

Top 10 reasons why Capella is different

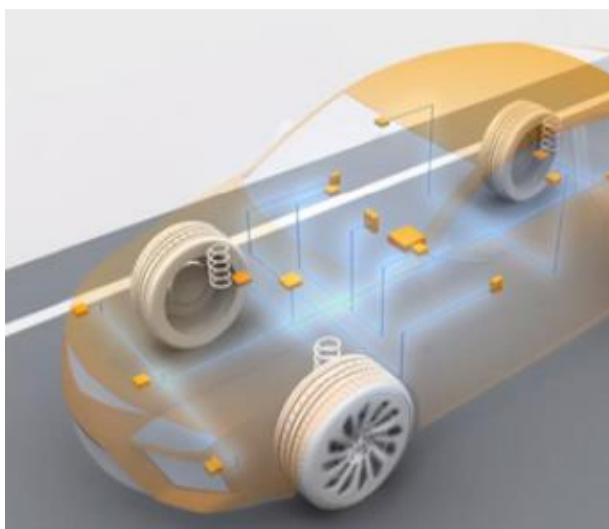
CAPELLA DAY STUTTGART, MARCH 13TH 2018

Stéphane Bonnet

In charge of Thales Corporate MBSE Coaching & Community
Capella Design Authority

stephane.bonnet@thalesgroup.com





#1 - Scope

What are Arcadia and Capella meant for?

Scope

Enterprise Architecting (operational capabilities and need, orientations, etc.)

Multi-physics:
3D,
power models,
thermal models,
etc.

Algos,
Real-time
Analysis,
NF,
Etc.

System Architectural Design

**SW/HW/FM
Architectural Design**

V&V

Detailed design, development

Scope

Enterprise Architecting (operational capabilities and need, orientations, etc.)

Multi-physics:
3D,
power models,
thermal models,
etc.

Algos,
Real-time
Analysis
NF,
Etc.



