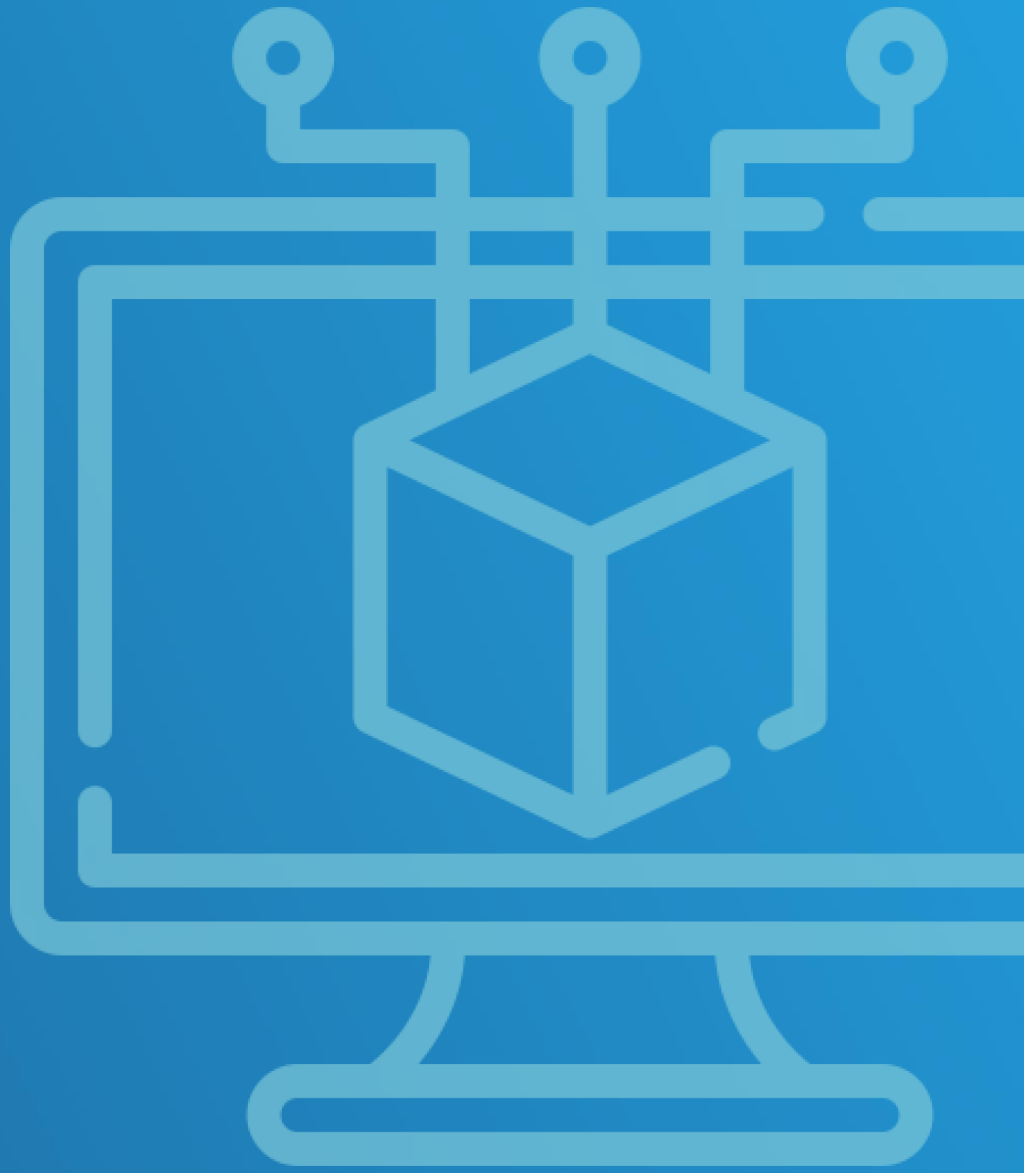
SOFTACUS
IBM BASED SOLUTIONS

Reuse Techniques

Jan Jancar



IBM Gold Partner

www.softacus.com
info@softacus.com

WHY REUSE?

- Many custom variants are required by the market
- Cost savings
- Consistent high quality
- Improve Time to market
- Revalidation & Recertification
- Consistency
- Scalability
- Customer satisfaction
- Ability to attract different customers

Simple Copy & Paste

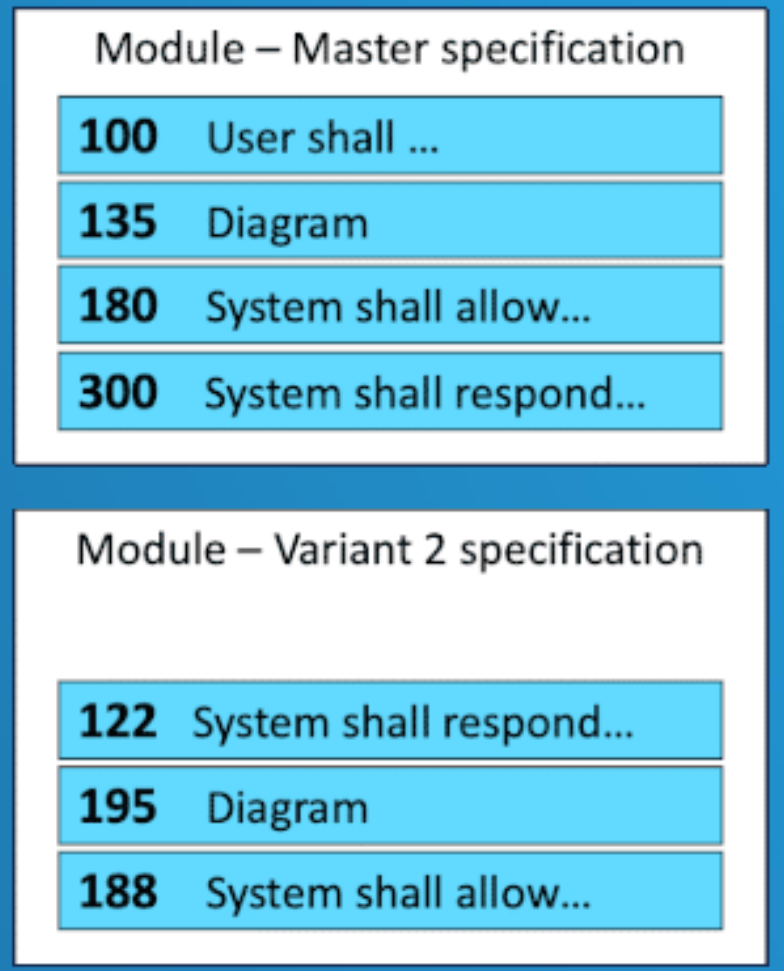
Simple technique for using existing data for a new project or product. Good option if reference to the original artifact is not needed.

