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Analyzing system variability according to modes and states

INCOSE SYMPOSIUM, JULY 18TH 2017

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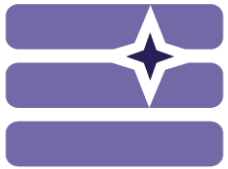

Capella

Open Source Solution for Model-Based Systems Engineering

A result of the **Clarity** *collaborative project*

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ALTRAN

Mission	Phase 1	Phase 2	Phase 3	Phase 4

System		Mode 1	Mode 2	Mode 3	Mode 4	Mod
Subsystems	1	Mode A	Mode B	Mode C	Mode A	Mode (
	2	Mode X	Mode Y	Mode Z		ModeX
	3	Mode I	Mode J	Mode I	Mode J	M

Mode combinations. Identical issue with states

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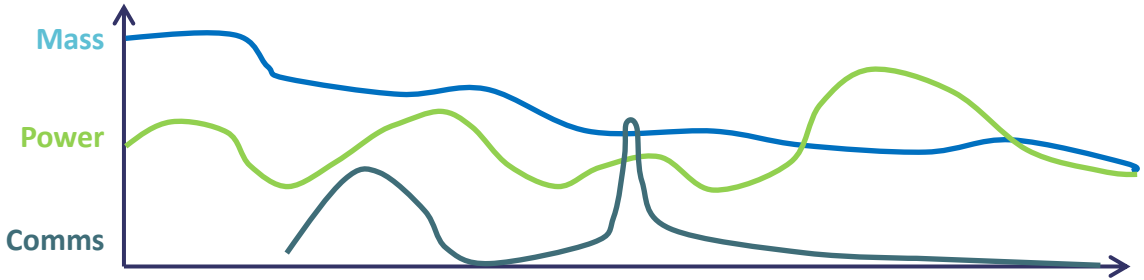
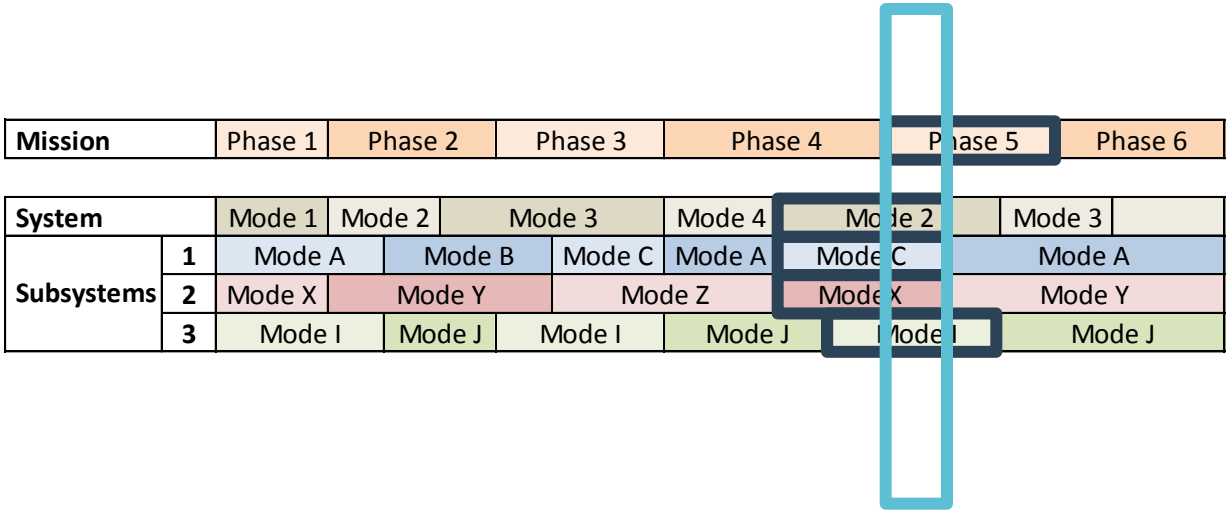
Mission	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6

System		Mode 1	Mode 2	Mode 3	Mode 4	Mode 2	Mode 3	
Subsystems	1	Mode A	Mode B	Mode C	Mode A	Mode C	Mode A	
	2	Mode X	Mode Y	Mode Z		ModeX	Mode Y	
	3	Mode I	Mode J	Mode I	Mode J	Mode I	Mode J	



How are non-functional and parametric analyses correlated with modes and states?



What is the **expected** / **actual** functional behavior in one particular combination of modes and states?