ARCADIA

Method

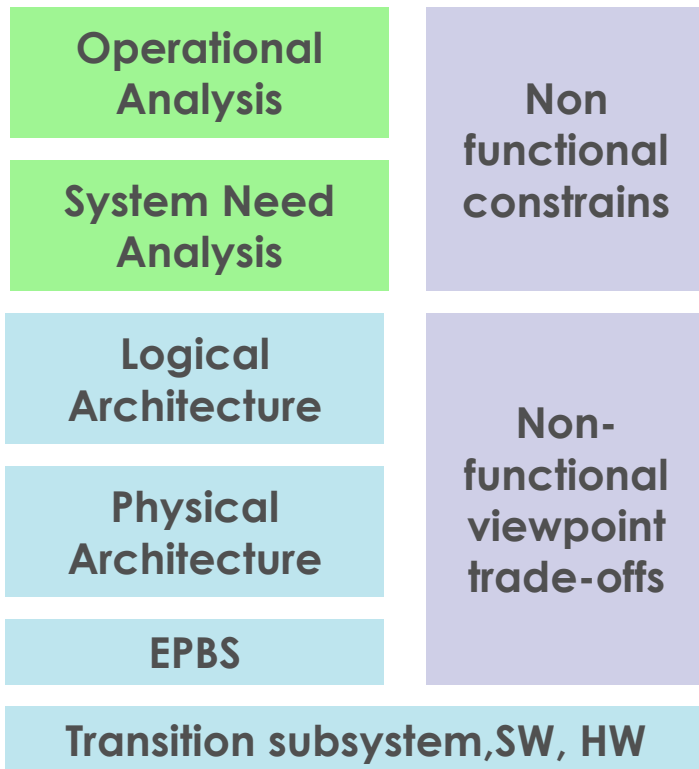


Capella

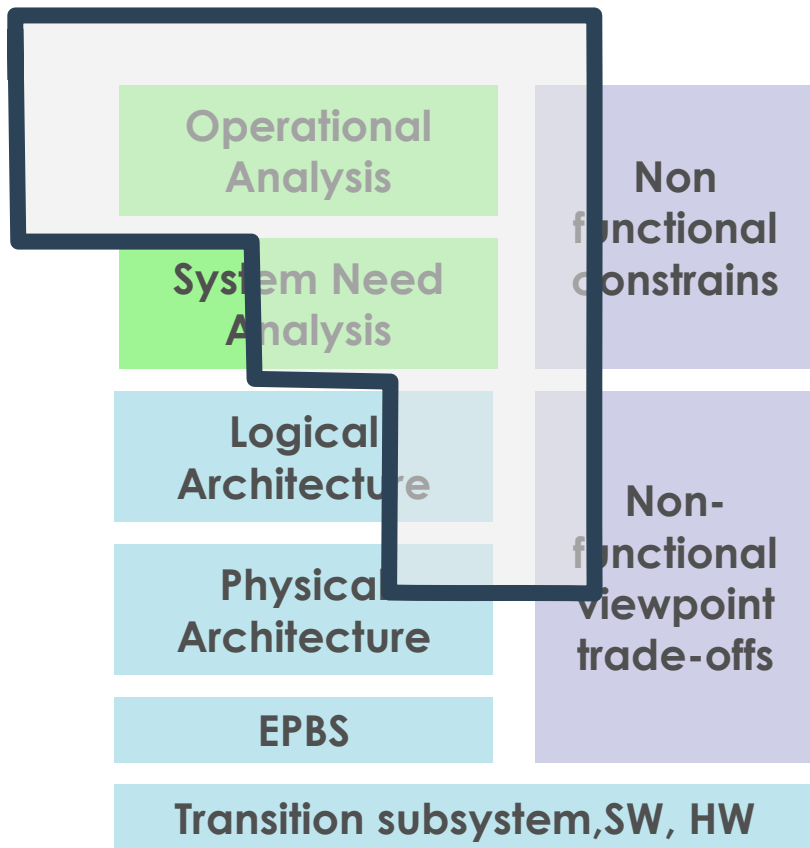
Workbench

V&V

Detailed design, development



Arcadia and Architecture Frameworks



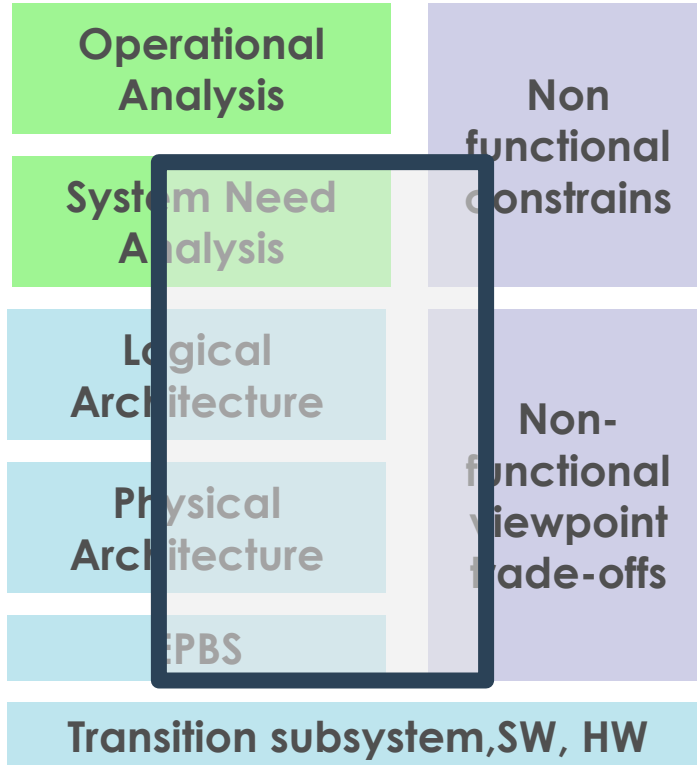
Similar concepts

- Operational Entities, Actors, Roles
- Operational Activities, Processes
- States and modes, functions, data flows, etc.
- System Nodes, equipment
- Traceability between operational & system

Similar diagrams

- OV2, OV4, OV5, OV6, OV7;
- SOV;
- SV1, SV2, SV4, SV5, SV10...

Arcadia & SysML



Main differences

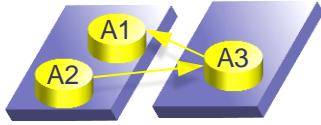
- Method vs Language
- Activity diagrams vs functional dataflows
- Management of types and instances

Arcadia additions

- Operational analysis
- Functional analysis

#2 - Arcadia

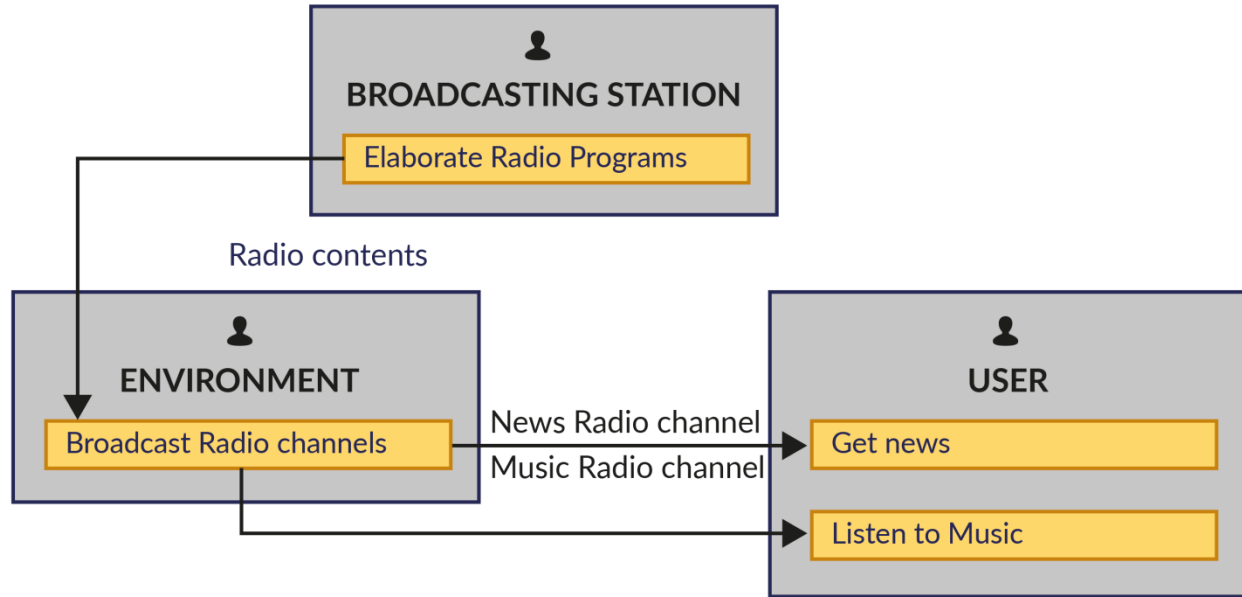
Field-originated, model-based engineering method