- Copied artifact will get a **new ID**.
- Ability to copy the links of the copied artifact.
- Ability to copy artifacts from specifications as well as **other components and projects**

DISADVANTAGES

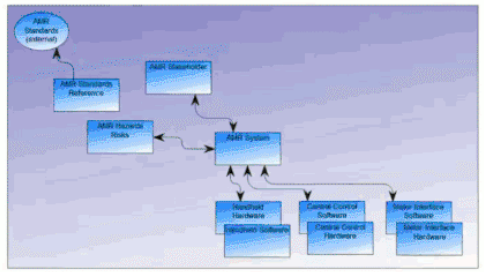
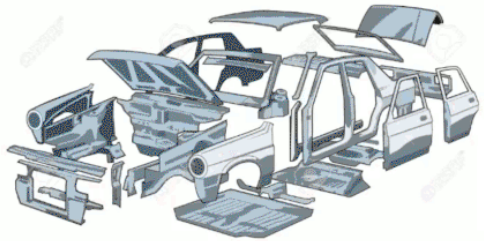
- Duplication of the data
- No reference to the original data

Widely used technique by companies developing big investment project in military area.



... / 01 Requirements / | 349092 AMR System Requirements Specification

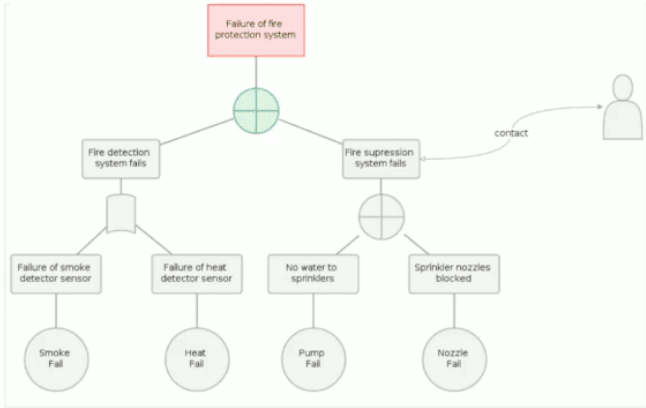
Create | Type to filter artifacts by text or by ID

ID	Contents	Satisfies
349162	1 Introduction	
349329	1.1 Purpose of the Document	
349419	The meter interface unit shall be compatible with the existing meter models in use for the area covered by this project.	349104:The meter inter…
349361	The meter interface unit shall be powered by a replaceable long lasting battery (lithium or other).	349122:The meter inter…
448650		349236:A system goal …
448652		

Showing 75 of 75 (100%)

equirements / | 349088 AMR Stakeholder Requirements Specification

View: copy paste | Type to filter artifacts by text or by ID

ID	Contents	Satisfied By
448649		349309:Individual meter usage d… Priority: Low Modified On: Aug 24, 2023 3:41 PM Modified By: Igor Chudacik 349106:Information captured via … Priority: Medium Modified On: Aug 24, 2023 3:41 PM Modified By: Igor Chudacik
349285	The AMR is intended for gathering and reporting of water consumtion data to facilitate measurement of residential and business customers.	349175:The handheld device sh… Priority: Medium Modified On: Apr 24, 2023 9:02 AM Modified By: Igor Chudacik
349183	The system, when deployed, will initially include water service for residential, commercial and industrial customers inside a 72 square mile area (~79,000 meter connections).	349373:The handheld device sh… Priority: High Modified On: Aug 24, 2023 3:41 PM Modified By: Igor Chudacik
349276	The Stakeholder requirements describe the user needs for a water meter reading system (AMR) including the meter, the method of collecting data from the device, and the means by which the customers will be billed for usage.	349272:The meter interface unit … Priority: High Modified On: Aug 24, 2023 3:41 PM Modified By: Igor Chudacik
349339	The AMR product is intended to allow water providers to lower their cost of operation by more accurately measureing consumption and more quickly gather data	349320:When connected to a fix… Modified On: Apr 24, 2023 9:02 AM

91 (100%) 1 selected (Clear All Selected)

Copy, Paste & Link

Very similar to Copy & Paste. When copying, link of your choice is created between original and copied artifact.

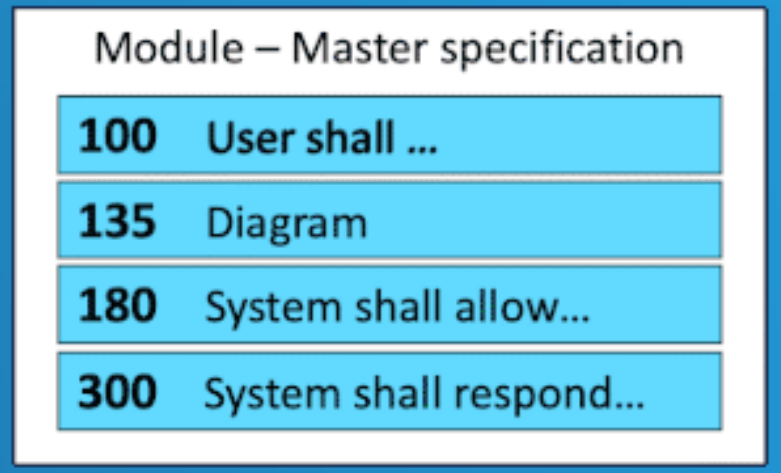
ADVANTAGES

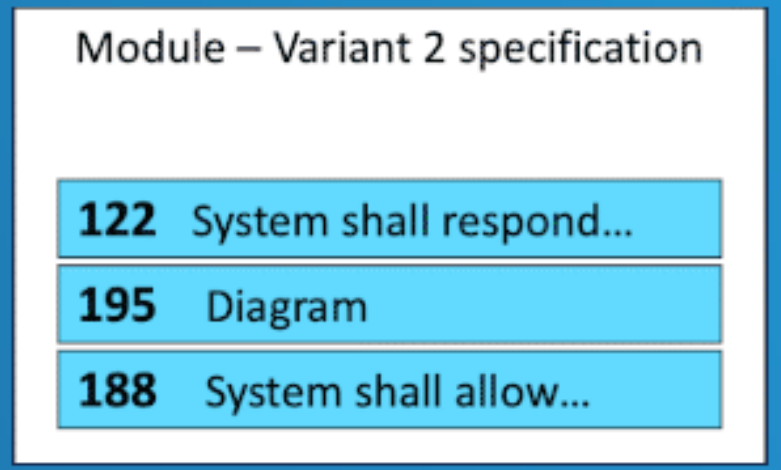
- Live reference to the original artifact
- Link validity can be used to spot the changes between artifacts
- Link + Link Validity = Keeping control of the copy

DISADVANTAGES

- Duplication of the data
- Some systems do not support copying across different data models

Widely used technique in all industries where you need to track the source requirements during your project.





