Enabling a credible simulation process

SSP Traceability

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presented by

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Status in the usage of simulation

- We do a lot of simulation,
- We have great tools,
- We have great modeling languages
- We have a lot of experience

→ **We trust our simulations**

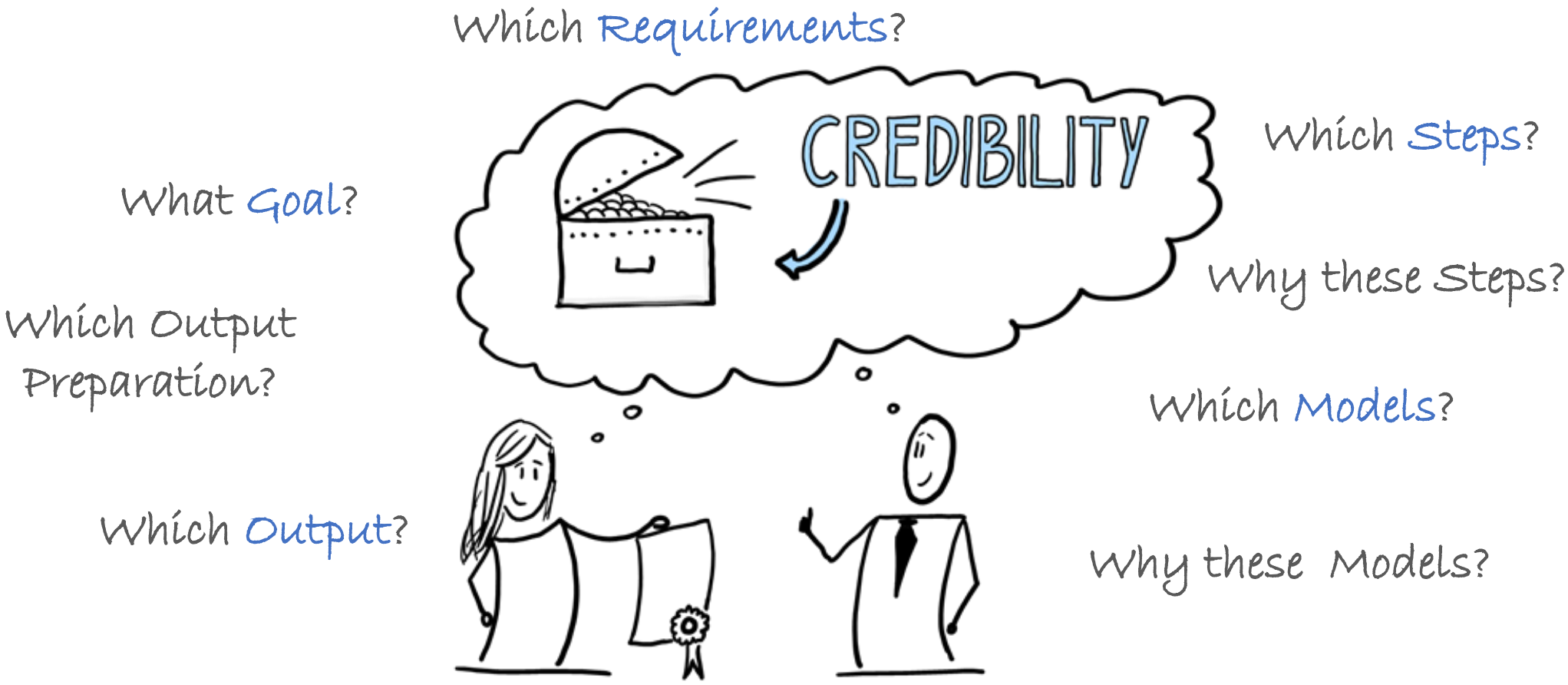
But...

..do others trust our simulations?

- Decisions are increasingly based on the results of simulations
- Decisions have far-reaching consequences

→ **How do we make it possible for someone to make a decision with clear conscience based on simulation results?**

By presenting simulation results in a credible way.

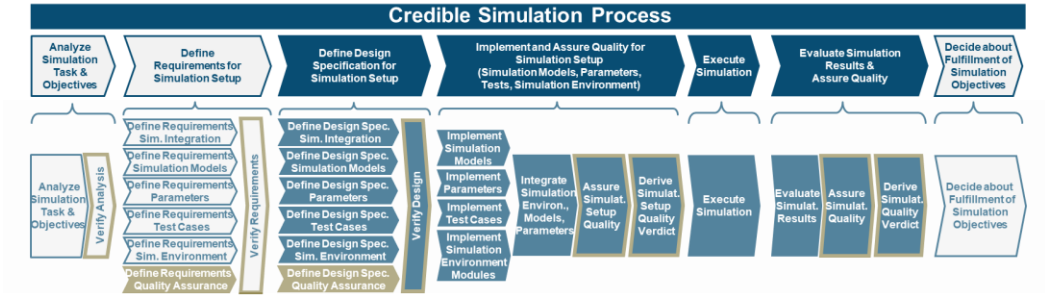


What is necessary to easily and reliably answer these questions?

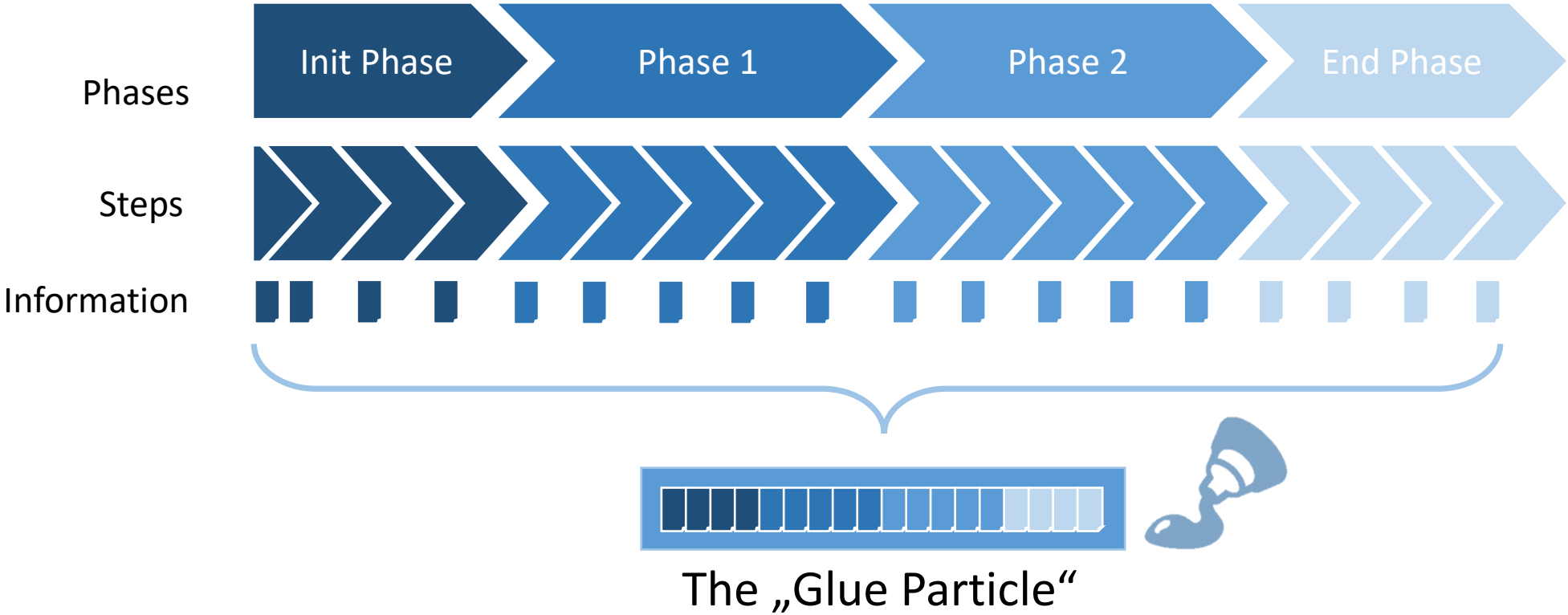
1st: A common understanding of the process - the Credible Simulation Process (CSP)

Phases and Steps define a common understanding of the process which can be individually performed