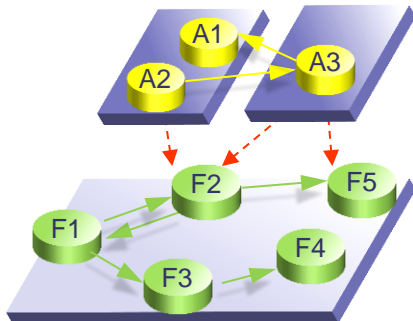


Operational Analysis

WHAT THE USERS/STAKEHOLDERS
NEED TO ACCOMPLISH

Support of discussions
with the customer,
capabilities, scenarios
and processes

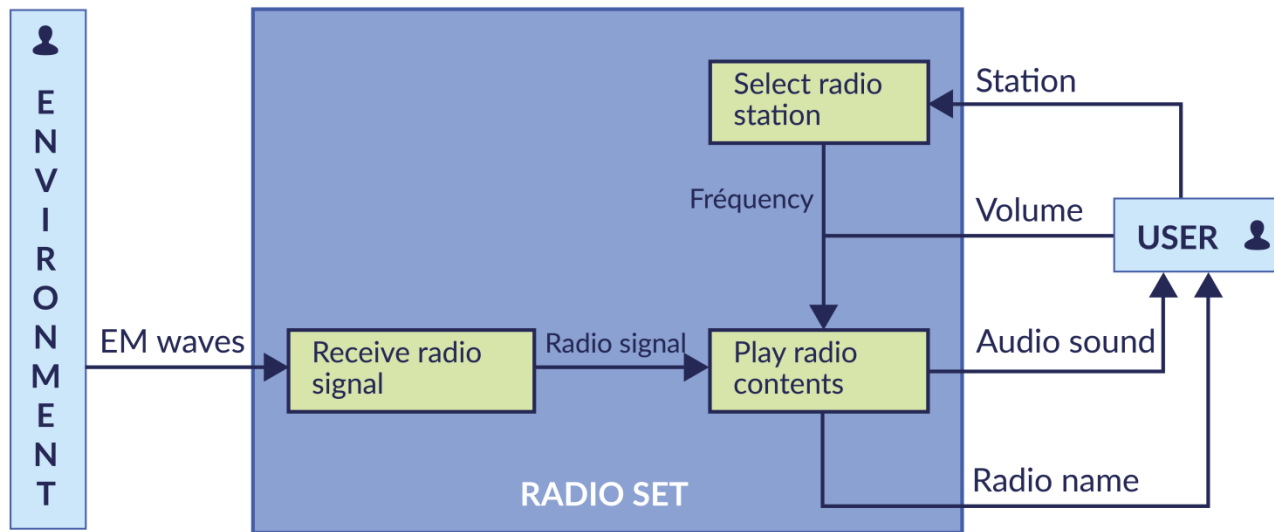


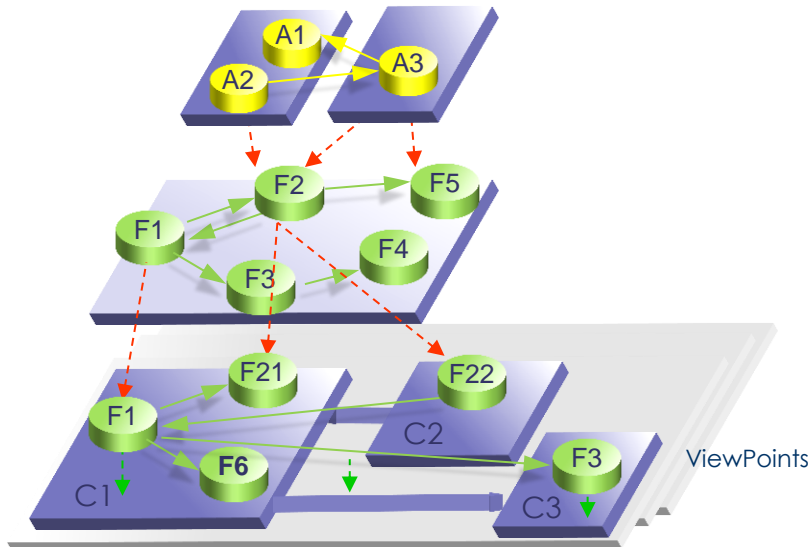


System Need Analysis

WHAT THE SYSTEM HAS TO ACCOMPLISH FOR THE USERS

Boundaries, external interfaces, specification, v&v procedures, feasibility of requirements