Artifact based reuse in specification

The best option for preservation high integrity and single source of truth.

- Artifacts can be reused across several specifications
- Any change to the artifacts in any specification is immediately propagated to all instances in other specifications*

ADVANTAGES

- Preserving high integrity

DISADVANTAGES

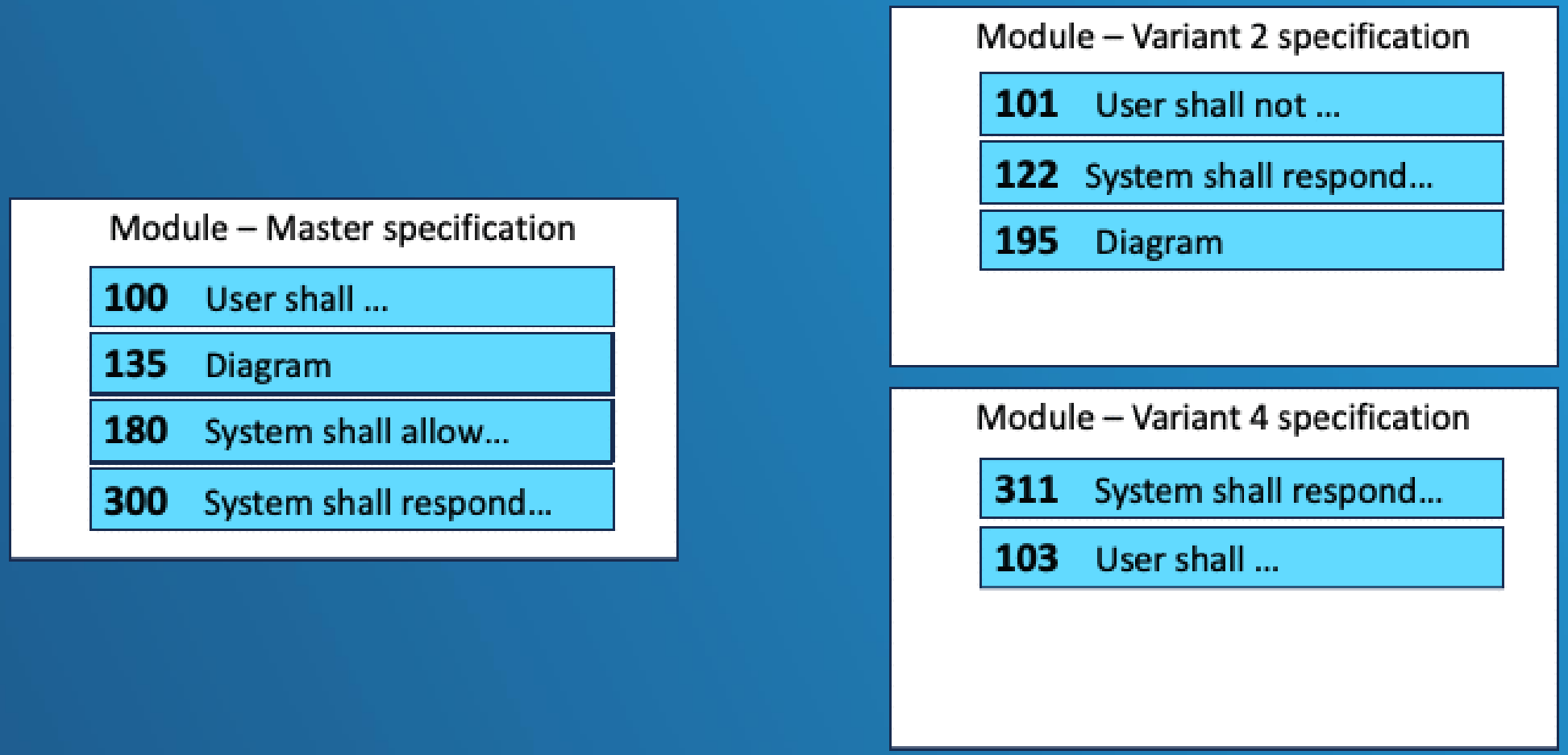
- Giving up control of the text and attributes = changes are harder to control

- *Links, comments and tags may be specification specific, and their changes may not be propagated to other instances of the artifact in other specifications.*

Example of simple reuse of hardware requirements specification (often medical and automotive projects)

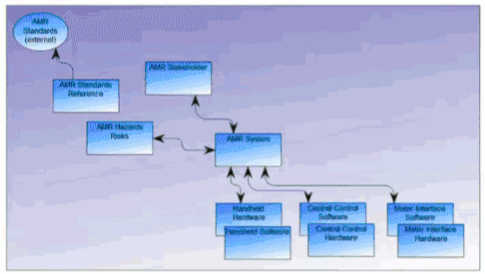
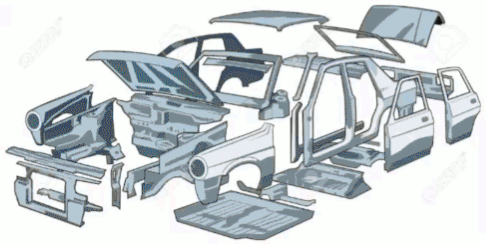
SOFTACUS
IBM BASED SOLUTIONS

Artifact based Reuse in Specification



... / 01 Requirements / | 349092 AMR System Requirements Specification

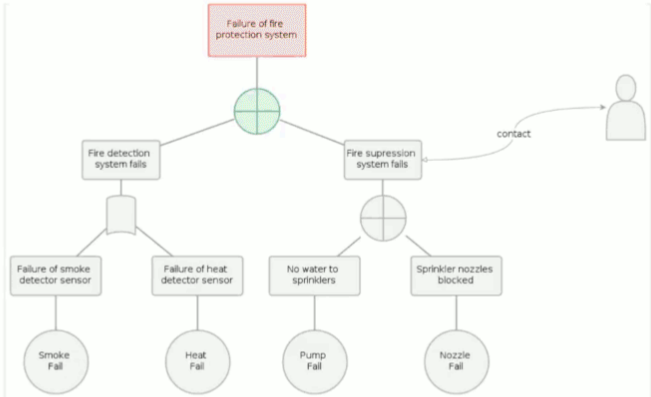
Create | Type to filter artifacts by text or by ID