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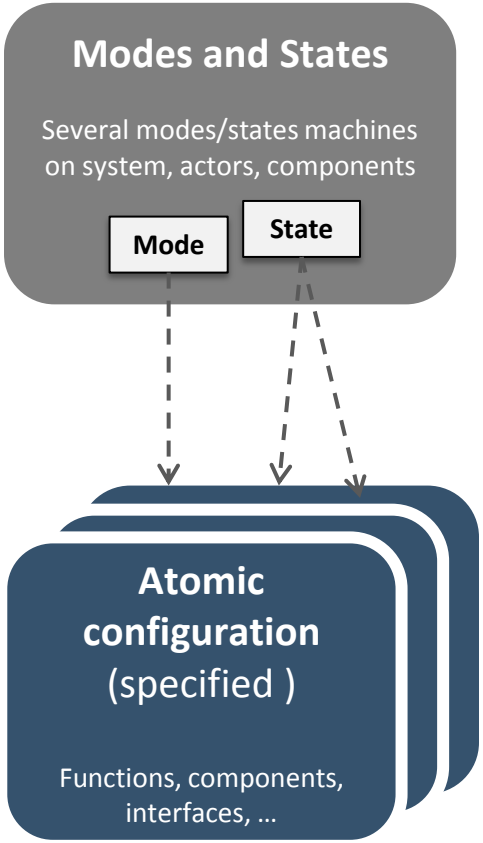
1

Capture atomic configurations



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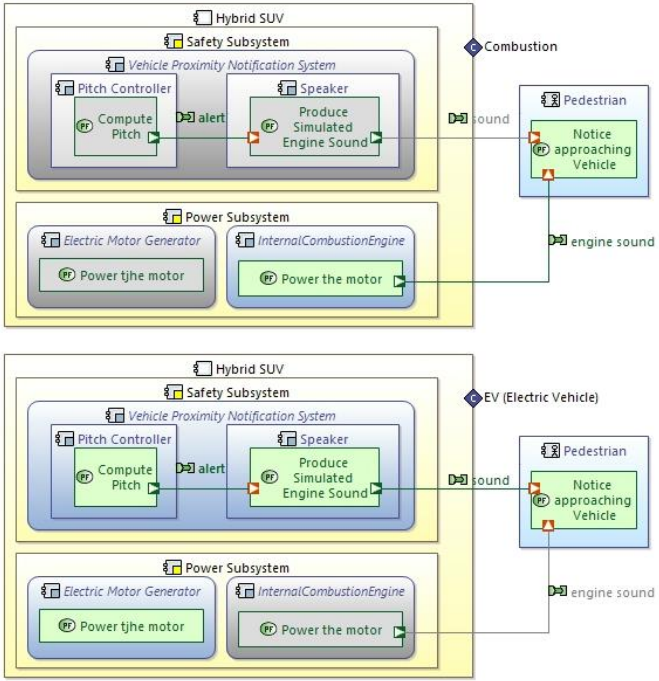
	EV ...	Hybrid	Combustion
safe vehicle approach			
safe pedestrian encounter in combustion configuration	X		
safe pedestrian encounter in EV configuration			X
Hybrid SUV			
Safety BCs			
Vehicle Proximity Notification System		X	X
Speaker			
Produce Simulated Engine Sound			
sound			
alert			
Pitch Controller			
bus			
Compute Pitch			
BrakeAssist			
Airbags			
Power Subsystem			
Power BCs			
Transmission			
PowerControlUnit			
InternalCombustionEngine	X		
FuelTankAssembly	X		
ElectricalPowerController			
Electric Motor Generator			X
Differential			
BatteryPack			