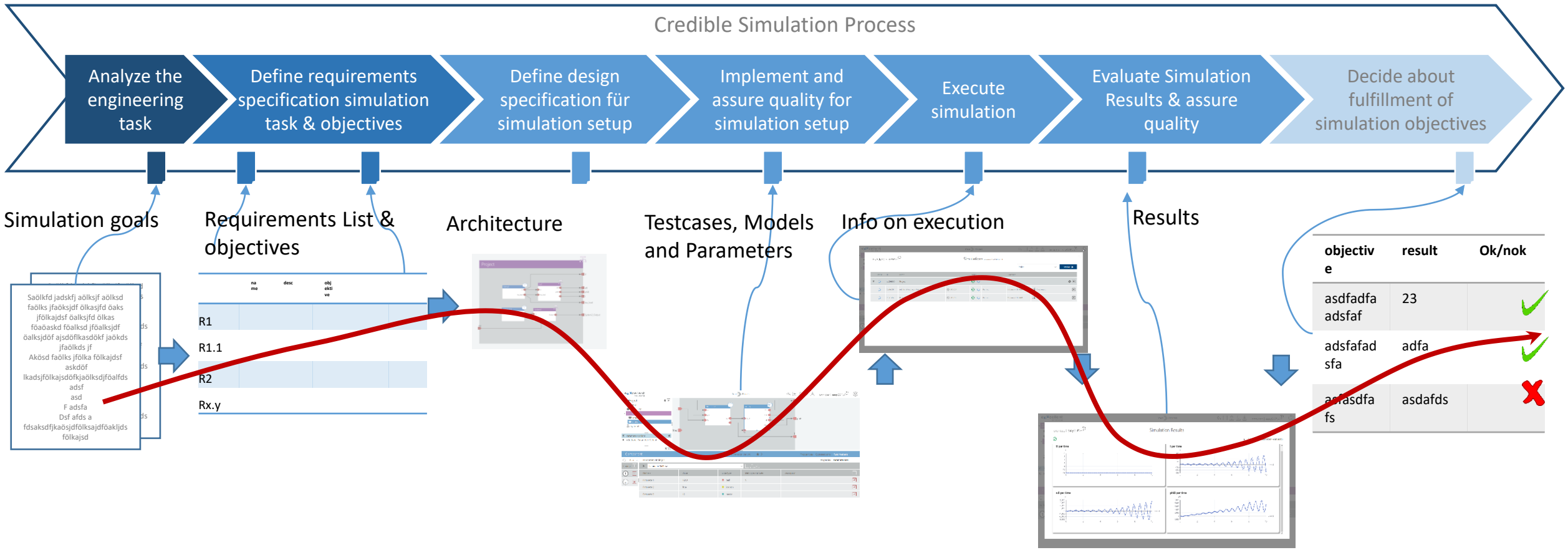
An example for a Credible Simulation Process was defined by the prostep smart Systems Engineering project and validated by SET Level project



2nd: Traceability as basis for Credible because of information in a uniform structure on each step, glued together to a gapless information chain



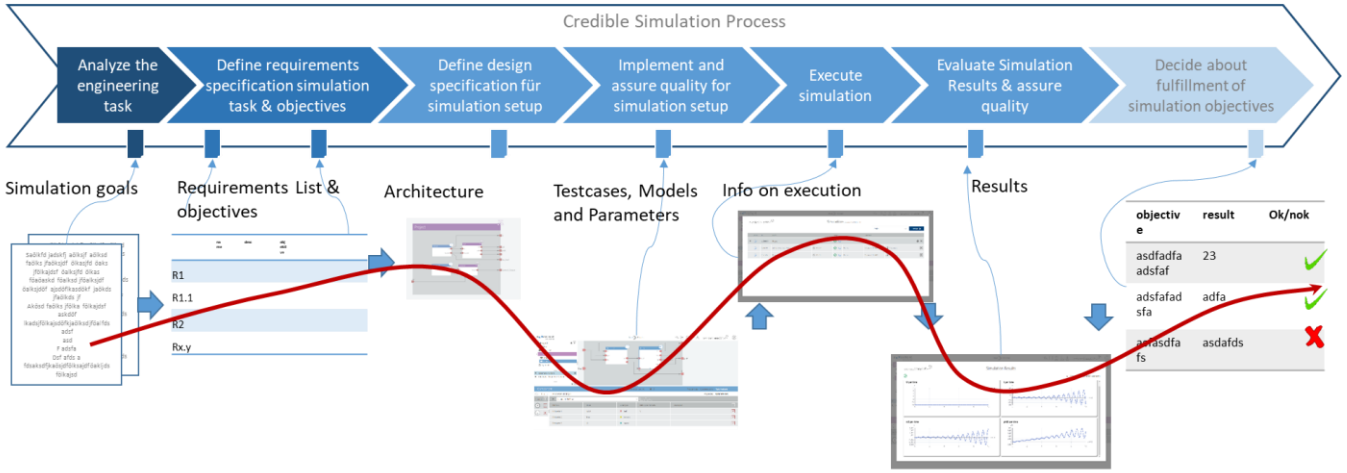
Along the process, we collect all necessary information in glue particles for credibility



SSP Traceability Specification

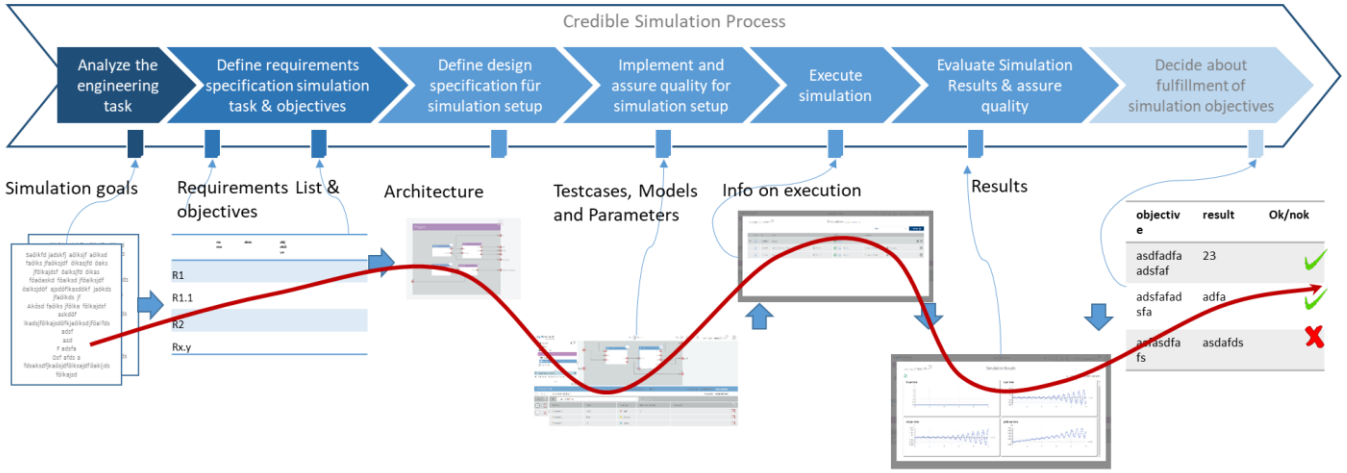
- Based on SSP Formats and Principles

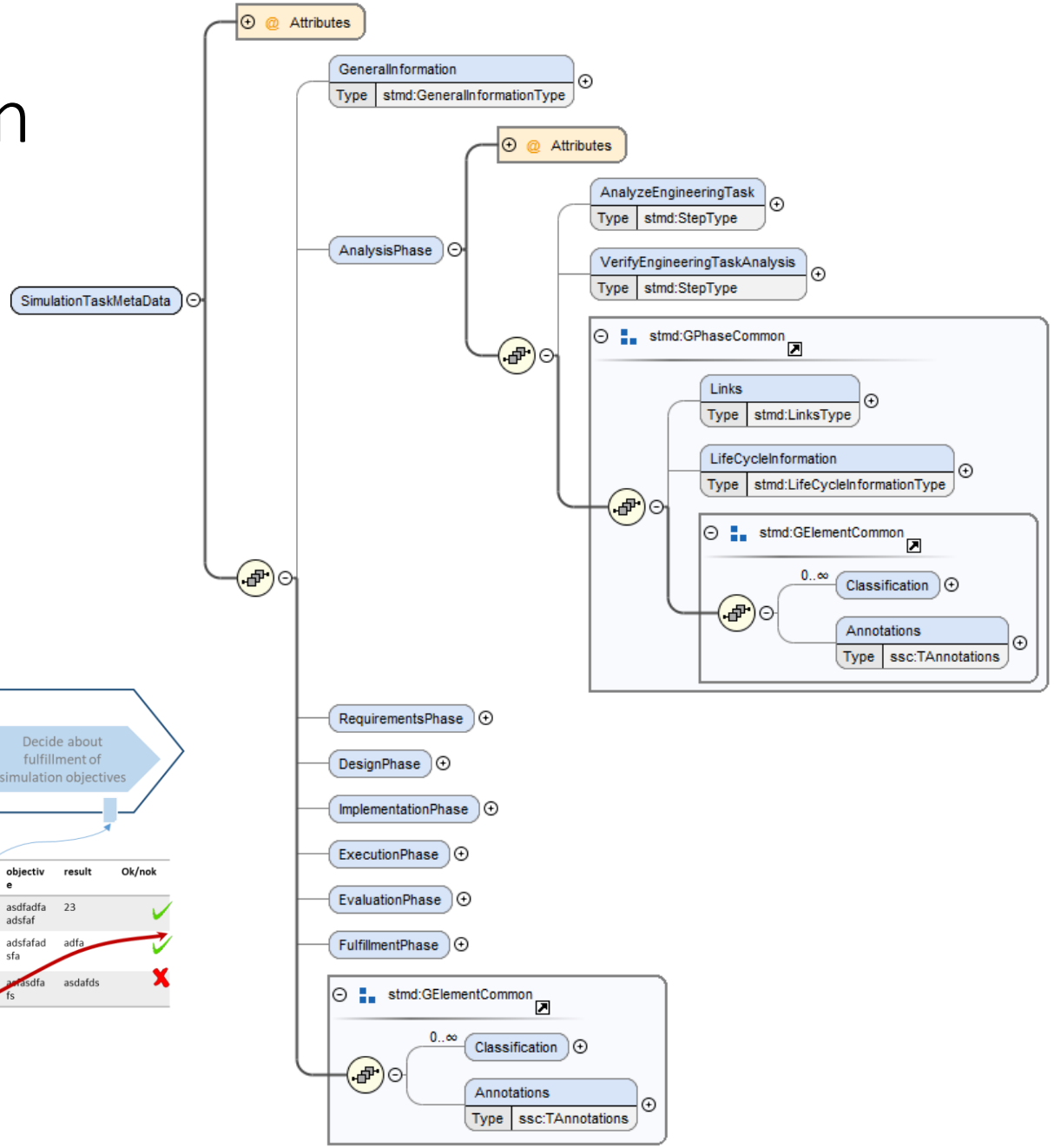
- SSP ZIP Packaging
- (Relative) URI References to Resources
- Multi-Format Support for Resources
- Common XML Schema Components
- Extensibility via Annotations
- Can devolve into pure SSP for tools without support of SSP Traceability