		ID	Contents	Satisfies
☐		349162	**1 Introduction**	
☐		349329	**1.1 Purpose of the Document**	
☐		349419	The meter interface unit shall be compatible with the existing meter models in use for the area covered by this project.	349104:The meter inter…
☐		349361	The meter interface unit shall be powered by a replaceable long lasting battery (lithium or other).	349122:The meter inter…
☐		448650		349236:A system goal …
☐		448652		

Showing 75 of 75 (100%)

equirements / | 349088 AMR Stakeholder Requirements Specification

View: copy paste | Type to filter artifacts by text or by ID

ID	Contents	Satisfied By
349274	**1 Introduction**	
448649		349309:Individual meter usage d… Priority: Low Modified On: Aug 24, 2023 3:41 PM Modified By: Igor Chudacik 349106:Information captured via … Priority: Medium Modified On: Aug 24, 2023 3:41 PM Modified By: Igor Chudacik
349183	The system, when deployed, will initially include water service for residential, commercial and industrial customers inside a 72 square mile area (~79,000 meter connections).	349373:The handheld device sh… Priority: High Modified On: Aug 24, 2023 3:41 PM Modified By: Igor Chudacik
349276	The Stakeholder requirements describe the user needs for a water meter reading system (AMR) including the meter, the method of collecting data from the device, and the means by which the customers will be billed for usage.	349272:The meter interface unit … Priority: High Modified On: Aug 24, 2023 3:41 PM Modified By: Igor Chudacik
349339	The AMR product is intended to allow water providers to lower their cost of operation by more accurately measureing consumption and more quickly gather data.	349320:When connected to a fix… Priority: Low Modified On: Aug 24, 2023 4:22 PM Modified By: Igor Chudacik

90 (100%)

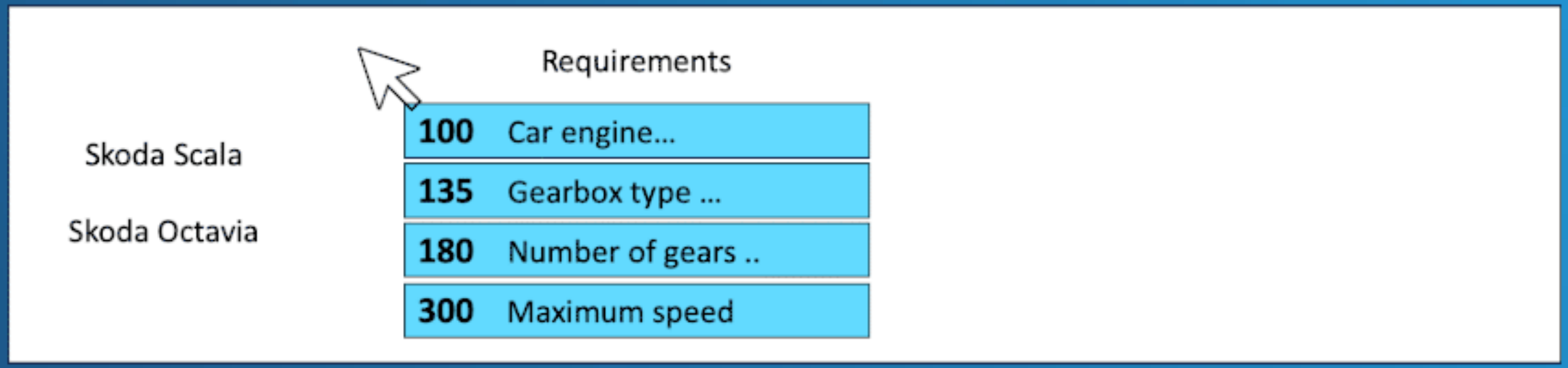
IBM. jazz jazz

Attribute based variants

Simple method recommended for less complex use-cases. Each variant has associated its specific attributes. The variant is shown based on saved filter.

Disadvantage

- Multiplication of attributes
- Traceability - relationship links are usually to general requirement not to specific attribute
- Rich text formatting is generally not possible to use for attributes

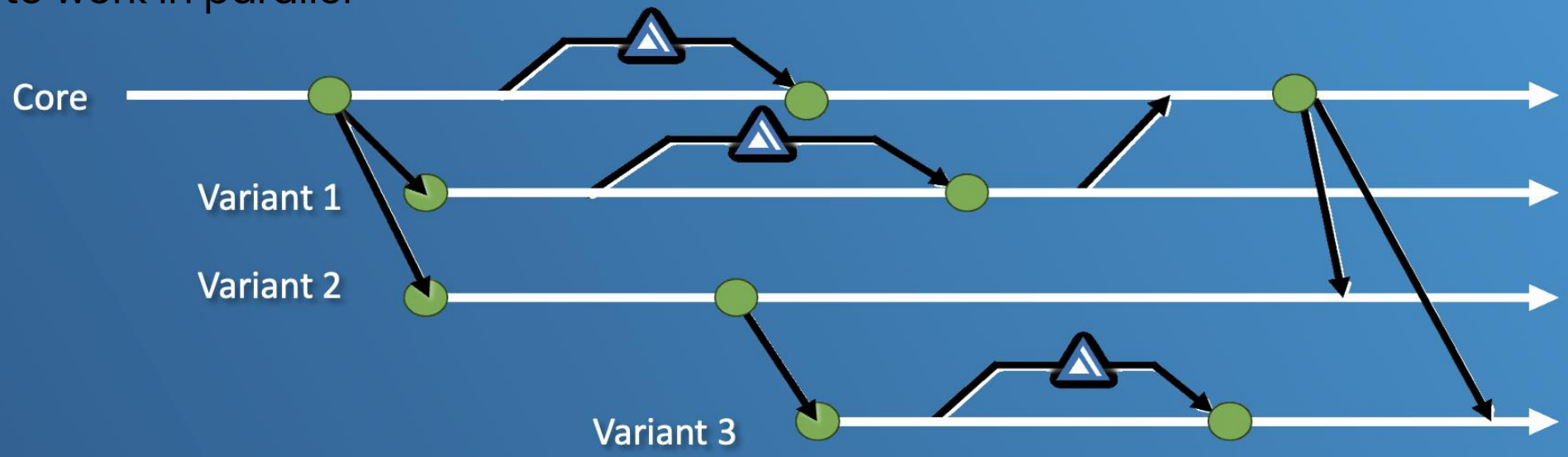


Branching & Merging

Key concept in systems and software development. It is possible to branch requirements from a component into 2 or more branches or "streams". Streams can be later compared and/or merged.