Relate atomic configurations
to specific modes and states

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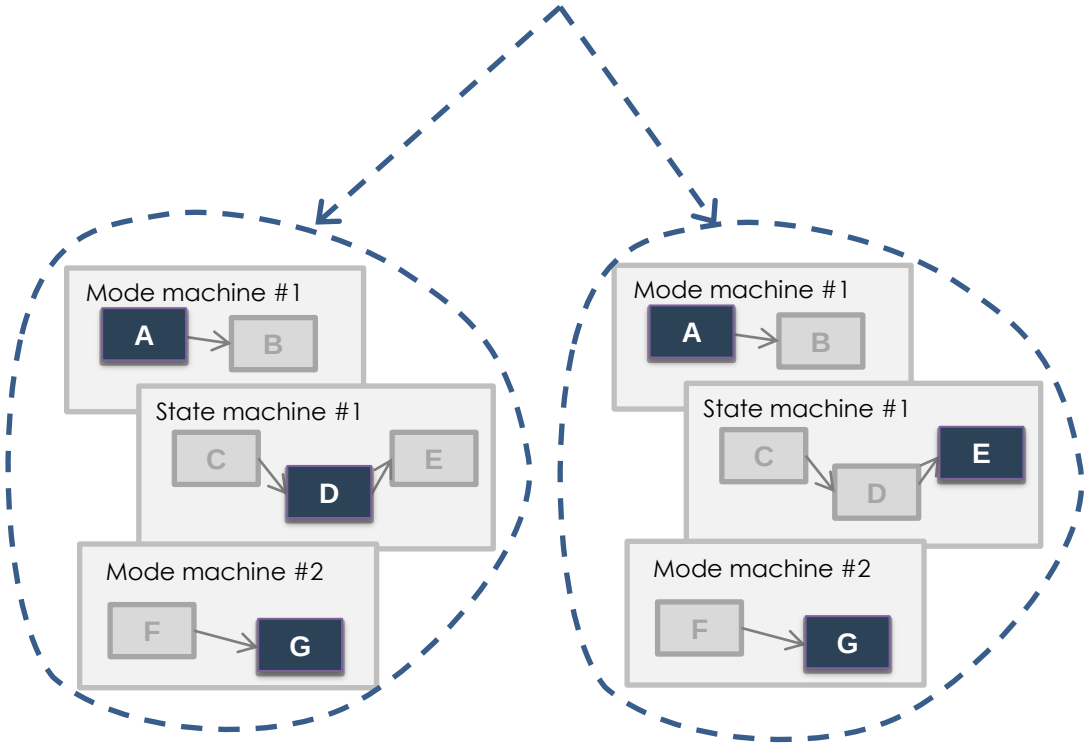
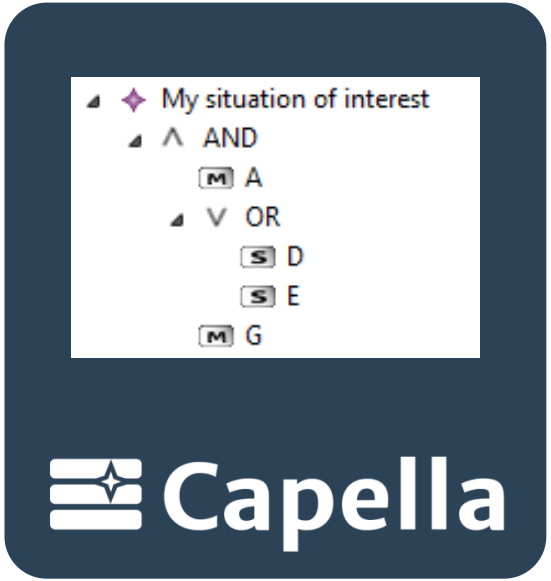
2