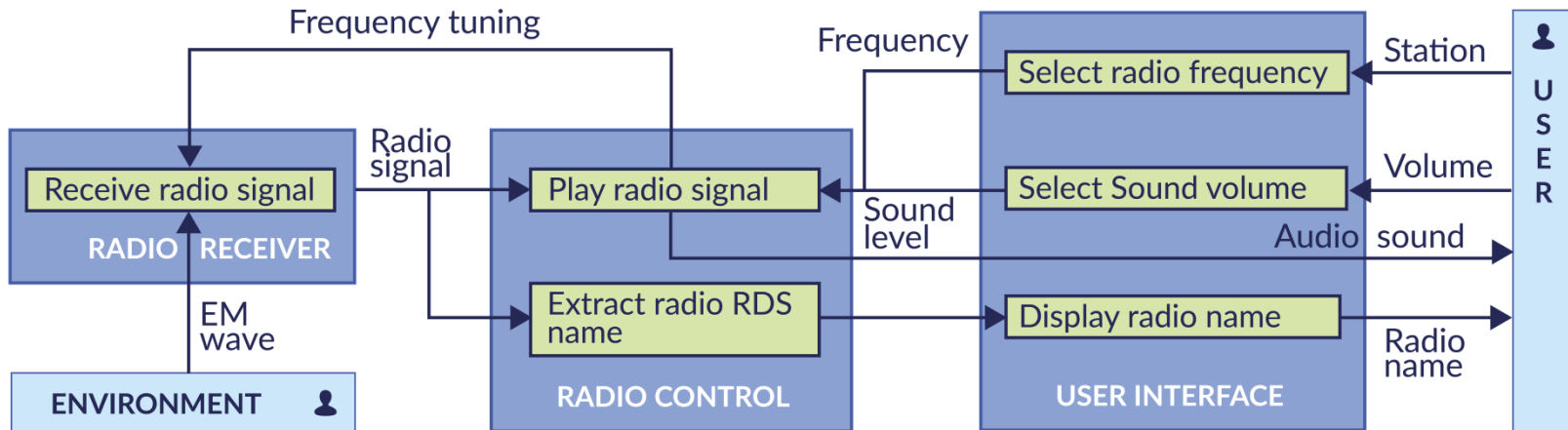


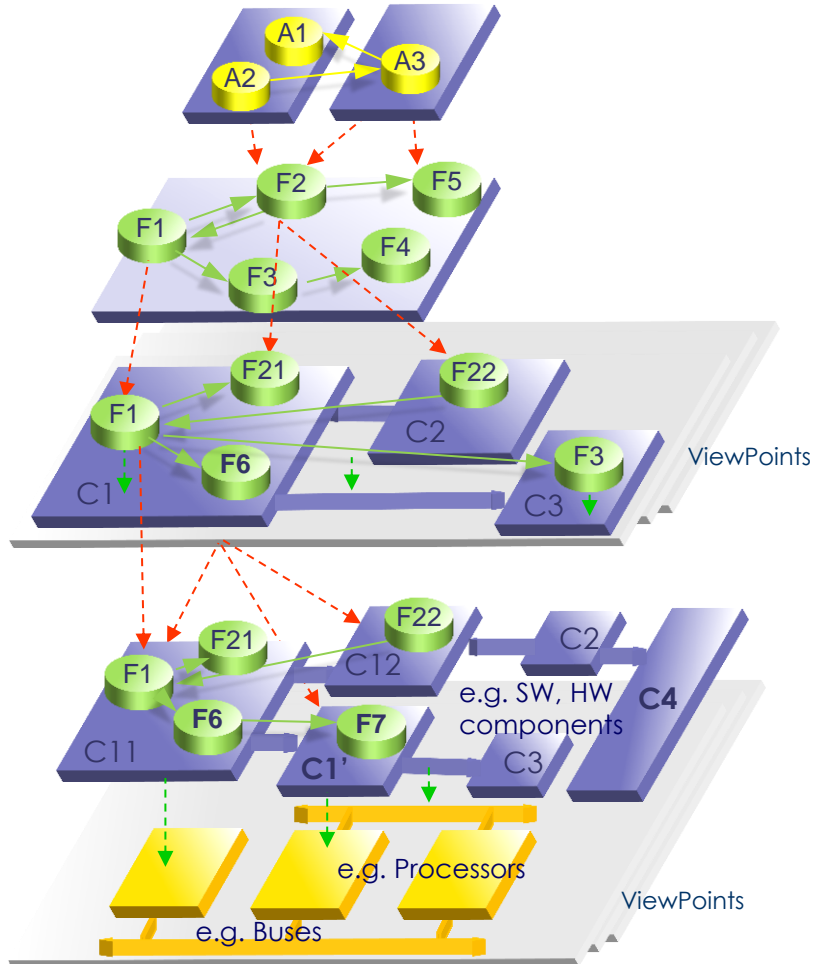


Logical Architecture

HOW THE SYSTEM WILL WORK SO AS TO FULFIL EXPECTATIONS

High-level architecture description, functional refinement, architectural drivers, functional allocation, first trade-offs, modes and states analysis