SSP Traceability Specification

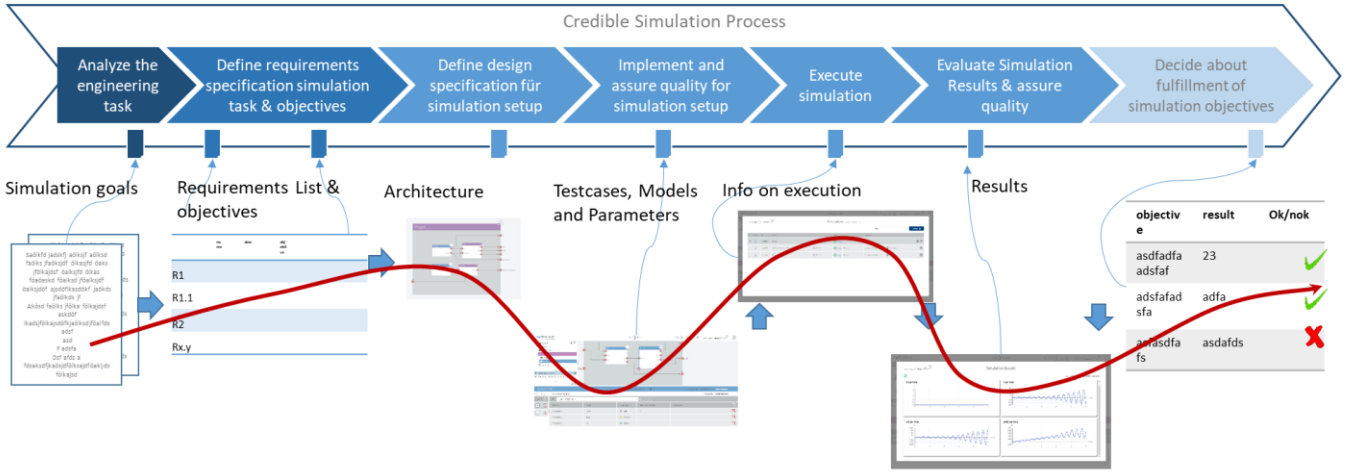
- Based on SSP Formats and Principles
- Generic Approach of Phases and Steps
- Instantiated for CSP as STMD Format