Branch is usually created to:

- Create different variants
- Create work stream for experimental work or new features while having stable release stream
- Control the changes and bug fixes
- Enable teams to work in parallel



Changeset

Baseline

Branching & Merging

Mini Dashboard

FMEA Drg - FD

Risk Class

Severity of Impact	Risk Likelihood: Low	Medium	High
High	Class 2	Class 1	Class 1
Medium	Class 3	Class 2	Class 1
Low	Class 3	Class 3	Class 2

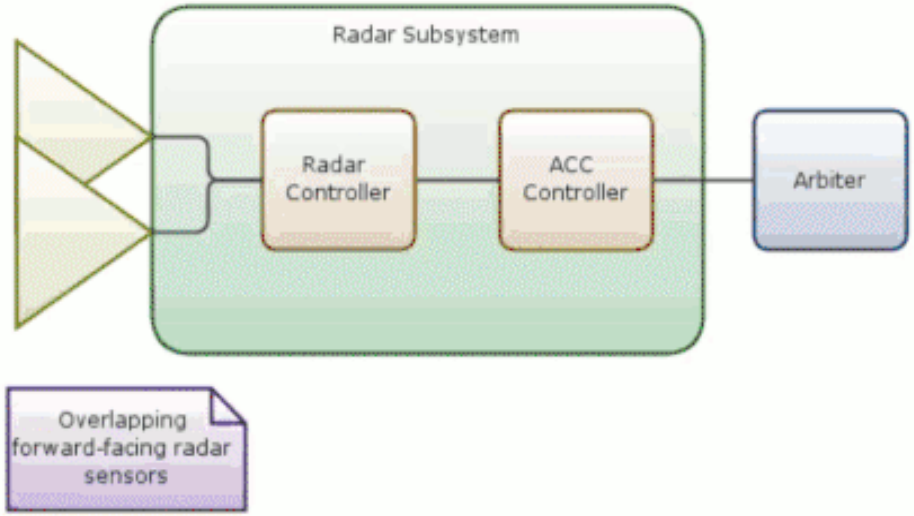
Risk Priority

Risk Class	Probability of detection: Low	Medium	High
1	High	High	Medium
2	High	Medium	Low
3	Medium	Low	Low

Calculate Risk Class and Risk Priority

... / Infusion Pump Safety Requirements (US) artifacts / | 4236 Infusion Pump Safety Requirements (US)

Create | View: I | Type to filter artifacts by text or by ID

ID	Contents	Mitigates
4275	**1 Safety Requirements**	
4263	This Section lists safety requirements for the generic infusion pump model. The requirements include safety features and constraints for a general-purpose infusion pump. Configuration parameters for the model are identified and enumerated based on these requirements.	
4246	**1.1 Infusion Control**	
4393	**1.1.1 Flow rate**	
4302	The flow rate for the pump (for both primary and secondary infusions) shall be programmable.	
4363	The **downstream** occlusion pressure limit shall be less than 20 psi (1034 mm Hg). 	4311:Block in line (In Module: Infusion Pump F... Probability (FMEA): Extremely Unlikely (1) Severity (FMEA): None (1) Detection (FMEA): High (3) Risk Priority Number (RPN): 3 aPJ Risk Class: Class 2
4294	At minimum, the pump shall be able to deliver primary (basal) infusion at flows	340158:Wrong maximum pump channel volume (

Showing 66 of 66 (100%)