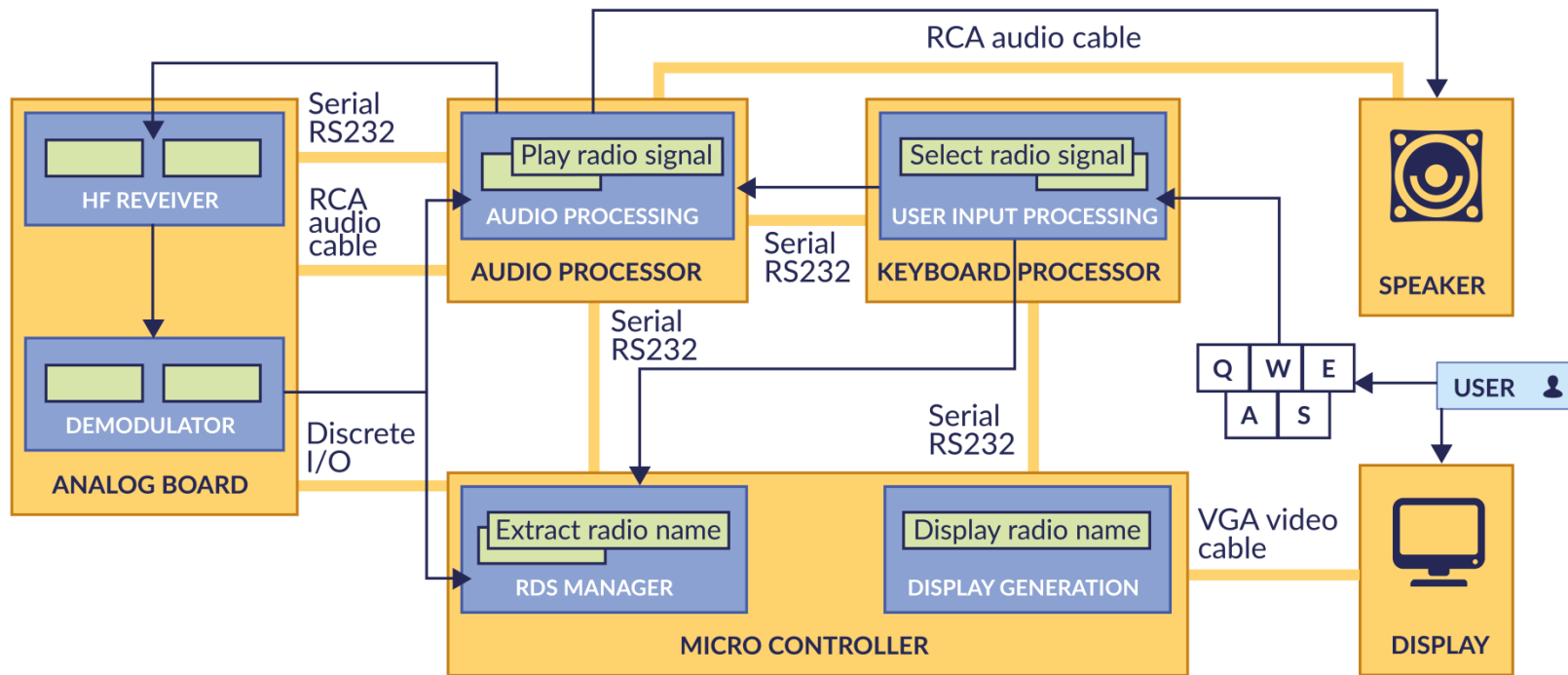




Physical Architecture

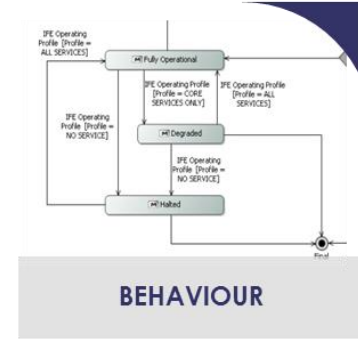
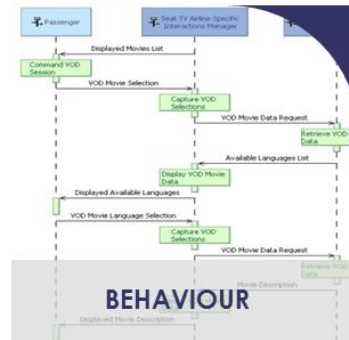
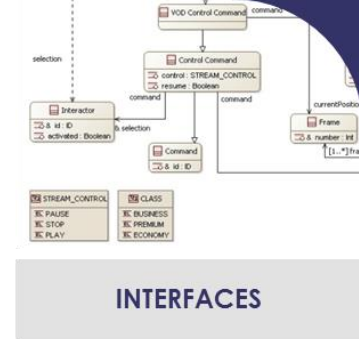
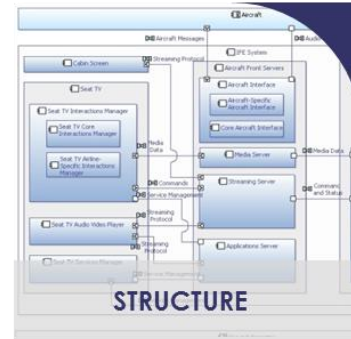
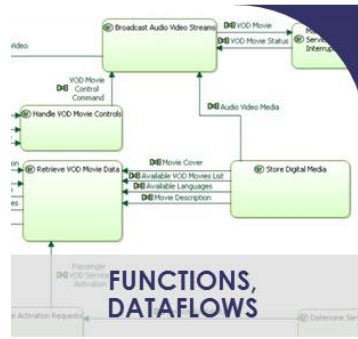