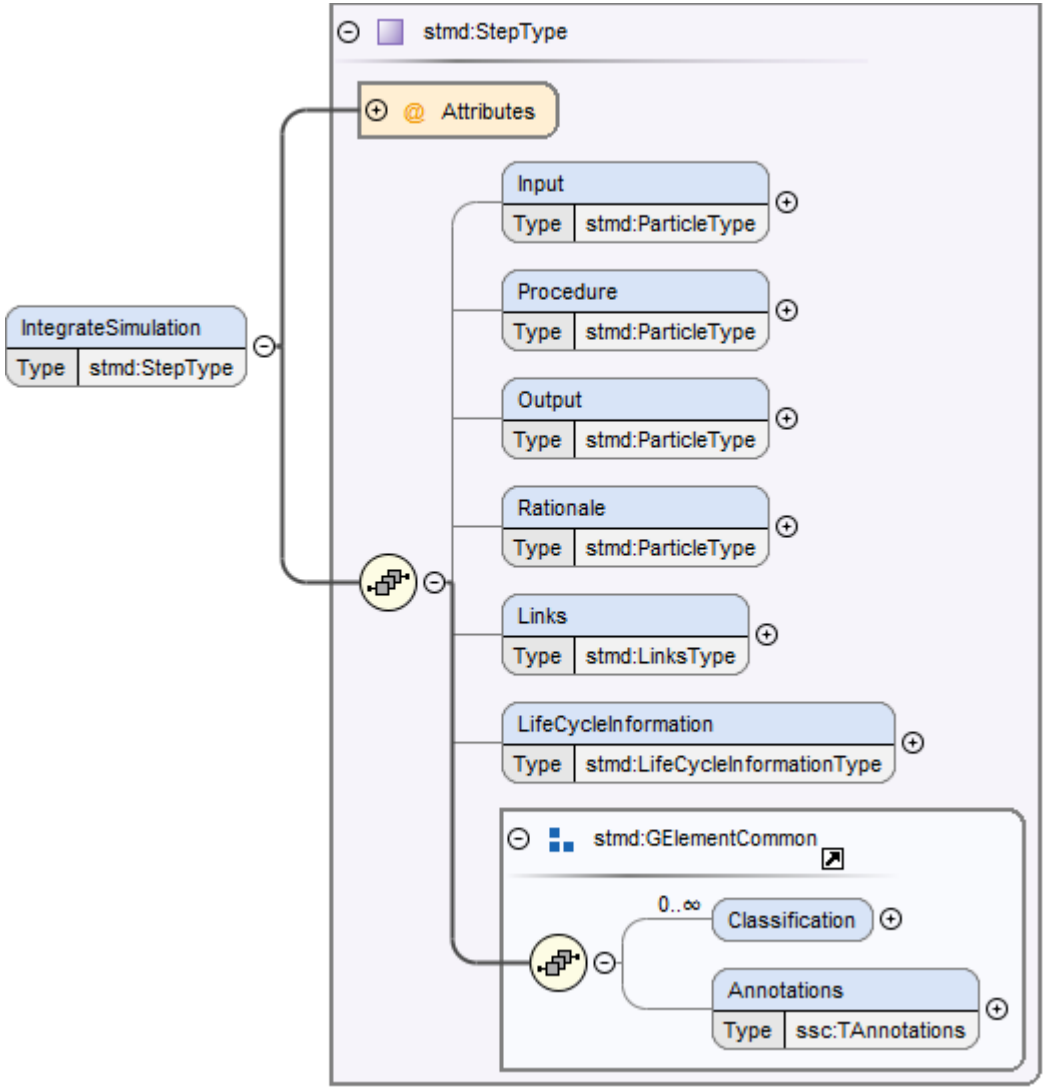


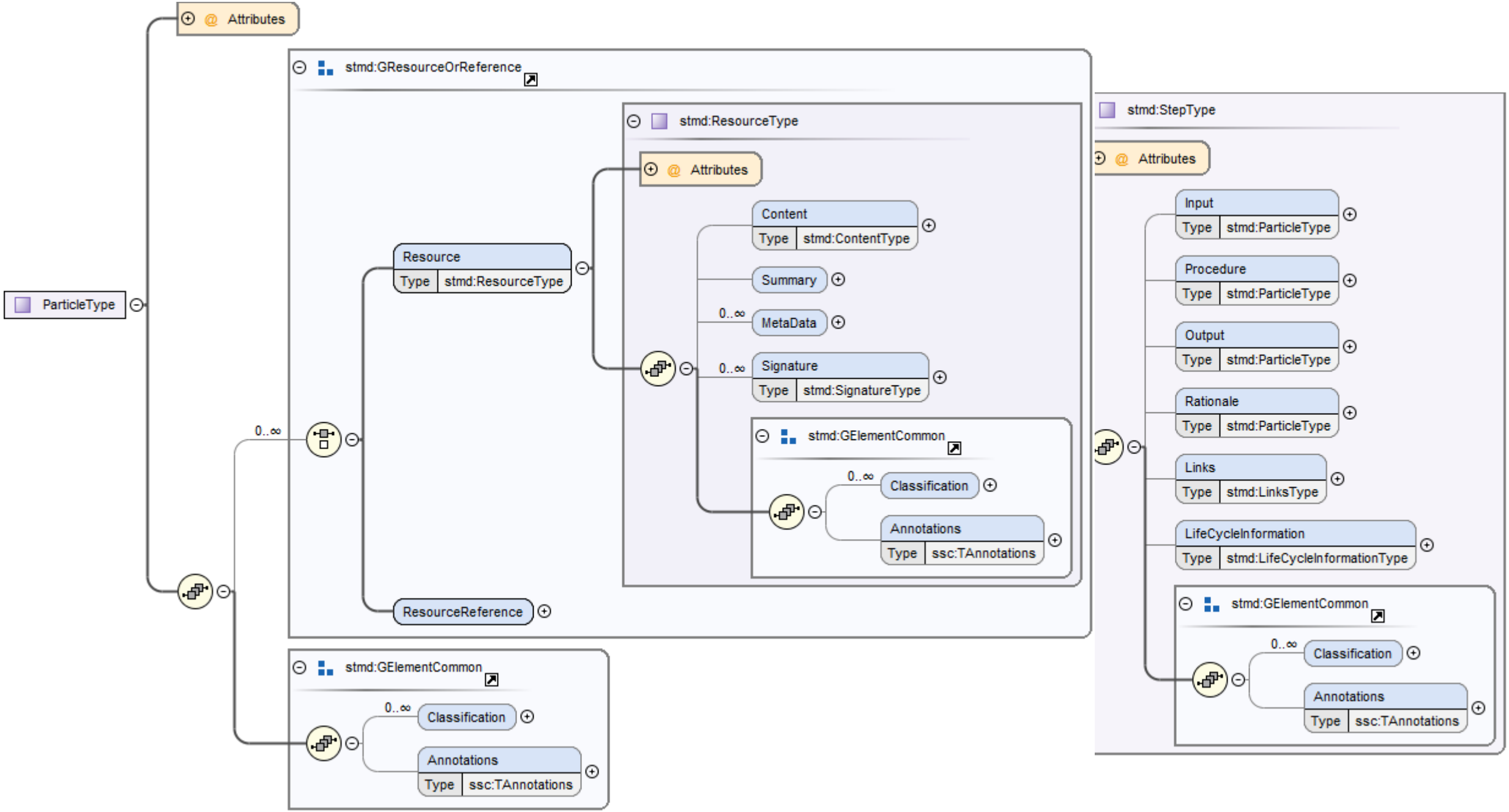


SSP Traceability Specification

- Based on SSP Formats and Principles
- Generic Approach of Phases and Steps
- Instantiated for CSP as STMD Format
- Each Step contains Input, Procedure, Output, Rationale information, referencing Resources



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SSP Traceability Specification

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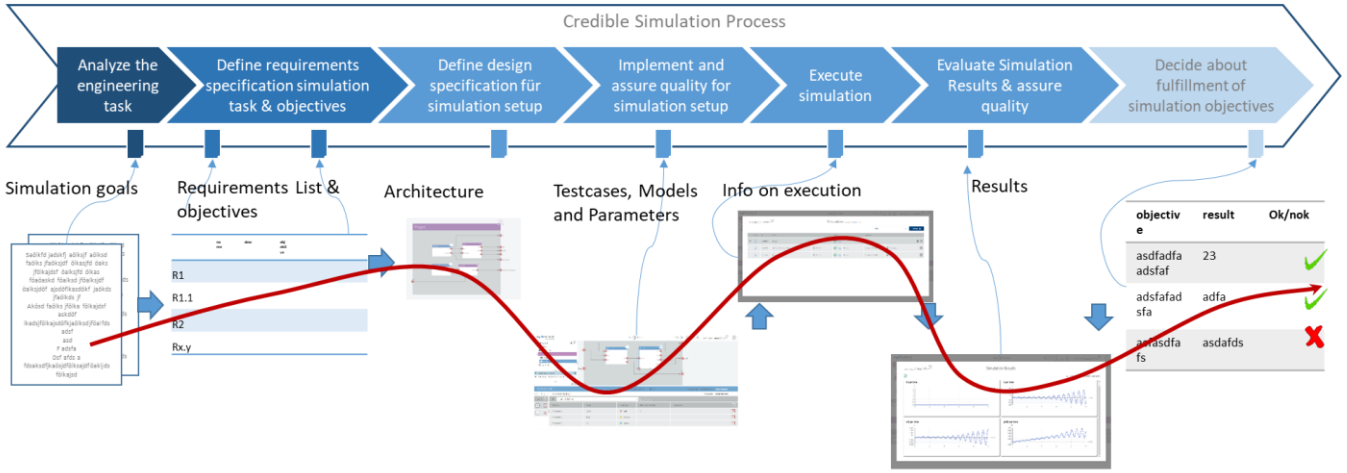
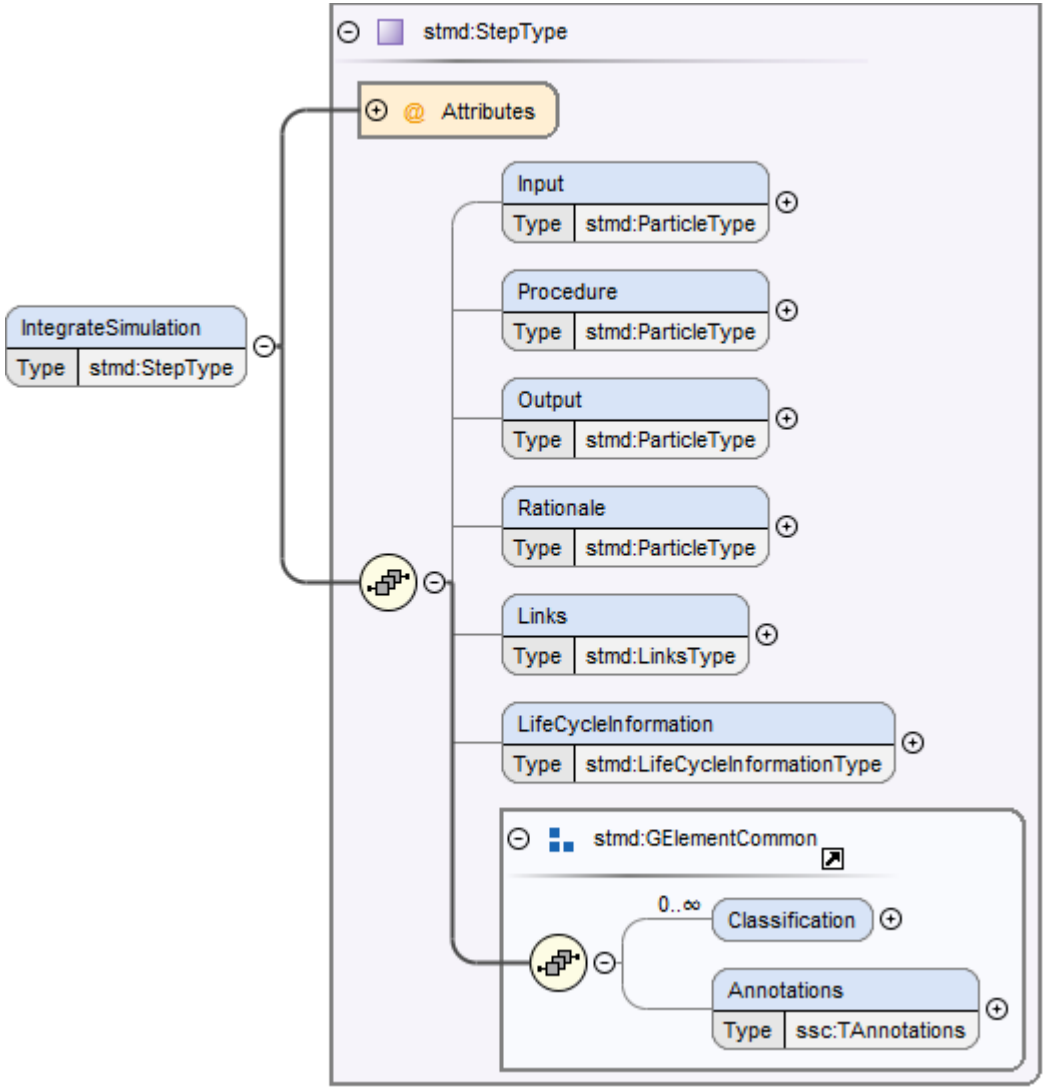
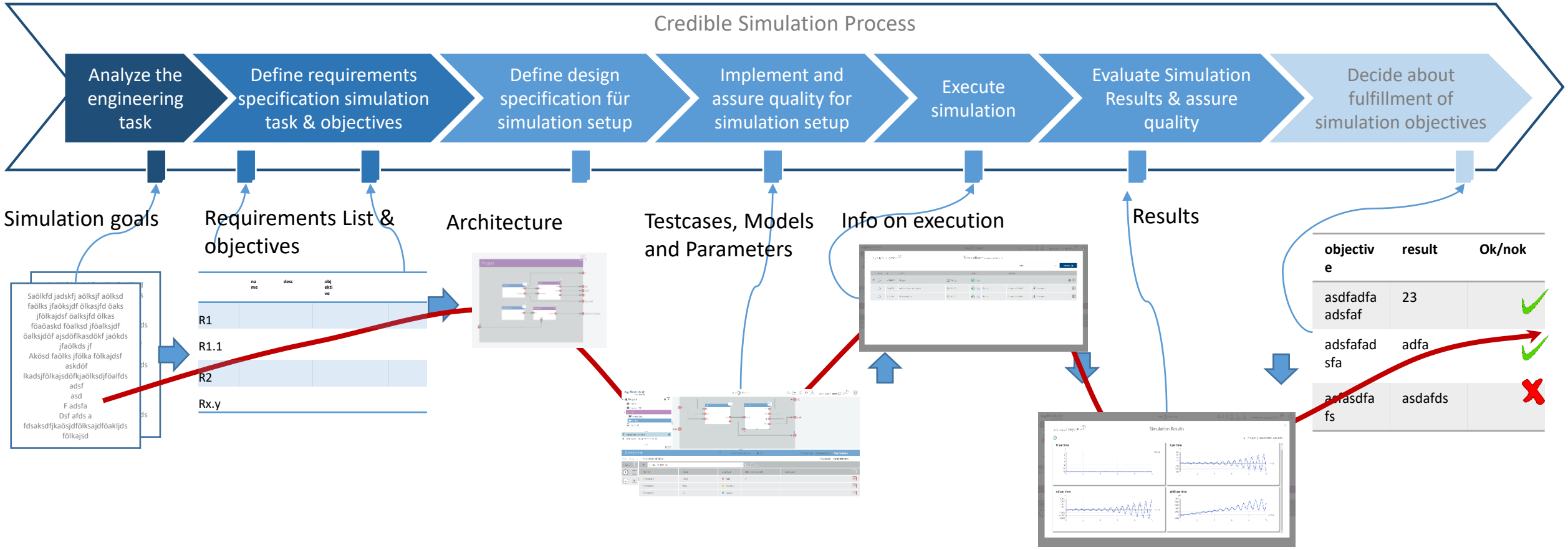
- Additional Linking, Life Cycle & Classification