Identify situations of interest

SITUATION: Mode A AND (State D or State E) AND Mode G





Current mode/state in the mode/state machine

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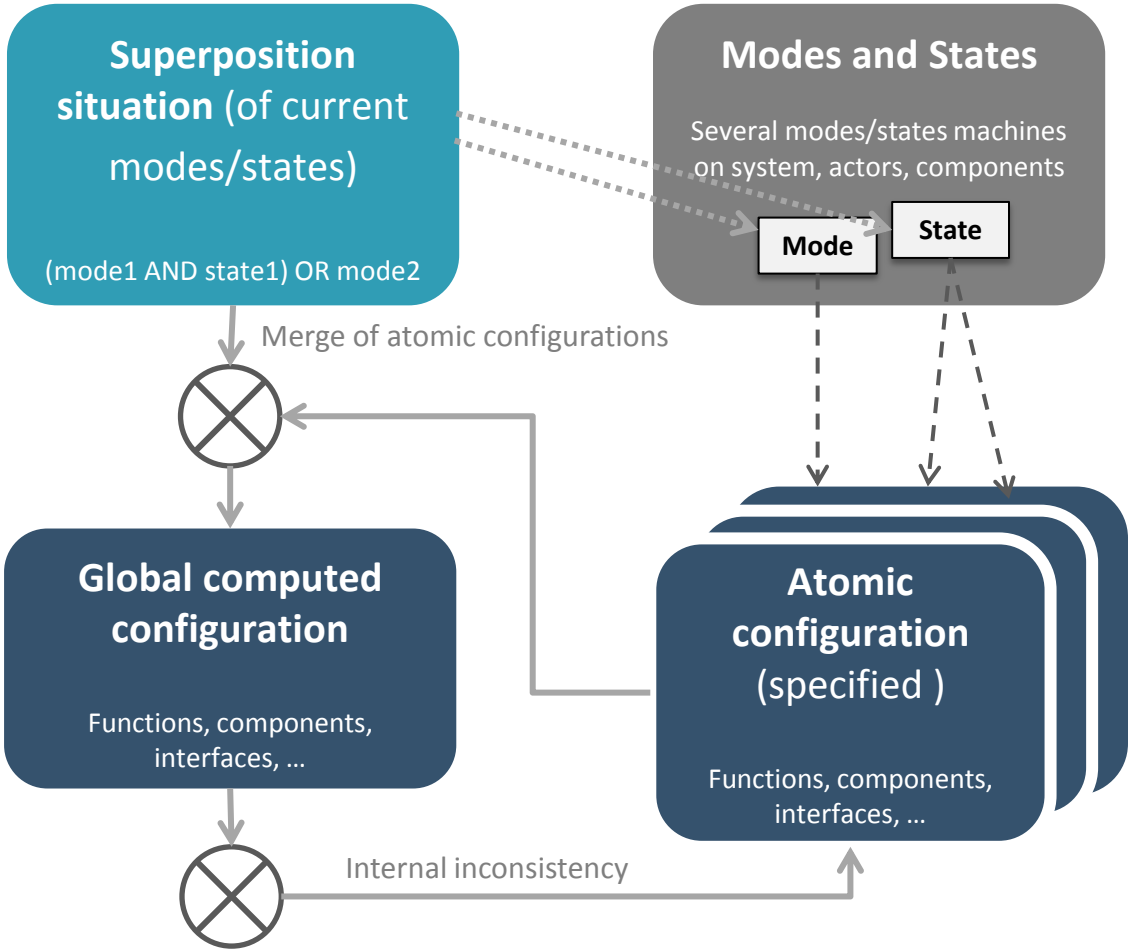
3

Compute the global configuration for this situation



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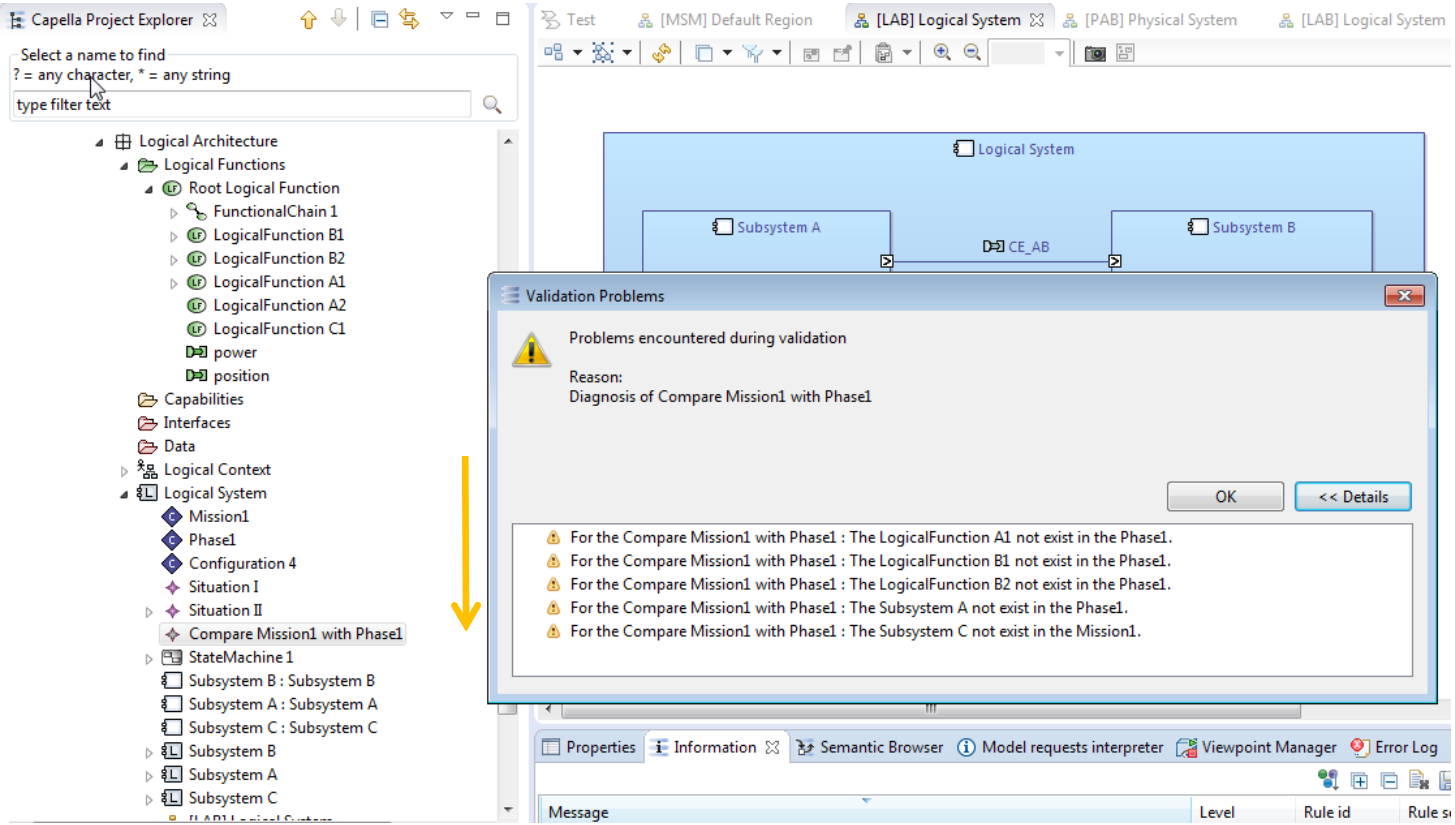