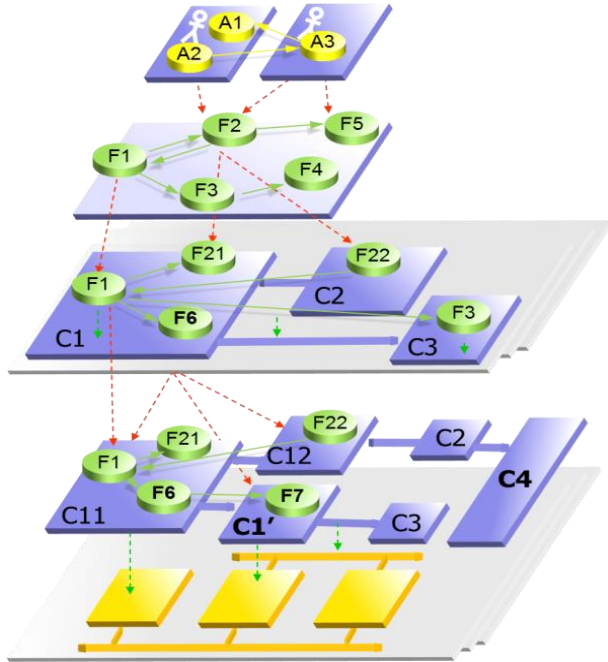
HOW THE SYSTEM WILL BE DEVELOPED AND BUILT

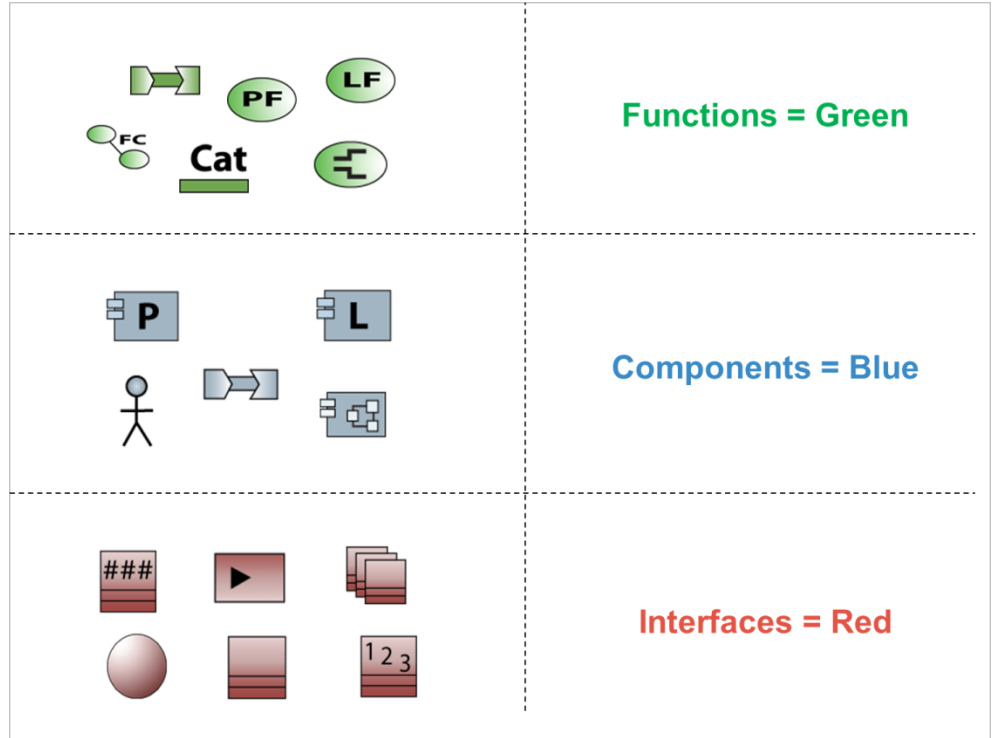
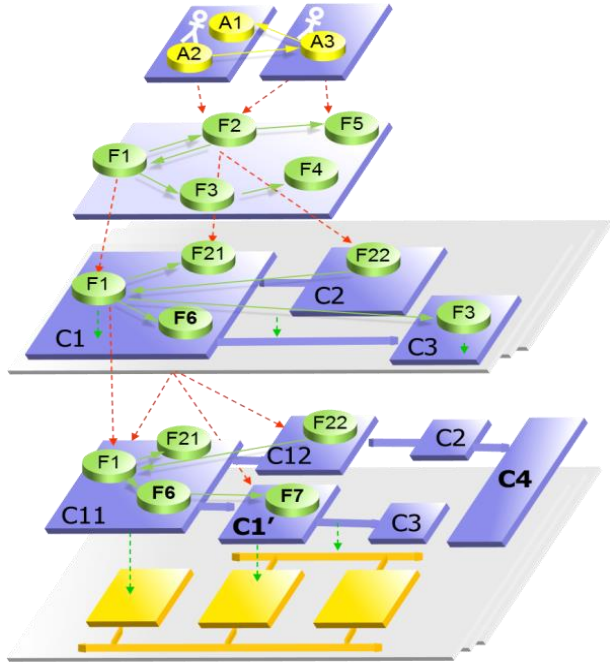
Implementation constraints,
reuse, refined trade-offs,
M/T/B strategy,
finalized detailed interfaces