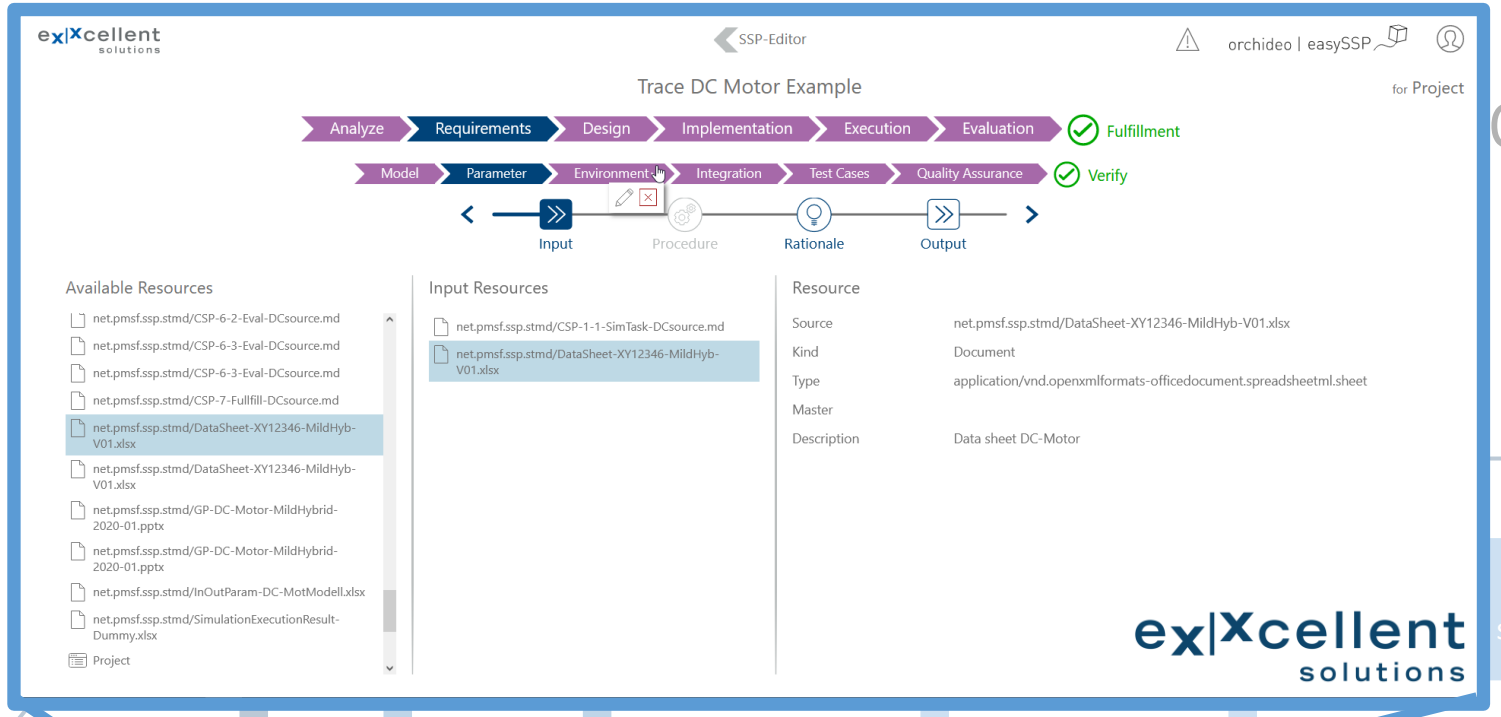




Prototypical application of SSP Traceability across a sample process based on CSP/SSP