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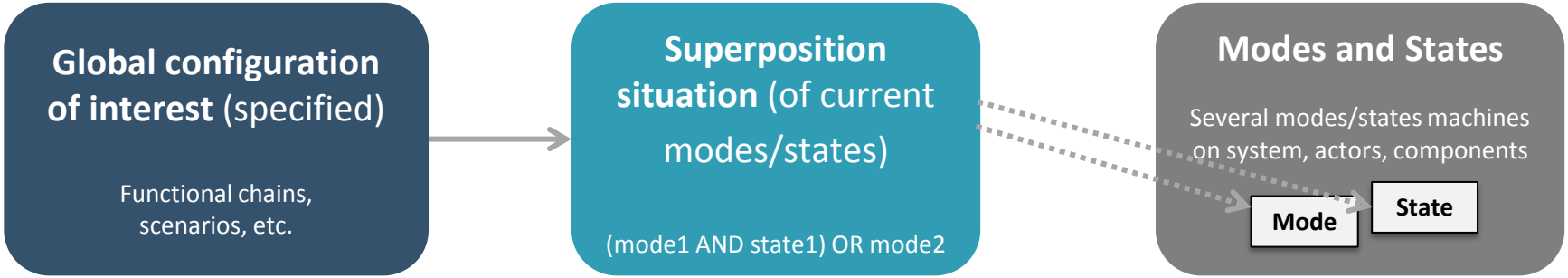
4

Specify what is expected in term of functional content for this situation



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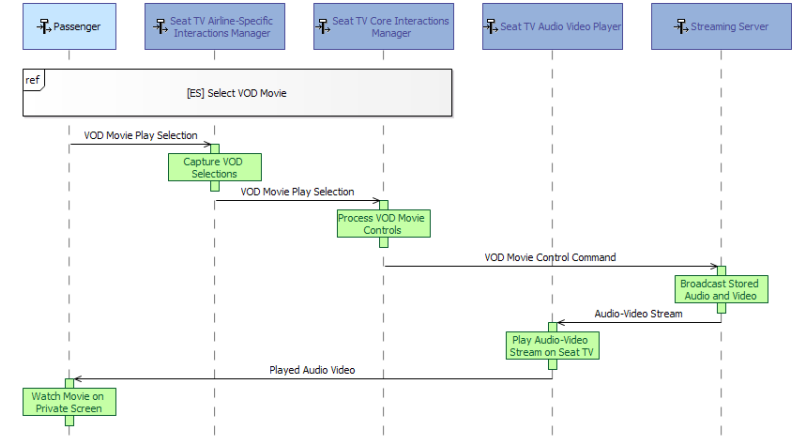

