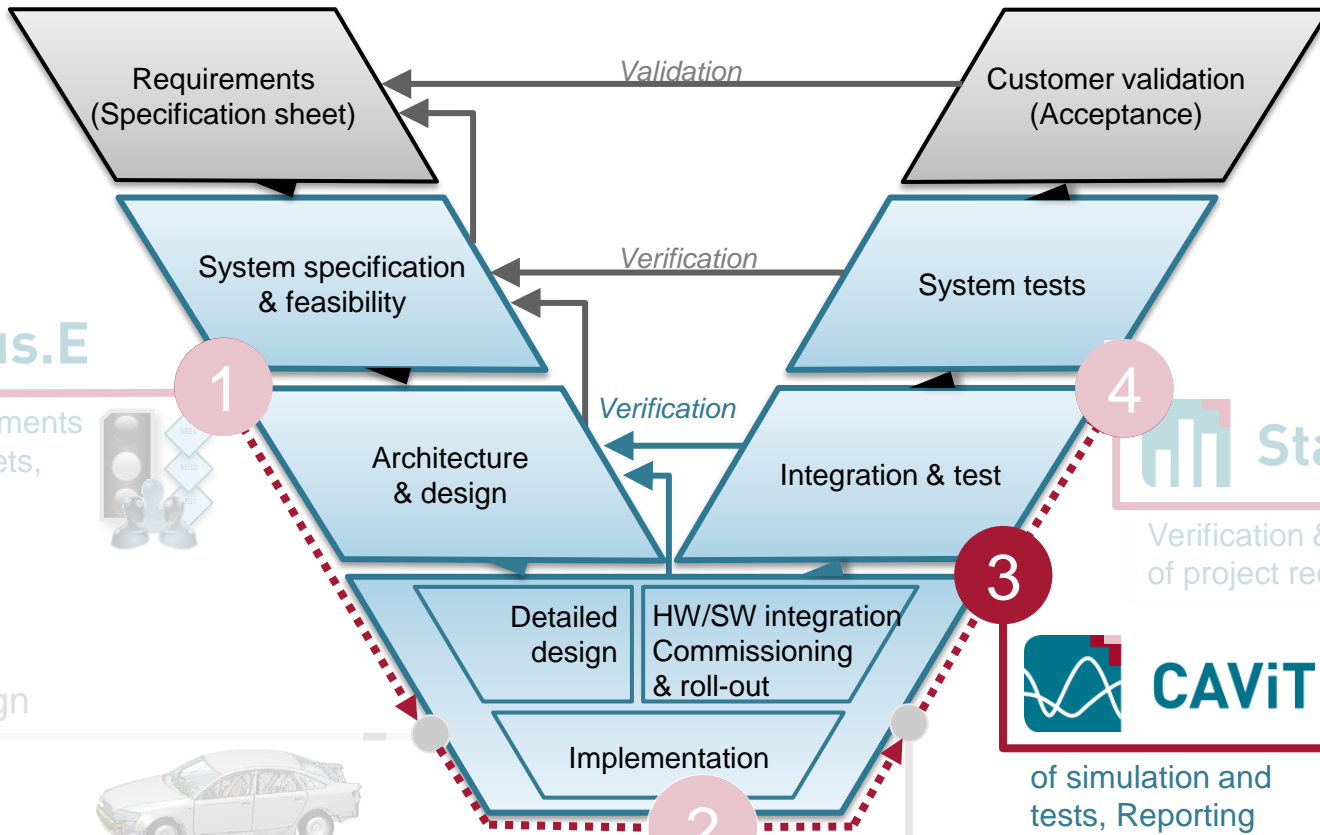
# Entwicklung LoCoX - Zeitplan



- Entwicklung von LoCoX parallel zu LoCo2
- Keine Neuimplementierung mehr von GUI Features in LoCo2
- LoCoX Versionen werden parallel zu LoCo2 Versionen released
- LoCoX Versionen sind im Backend vollständig kompatibel mit LoCo2
- Wechsel zwischen LoCoX und LoCo2 problemlos möglich



# Systems Engineering Process



Setup of requirements and project targets, milestones and responsibilities



Verification & monitoring of project requirements

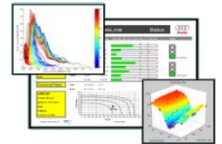


Detailed design

CAD / DMU



of simulation and tests, Reporting

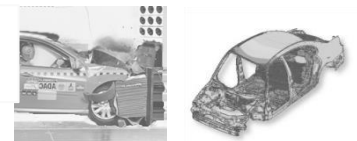


Setup of simulation models and test prototypes



Solving / Testing

Perform simulation & test



so long, and thanks for all the fish...