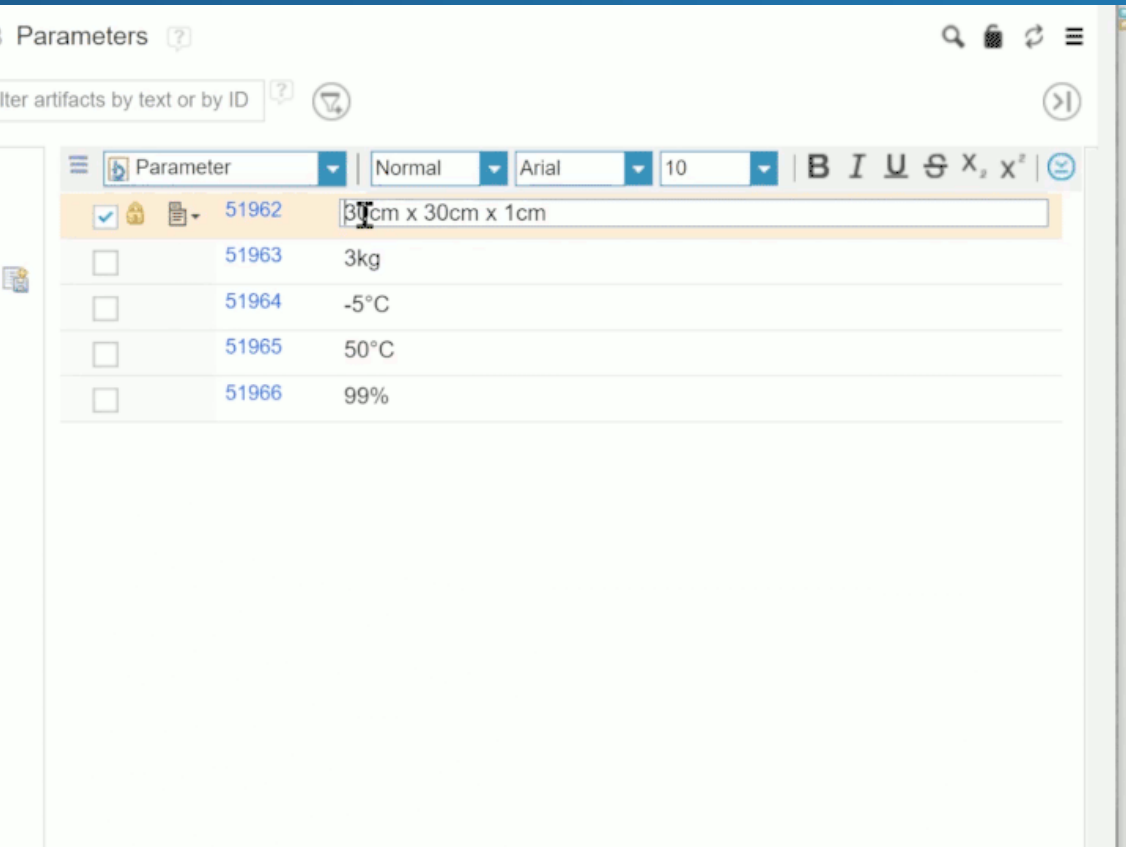
Templates

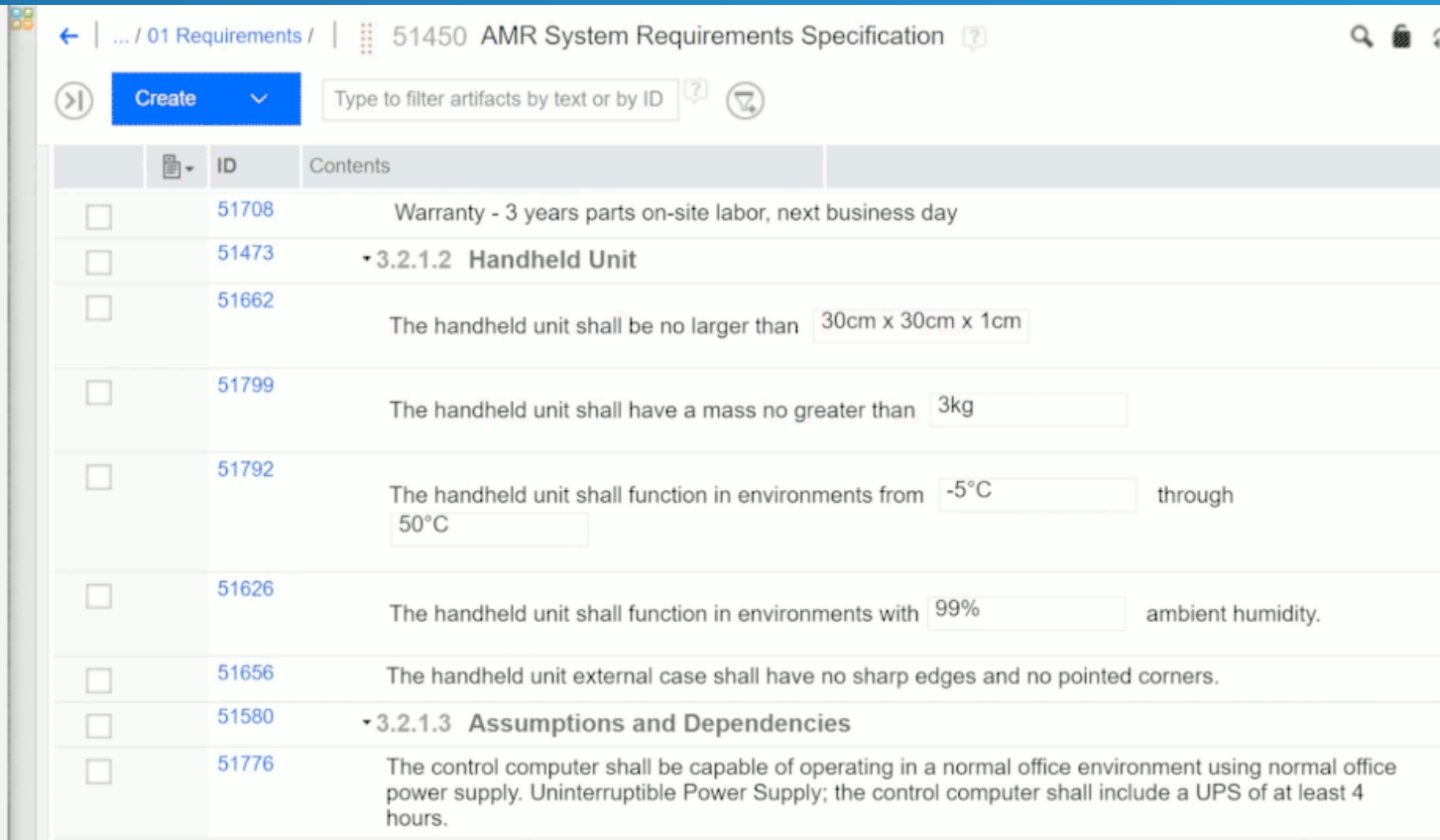
Project templates - Coping project or component properties
Artifact templates – Reusing only specific artifact
Specification template – Reusing or duplicating all artifact in the specification

SOFTACUS
IBM BASED SOLUTIONS

Parameters

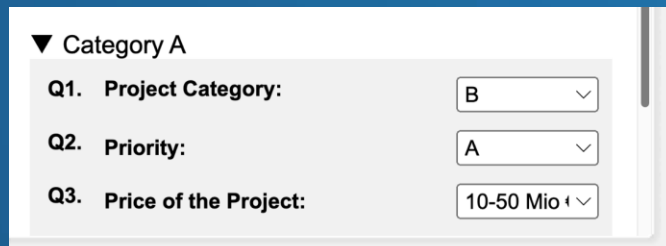
- Parameter values are embedded artifacts
- Parameters are created, changed and stored in separate specification document
- Updating the parameters in specification document will update parameter values in all specifications