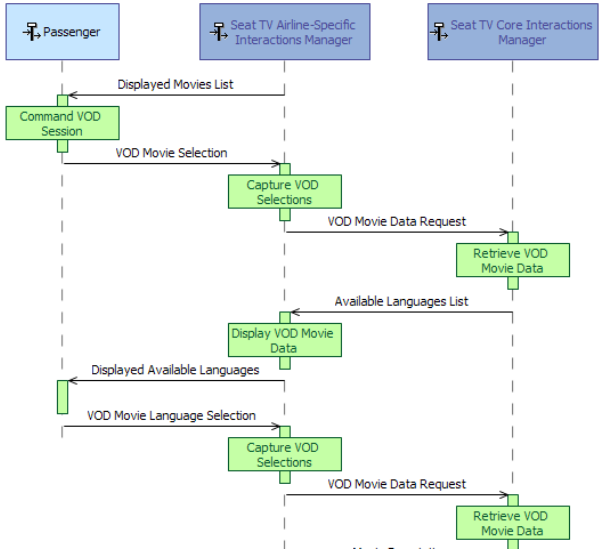

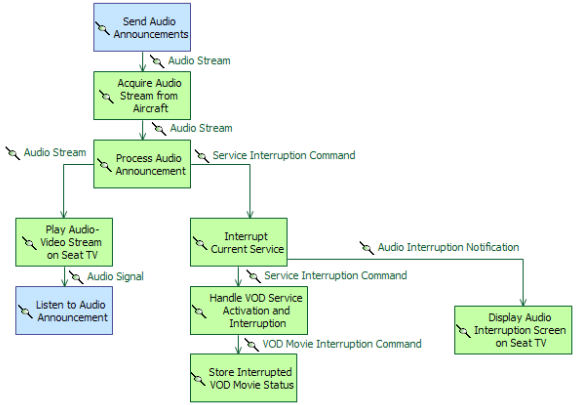

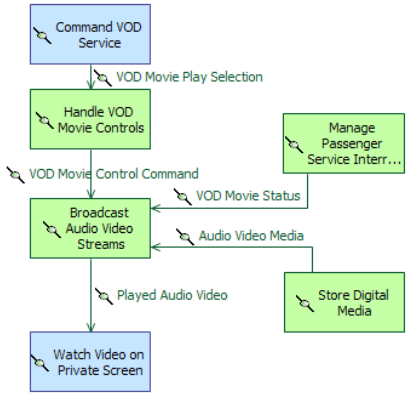

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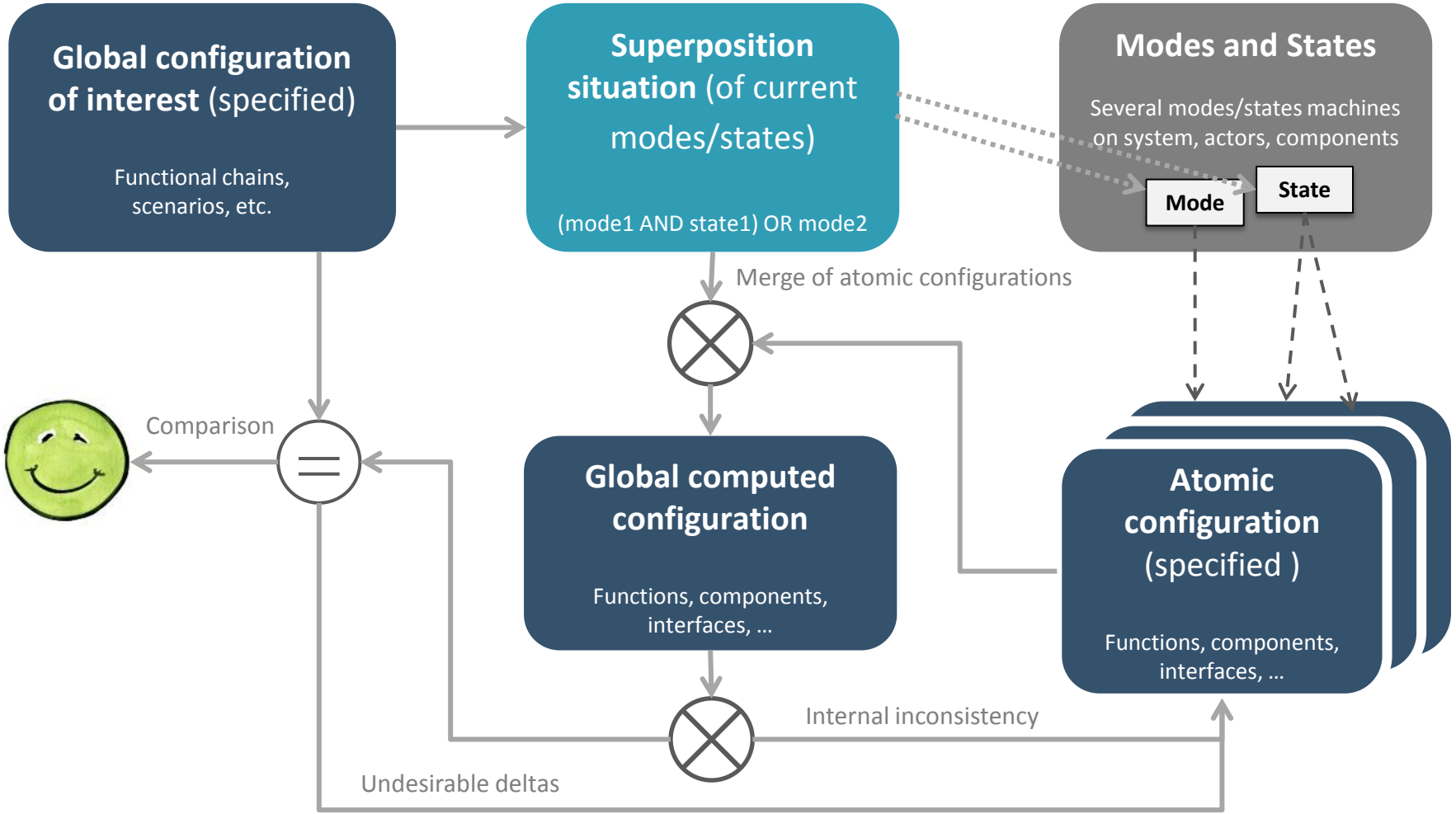
5