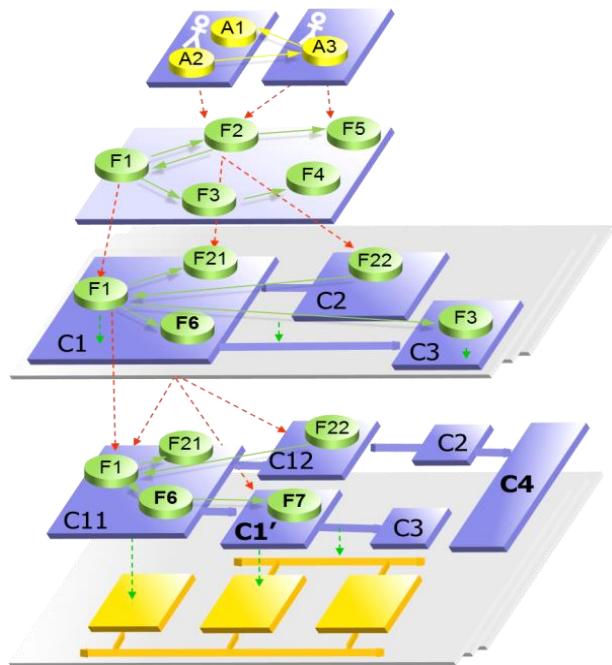


#3 - Method-coupled

What does this mean?







In-Flight Entertainment System - Activity Explorer

Logical Architecture

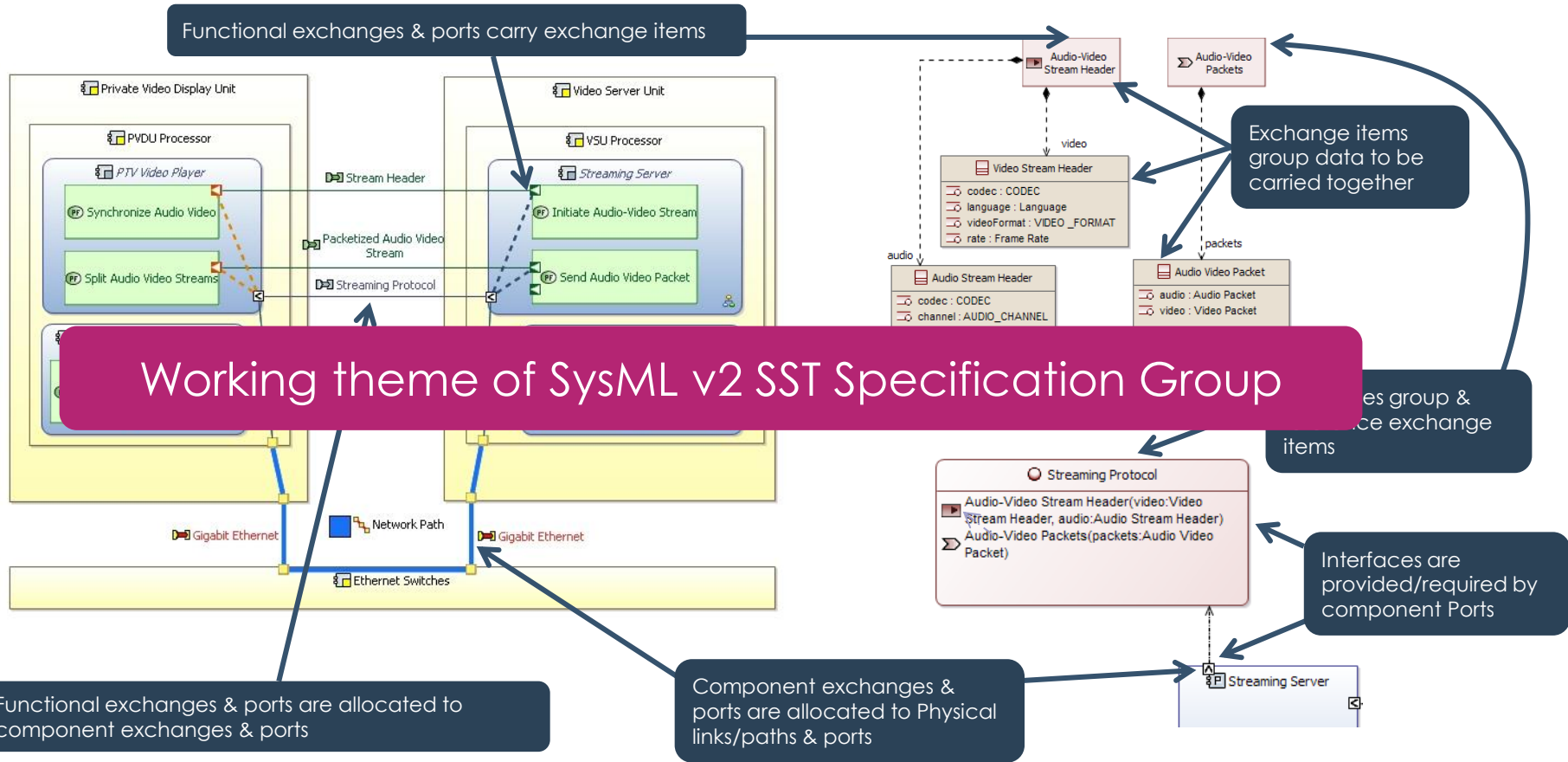
System Analysis **Logical Architecture** *Develop System Architectural Design* Physical Architecture