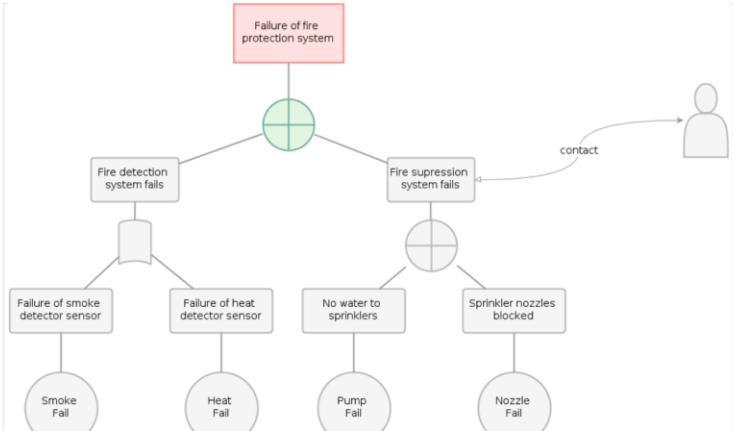




Requirements reuse using logical formulas

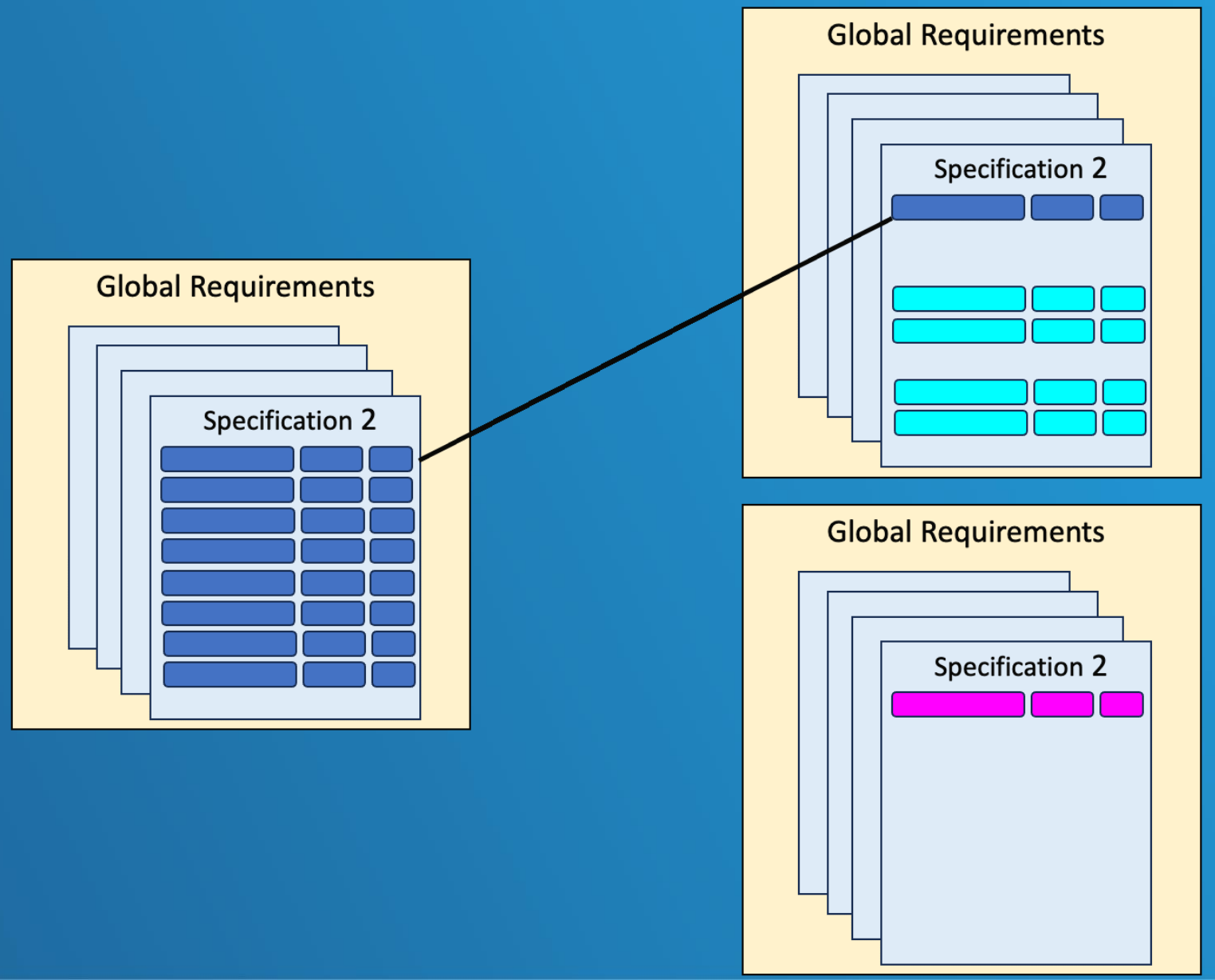
- Filter relevant artifact using logical formulas entered by user.
- Filtered artifacts are marked and reused in another specification.
- Every artifact is filter based on its own formula – extremely granular.



Contents	Formula	Relevant	Satisfied By
1 Introduction			
The AMR is intended for gathering and reporting of water consumtion data to facilitate measurement of residential and business customers.	IF(Q2=A)	True	349175:The handheld device sh… Priority: Medium Modified On: Apr 24, 2023 9:02 AM Modified By: Igor Chudacik
The system, when deployed, will initially include water service for residential, commercial and industrial customers inside a 72 square mile area (~79,000 meter connections).	OR(Q1=B,Q2=D)	False	349373:The handheld device sh… Priority: High Modified On: Aug 24, 2023 3:41 PM Modified By: Igor Chudacik
The Stakeholder requirements describe the user needs for a water meter reading system (AMR) including the meter, the method of collecting data from the device, and the means by which the customers will be billed for usage.	AND(Q1=B,Q2=A)	True	349272:The meter interface unit … Priority: High Modified On: Aug 24, 2023 3:41 PM Modified By: Igor Chudacik
	IF(Q3="10-50 Mio €")	True	349309:Individual meter usage d… Priority: Low Modified On: Aug 24, 2023 3:41 PM Modified By: Igor Chudacik 349106:Information captured via … Priority: Medium Modified On: Aug 24, 2023 3:41 PM Modified By: Igor Chudacik