Compare expected vs computed



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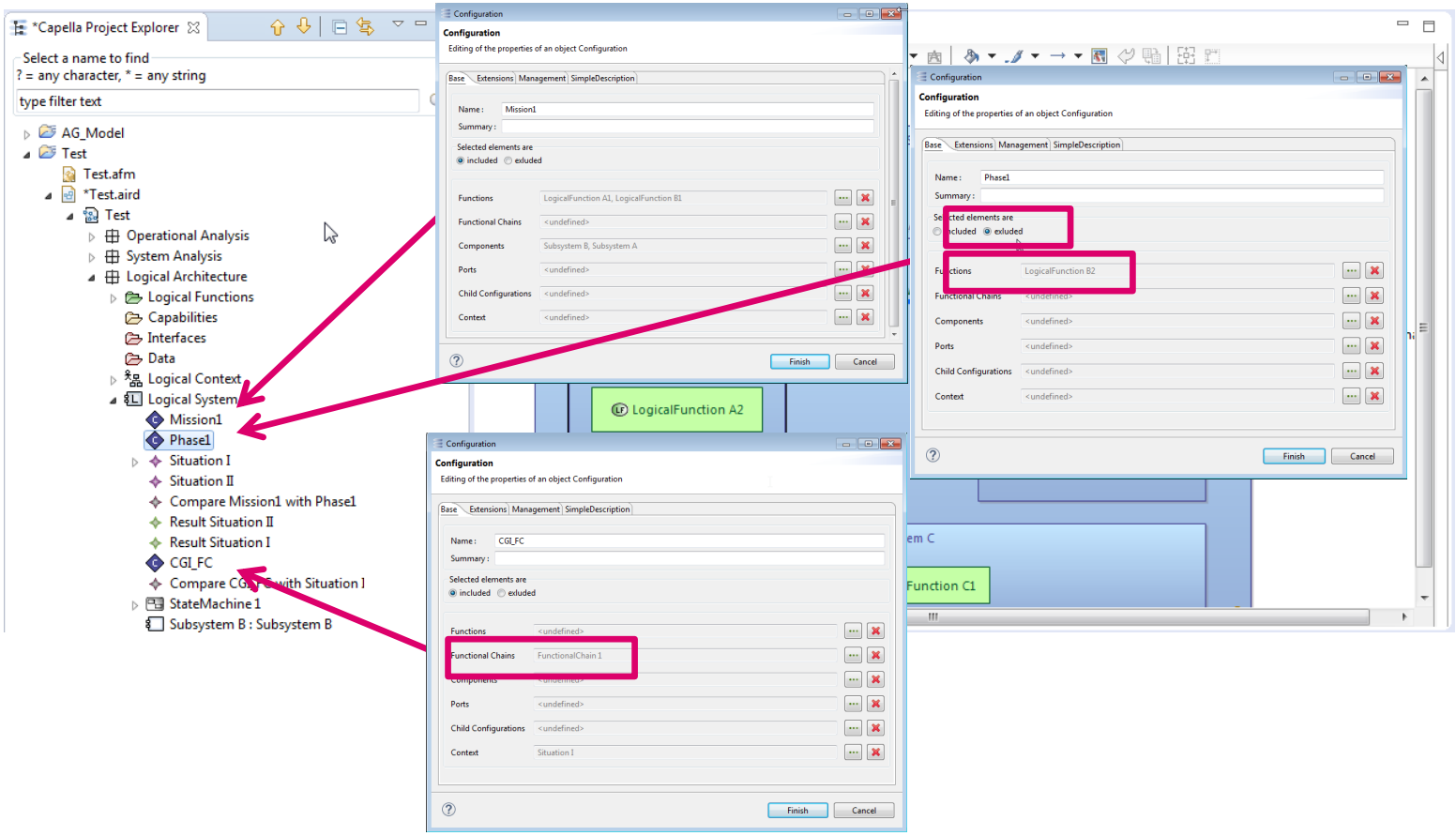