ceability CSP/SSP



Execute simulation

Evaluate Simulation Results & assure quality

Decide about fulfillment of simulation objectives

Simulation goals

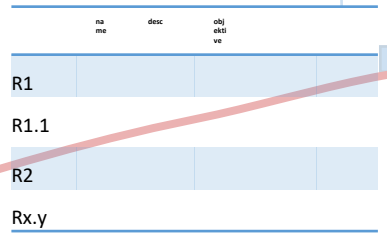
Requirements List & objectives

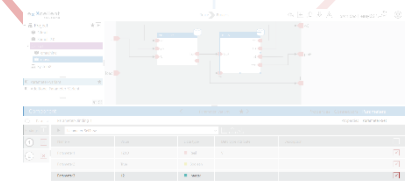
Architecture

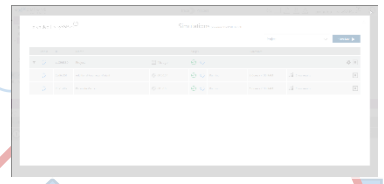
Testcases, Models and Parameters

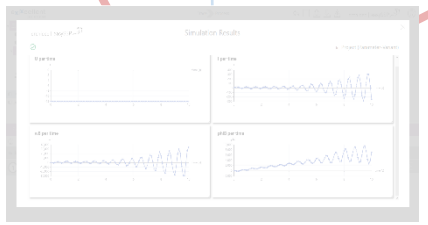
Info on execution

Results









objective	result	Ok/nok
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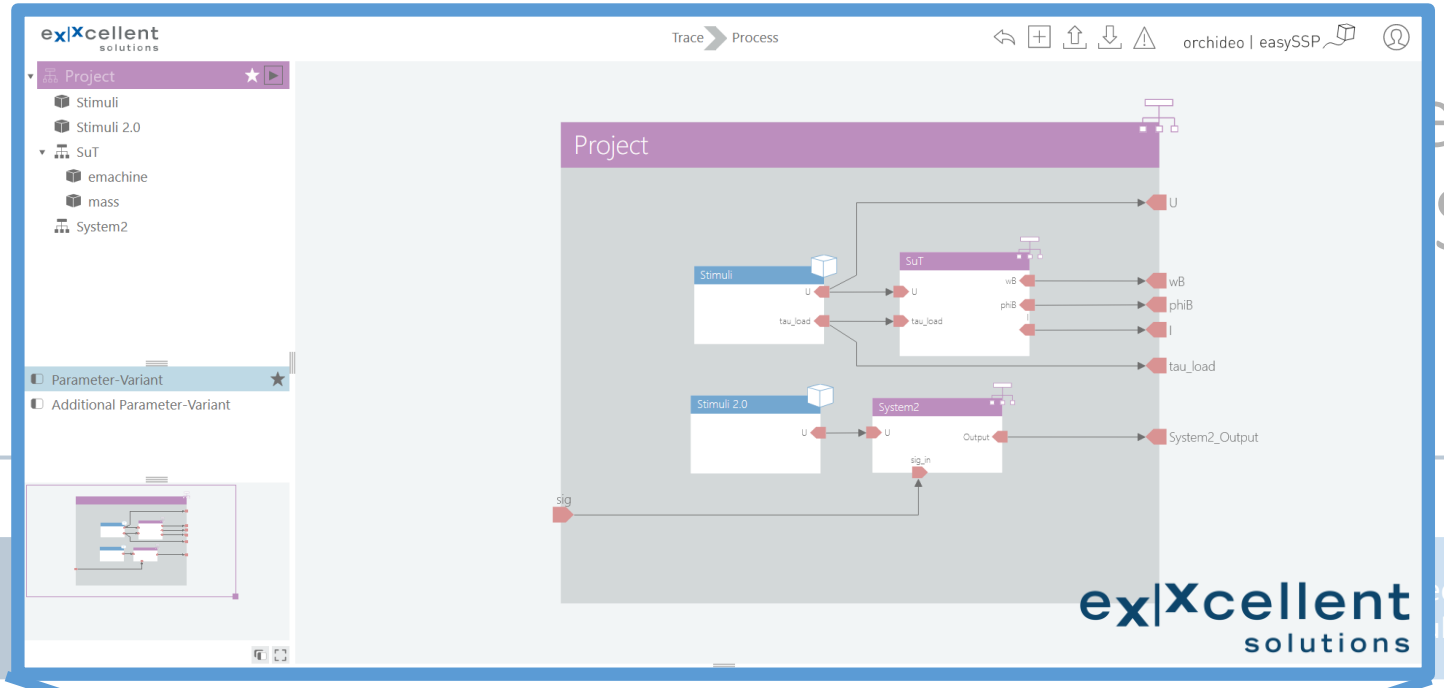
adsfafad sfa	adfa	✓
asfasdfa fs	asdafds	✗

eability
SP/SSP



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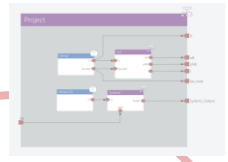

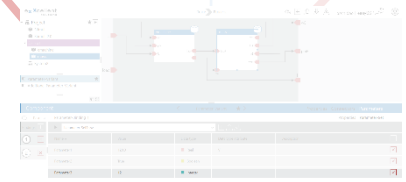

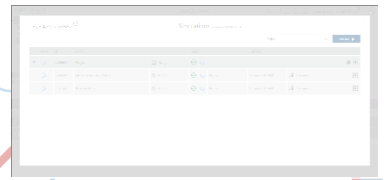

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adsfafad sfa	adfa	✓
asfasdfa fs	asdafds	✗

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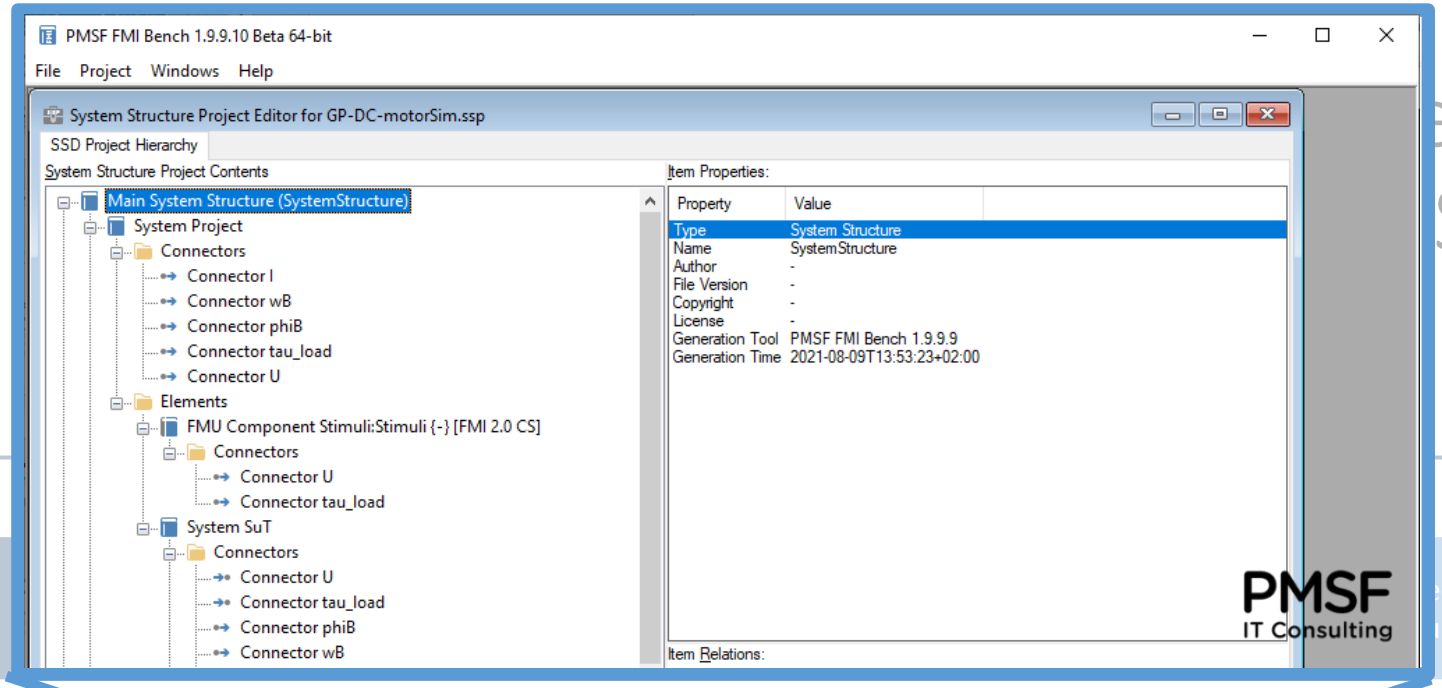

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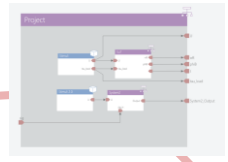

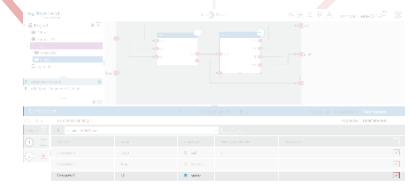

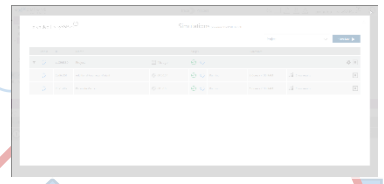

objective	result	Ok/nok
asdfadfa adsfaf	23	✓
adsfafad sfa	adfa	✓
asfasdfa fs	asdafds	✗