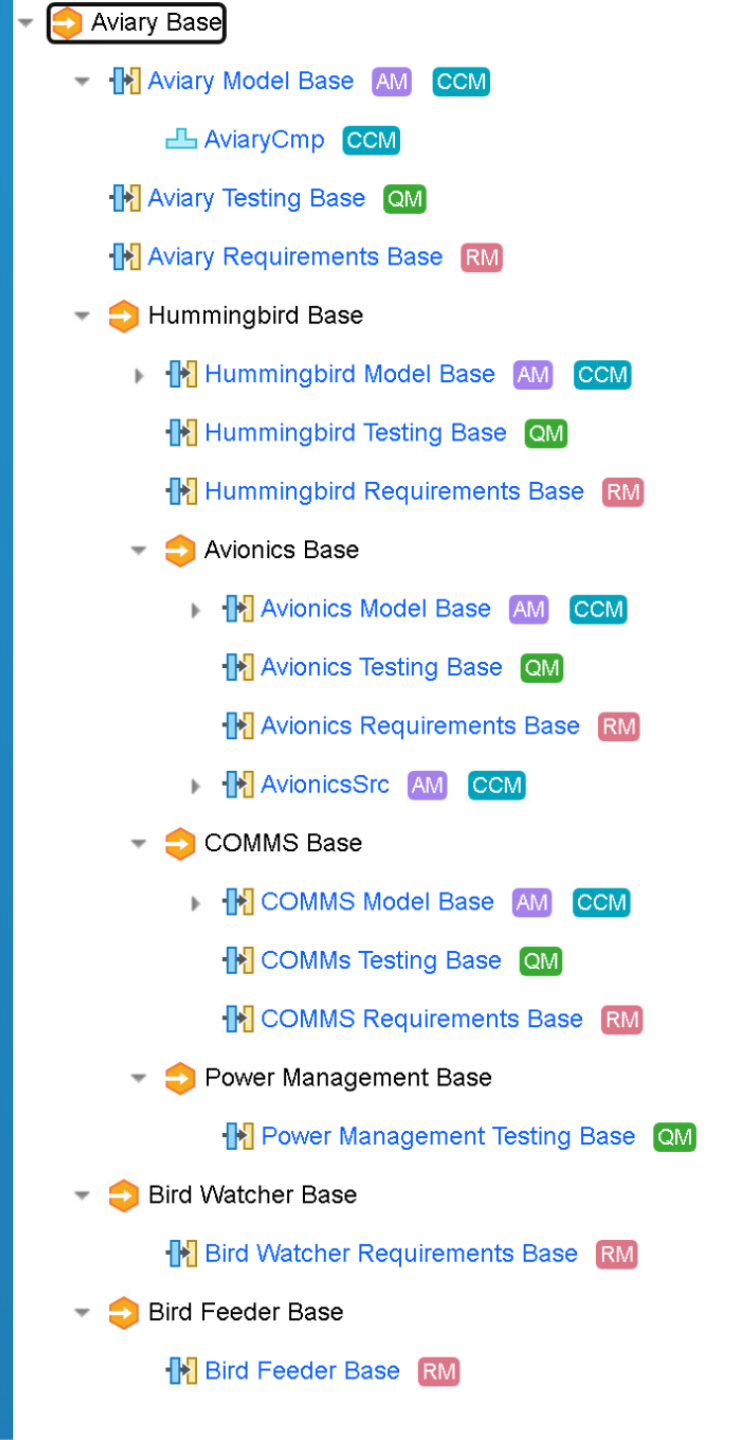
Reuse across components and projects

- Discover, explore and deliver artifact changes across projects, components and streams
- Cherry pick atomic changes all the way to specific attribute



Reuse of system components

- Most advanced and most powerful form of reuse across entire engineering lifecycle.
- Component represents physical or logical pieces of the system.
  - In requirements management context, component represent set of requirements specifications and artifacts.
  - In a system context, component represents combination of requirements, architecture and tests, organized in hierarchy
- Components make it easy to reuse and combine parts of the system across V model, into different versions, variants or products.
- Disadvantage – Increased complexity requires certain level of process maturity in your company, regarding variants management

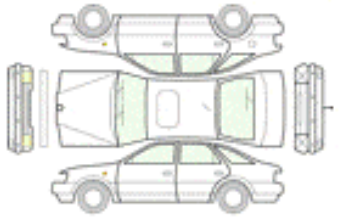


Reuse of system components

Your product

Standard variant

Body Standard



Rims Standard

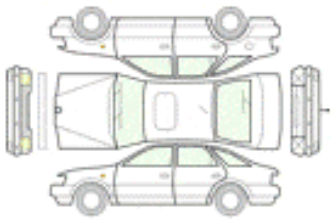
Engine Standard

Standard Standard Standard

Sub-components

Variant 1

Body Variant 1



Rims Standard

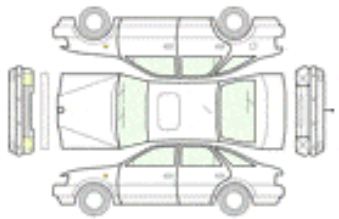
Engine Standard

Standard Standard Standard

Sub-components

Variant 2

Body Variant 2



Rims Standard

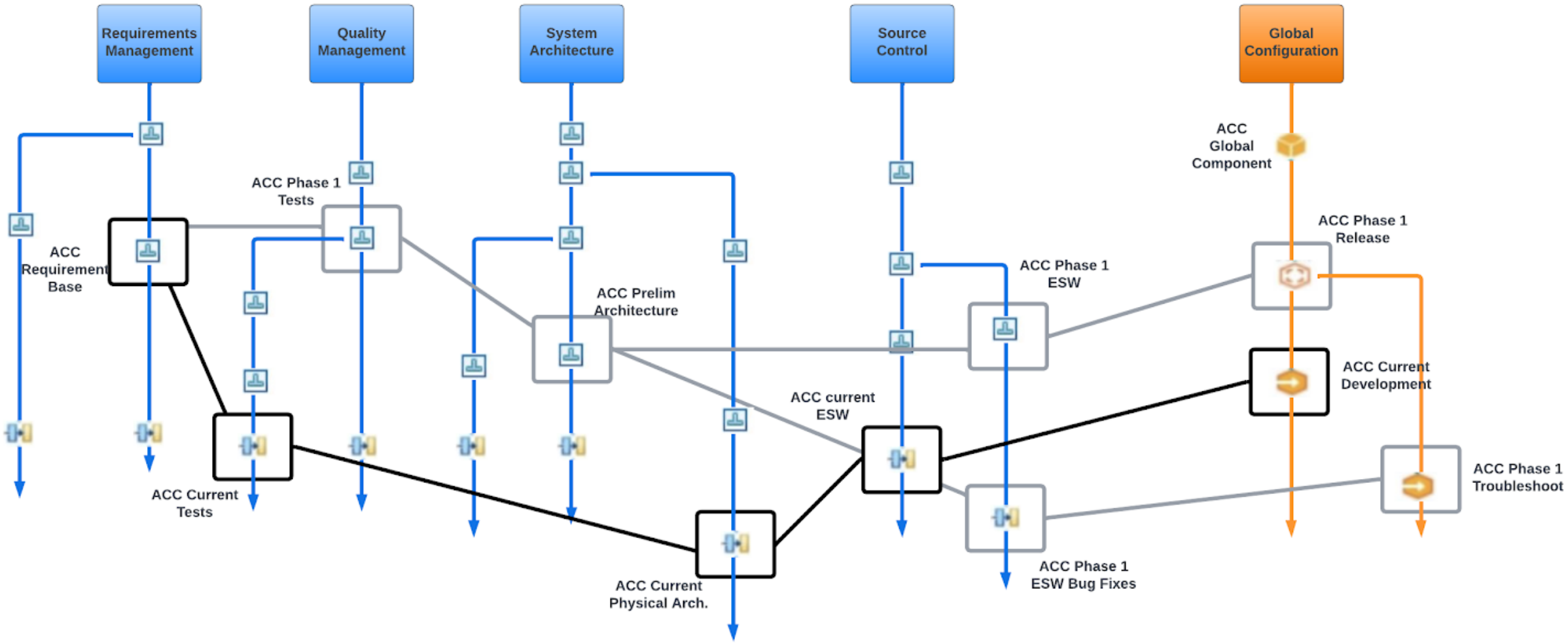
Engine variant 2

Variant 2 Variant 2 Standard

Sub-components

SOFTACUS
Business and IT Solutions
IBM
SOFTACUS
Business and IT Solutions
IBM

Reuse of system components



Thank you for your attention

Get more information at:

- www.softacus.com
- jan.jancar@softacus.com
- andreas.mettauer@softacus.com
- info@softacus.com

SOFTACUS
IBM BASED SOLUTIONS

IBM
Gold Partner

SOFTACUS

IBM BASED SOLUTIONS

IBM Gold Partner

www.softacus.com