## **Requirement matrices**

The matrices enables you to analyze, create, and modify relationships between Requirements and other design elements. It is especially valuable that you can display relationships that cannot be represented in diagrams, such as representations (classes by lifeline), behavior representations in other diagrams, operation representations by Call Behavior Actions, etc. All Requirement matrices allows you to perform Requirements gap and coverage analysis.

You can create four kind of Requirements matrices:

- Derive Requirement Matrix.
- Refine Requirement Matrix.
- Satisfy Requirement Matrix.
- Verify Requirement Matrix.

The different purposes for each matrix are illustrated below:

 Derive Requirement Matrix allows you to analyze, create, and modify Derive relationships between Requirements and other design elements. Rows represent the elements that are the clients of Derive relationship. Columns represent the Requirements that are the suppliers of Derive relationship. The example below is created by using the extract requirement values.mdzip sample model that comes only with SysML Plugin.

Legend	<b>D</b> .	🗆 🛅 User Needs					
↗ DeriveReqt			Ġ.,				
		UN1 Environmentally friendly	R UN2 Charging	R UN2.1 Regenerative braking	R UN4 Cruise control	R UNS Braking	R UN7 Range
System Requirements		1		2	2	3	4
R SR1 Adaptive Cruise Control	1				7		
R SR2 Regenerative Braking	1		1	$\overline{}$			
SR3 Braking safety requirements	2		1	$\overline{}$		$\overline{}$	
R SR3.1 Stopping Distance	1					7	
R SR3.2 Friction Brake Heating	1					7	
R SR4 ACC Brake	1						
R SR5 Category 1 of Ultra Low Emission Vehicle	1						
🖻 🖳 R SR6 Distance	1						
R SR6.1 Full charge mode distance	1						$\overline{}$
R SR6.2 Quick charge mode distance	1						$\overline{}$
R SR6.3 Hybrid mode distance	1						

<sup>•</sup> Refine Requirement Matrix allows you to analyze, create, and modify Refine relationships between Requirements and other design elements. Rows represent the elements that are the clients of Refine relationship. Columns represent the Requirements that are the suppliers

of the Refine relationship. The example below is created by using the extract requirement values.mdzip sample model that comes only with SysML Plugin.



Satisfy Requirement Matrix allows you to analyze, create, and modify Satisfy relationships between Requirements and other design elements. R
ows represent the elements that are the clients of Satisfy relationship. Columns represent the Requirements that are the suppliers of the Satisfy
relationship. The example below is created by using the extract requirement values.mdzip sample model that comes only with SysML Plugin.

دوend عنائل	R 5R3 Braking safety requirements	R SR3.1 Stopping Distance	R SR3.2 Friction Brake Heating	R SR5 Category 1 of Ultra Low Emission Vehicle	R SR6 Distance	R SR6.1 Full charge mode distance	R SR6.2 Quick charge mode distance	R SR6.3 Hybrid mode distance	R SR7 Time	R SR7.1 Full charge mode time	R SR7.2 Quick charge mode time	R SR8 Vehicle's battery mass	R SR9 Vehicle's battery energy consumption	R SR10 Electric Motor Power	R SR11 Fuel consumption	R SR12 Acceleration	R SR13 Brake Fluid Temperature	R SR14 Cargo	R SR15 Seat	R SR16 Maximum speed	R SR17 Tire	R 5R18 Car locking system	R SR19 Cargo space
□- 🛅 System Structure		1	1			1	1	1		1	1	1	1	1	1	1	1			1			1
다. 🔜 Body																							1
volume[decicubic metre]																							2
🛱 🔚 Brake Subsystem		1	1																				
V frictionBrakeHeating : power[kilowatt]			2																				
		2																					
Electric Motor														1									
v power : power[kilowatt] = 96.0														27									
🛱 - 🧱 Fluid reservoir																	1						
																	27						
🛱 🔚 Fuel Tank Assembly								1							1								
/distanceOnGasolineMode : distance[kilometre]								2															
<pre>consumption : volume[decicubic metre] = 6.0</pre>															27								
🛱 🧱 High-voltage Battery						1	1			1	1	1	1										
… V distanceOnFullCharge : distance[kilometre] = 200.0						2																	
distanceOnQuickCharge : distance[kilometre] = 95.0							27																
energyConsumption : electric power[kilowatt] = 14.0													2										
										27													
mass : mass[kilogram] = 100.0												27											
v quickChargeTime : time = 45.0											2												
🖻 - 🔜 Power Subsystem																1				1			
v acceleration : speed[metre per second]																27							
maxSpeed : speed																				2			

• Verify Requirement Matrix allows you to analyze, create, and modify Verify relationships between Requirements and other design elements. Rows represent the elements that are the clients of Verify relationship. Columns represent the Requirements that are the suppliers of the Verify relationship. The example below is created by using the Categorization requirements.mdzip sample model that comes only with Cam eo Requirements Modeler Plugin.

Legend	⊡	Ē 1	Req	uire	ment	s								_	_	_	
↗ Verify		ġ	R	τw	CATI	50	Proje	ct C	ate	goriz	zatio	n					
					⊟	R	TWC	AT	150.	5 Ca	teg	ory I	1ana	agen	nent		
							ġ	R	TWO	CAT	150.	5.2	Jser	-def	ined	Cat	egor
			R TWCATIS0.1 Category Definition	R TWCAT150.4 Category Properties		R TWCAT150.5.1 System Category Management Restrictions		R TWCATI50.5.2.1 Category Management Actions	R TWCAT150.5.2.2 Avoiding Name Clashes with System Category	R TWCAT150.5.2.3 Ensuring Name Uniqueness-	R TWCAT150.5.2.4 Automatically Reassigning Projects to System Category	R TWCAT150.5.2.5 Removing Category by Multiple Users at the Same Time	R TWCAT150.5.2.6 Handling Category Removal While Others Are Renaming It	R TWCAT150.5.2.7 Ensuring That Category Name is Entered	R TWCAT150.5.2.8 Category Renaming by Multiple Users	R TWCAT150.5.2.9 Assigning Project to Category While Others Are Deleting It-	R TWCAT150.5.2.10 Project Assigning to Categories by Multiple Users
Adding Local Projects to Teamwork											1	1				1	
Assigning Project to Category While Others Are Deleting It	1															7	
	1										7					-	
🛄 🔂 Removing Category by Multiple Users at the Same Time	1											7					

## (i) How to work with Requirement matrices

Requirement matrices are based on Dependency Matrix. That's why all it's procedures are allowable for Requirement matrices:

- Creating Dependency Matrix
  Using Dependency Matrix
  Dependency Matrix environment