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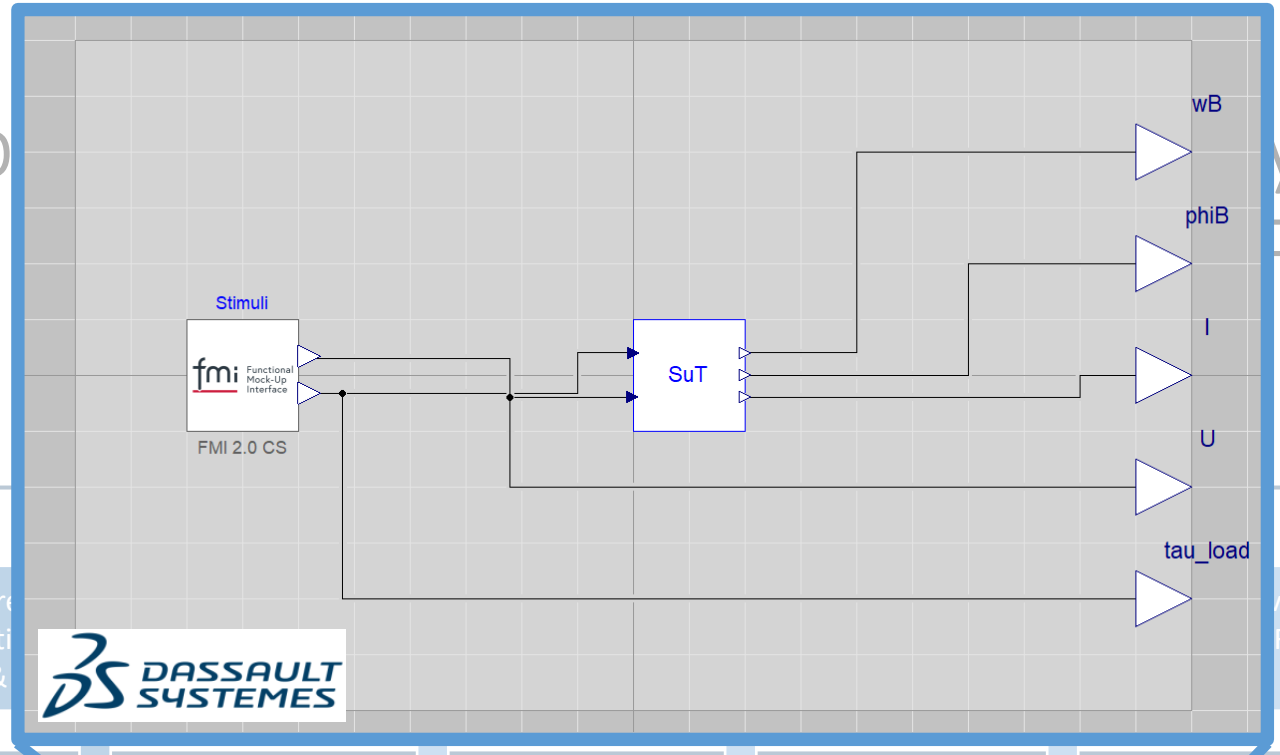

Analyze the engineering task

Define re… specificati… task &…

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Saölkfd jadskfj aölksjf aölksd faölks jfaöksjdf ölkasjfd öaks jfölkajdsf öalksjfd ölkas föaöaskd föalksd jföalksjdf öalksjdöf ajsdöflkasdökf jaökds jfaölkds jf Akösd faölks jfölka fölkajdsf askdöf lkadsjfölkajsdöfkjaölksdjföalfds adsf asd F adsfa Dsf afds a fdsaksdfjkaösjdfölksajdföakljds fölkajsd

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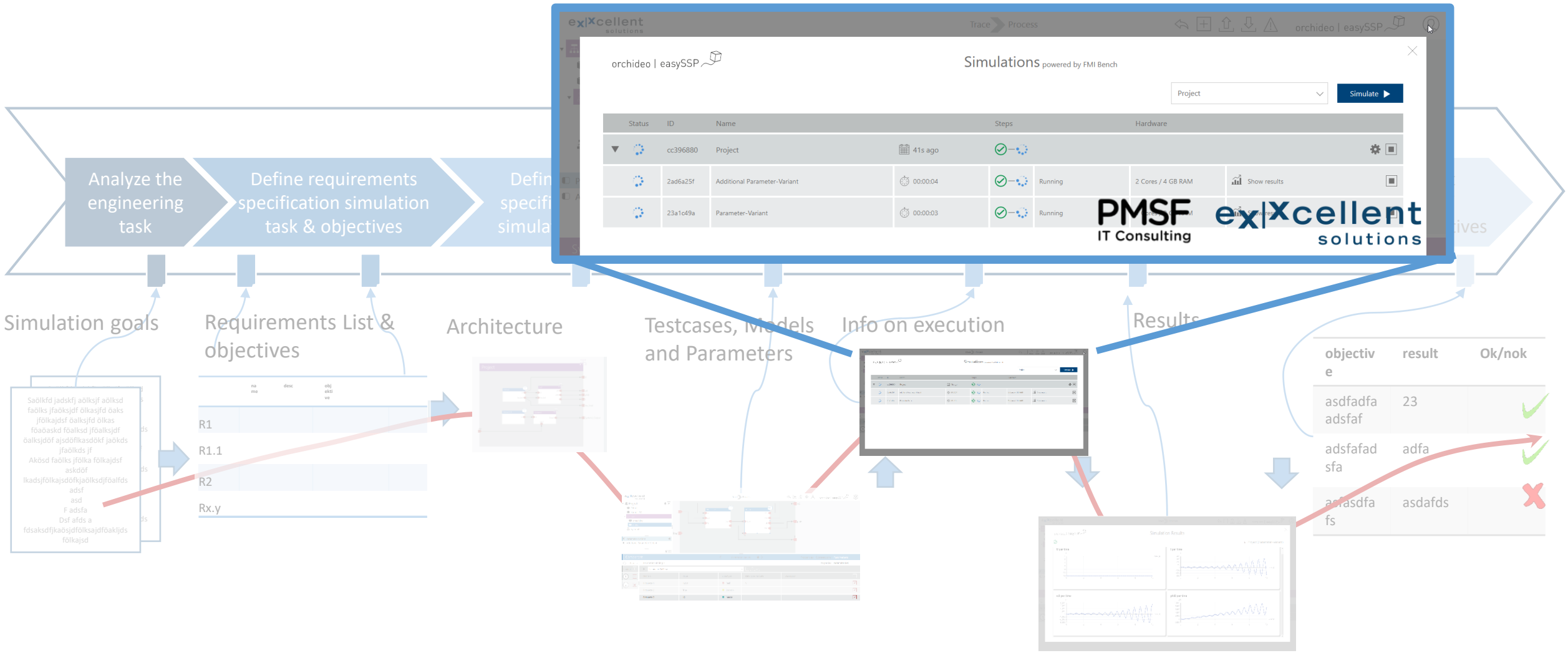
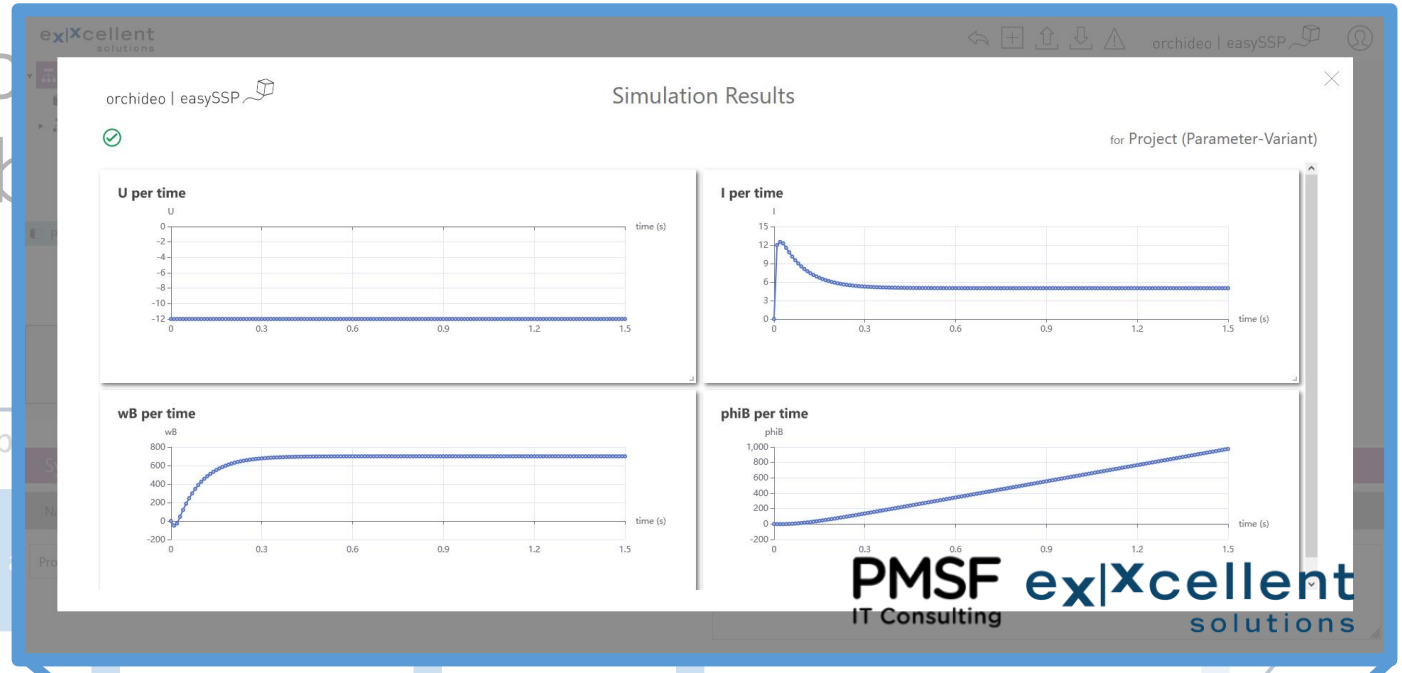
objectiv e	result	Ok/nok
asdfadfa adsfaf	23	✓
adsfafad sfa	adfa	✓
asfasdfa fs	asdafds	✗