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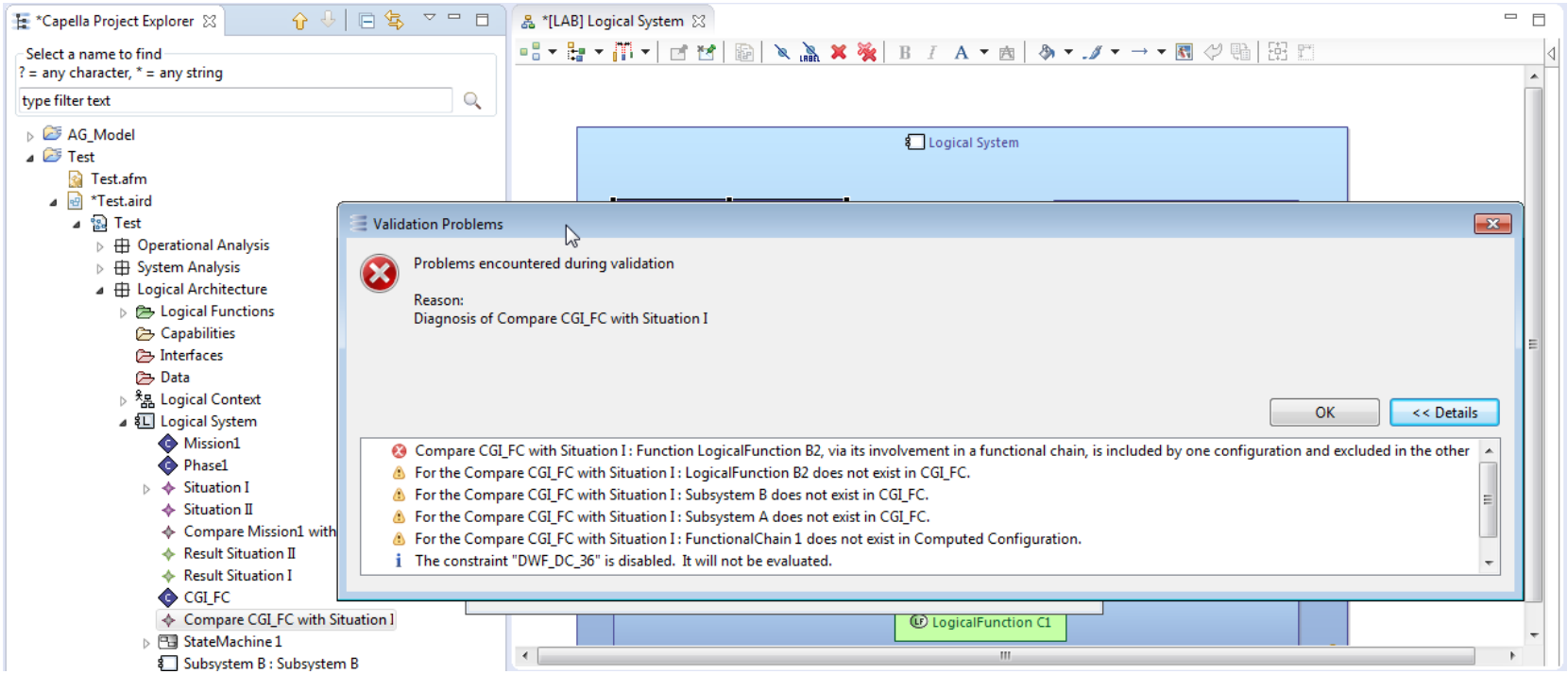

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Live demos on the booth!

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Thank You! Questions?

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