Prototypical application of SSP Traceability across a sample process based on CSP/SSP



Prototypical application c
across a sample process b



Credib

Analyze the engineering task

Define requirements specification simulation task & objectives

Define design specification für simulation setup

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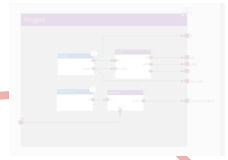
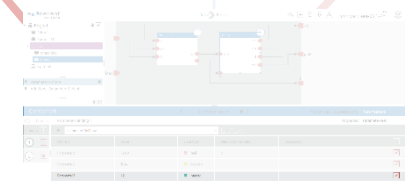
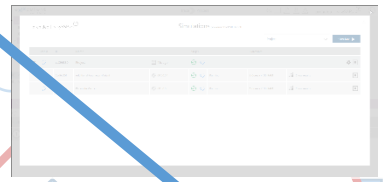
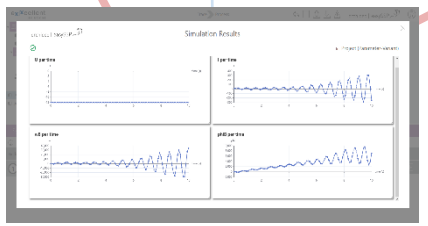


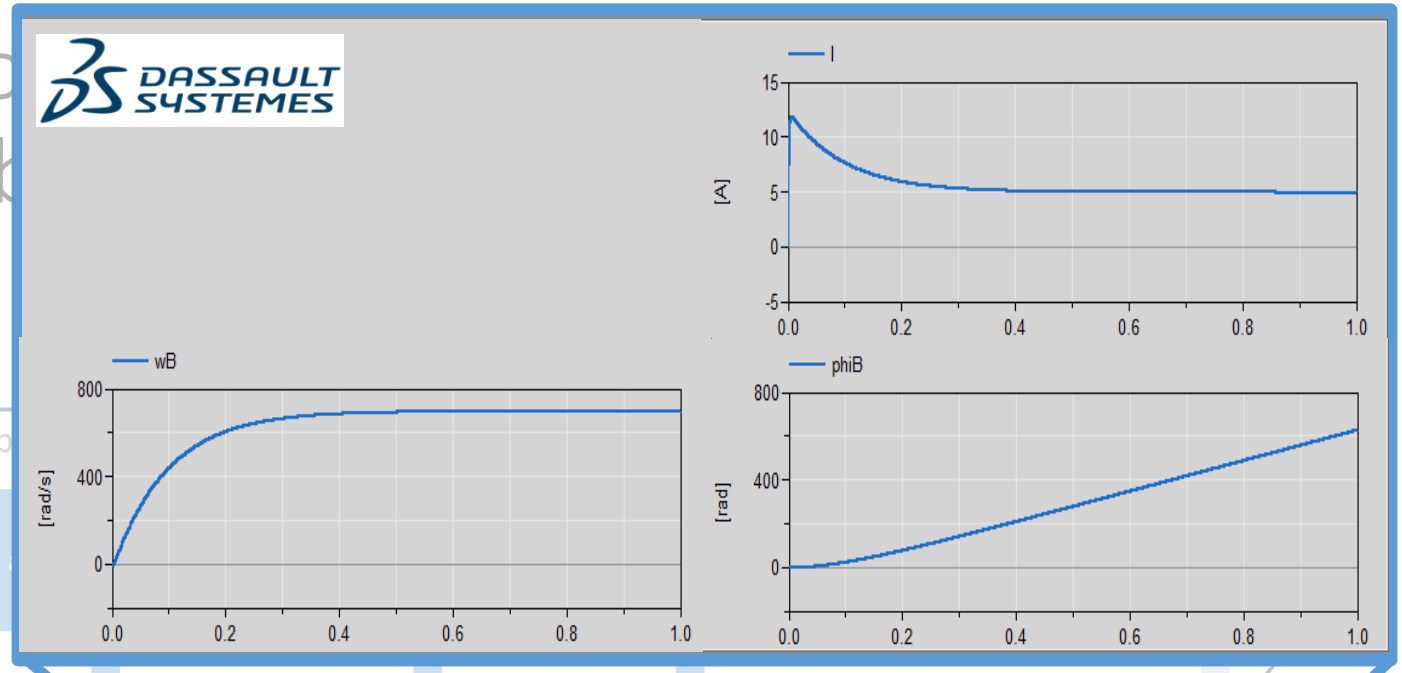






objective	result	ok/nok
asdfadfa adsfaf	23	✓
adsfafadsfa	adfa	✓
asfasdfafs	asdafds	✗

Prototypical application c
across a sample process b



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objective	result	Ok/nok
asdfadfa adsfaf	23	
adsfafadsfa	adfa	
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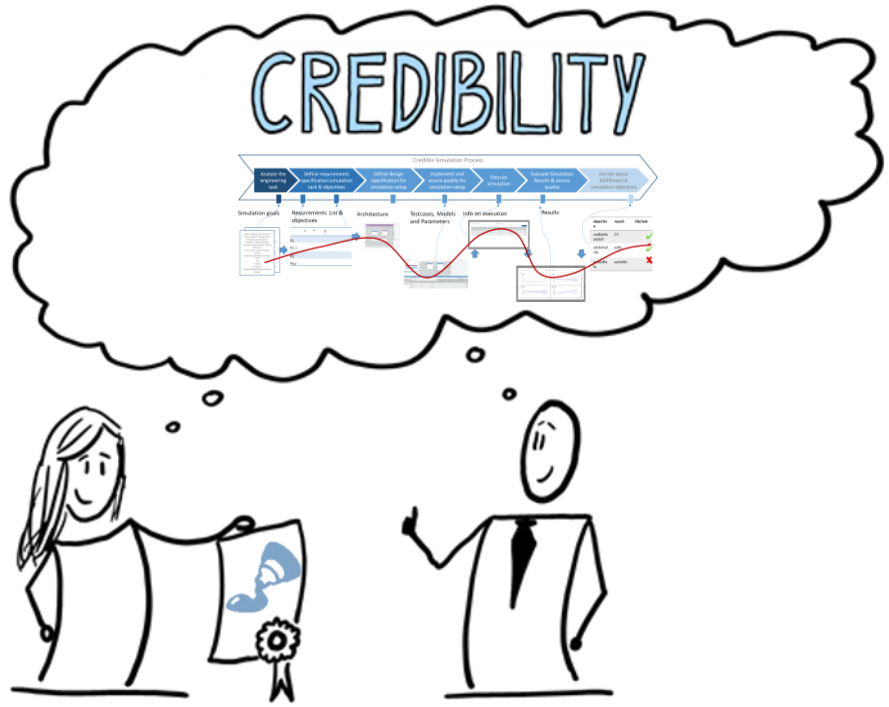
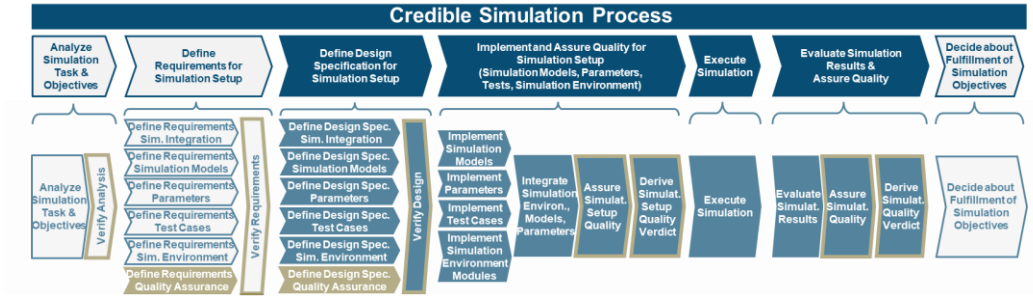
Summary & Benefits

- Credibility is key to acceptance of simulation for high-stakes decision making
- Credibility requires common understanding of simulation process → CSP
- Common understanding allows traceability of results to all inputs
- Glue particle approach allows traceability across parties and toolchains



Status and Outlook



SETLevel

- SmartSE project defined initial CSP
- SETLevel research project validated CSP
  2021-07-02: Release of refined CSP
  https://setlevel.de/neuigkeiten/credible-simulation-process
- Draft Version of SSP Traceability Specification
  https://github.com/PMSFIT/SSPTraceability
- Prototype Implementations from eXXcellent solutions, PROSTEP, PMSF, 3ds, Bosch

- Interested in CSP/SSP Traceability/SmartSE?
  - November Presentation Day at SmartSE Project:
    Demonstrators, more detailed overview of SSP Traceability, CSP
  - Phase V of SmartSE Project starts in 2022, open to new members!