- Transition from System Functions
- Refine Logical Functions, describe Functional Exchanges
 - [LFB] Create a new Functional Breakdown diagram
 - [LDFB] Create a new Functional Dataflow Blank diagram
 - [FS] Create a new Functional Scenario
- Define Logical Components and Actors
- Allocate Logical Functions to Logical Components



#4 – Support of Functional Analysis

Proper integration with structure and interfaces



Working theme of SysML v2 SST Specification Group

Functional exchanges & ports are allocated to component exchanges & ports

Component exchanges & ports are allocated to Physical links/paths & ports

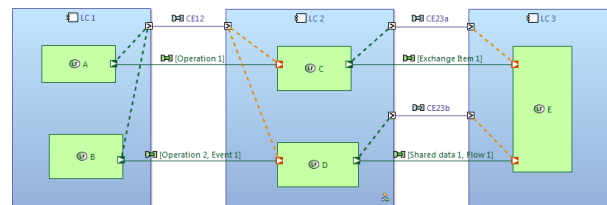
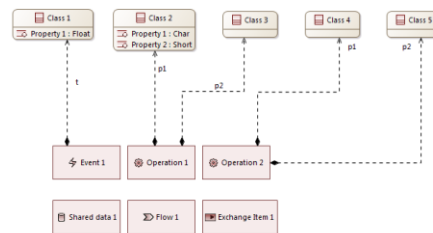
Exchange items group data to be carried together

Interfaces are provided/required by component Ports

Interfaces are provided/required by component Ports



DEMO

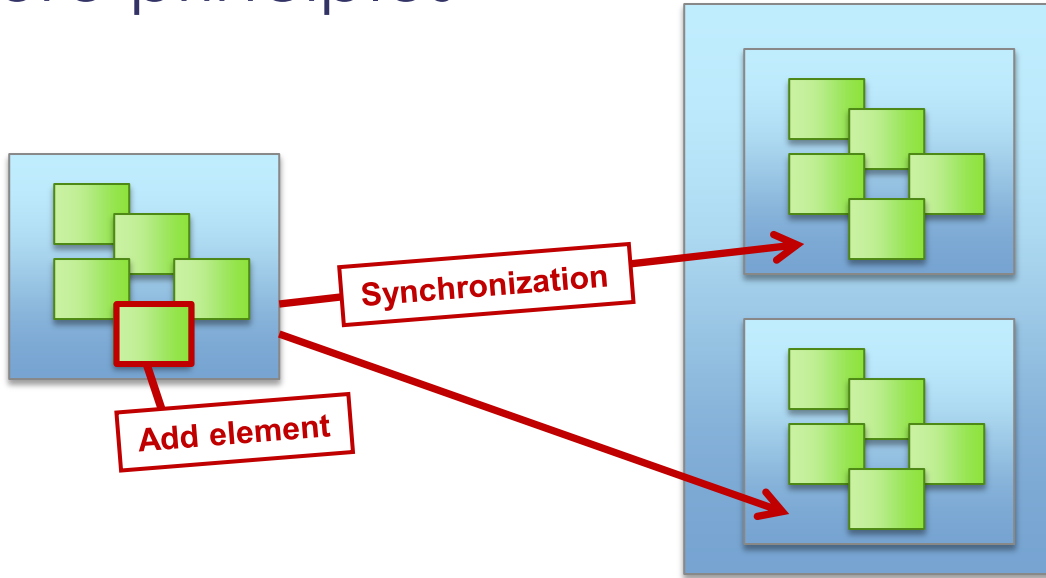


Message	Level	Rule id	Rule set
Capella (2 items)			
Design (1 item)			
Well-Formedness (1 item)			
Interfaces (1 item)			
Missing Exchange Item on Interface "CE12": "Operation 1" which is com.	Error		DWF_123
Integrity (1 item)			

#5 – Replicable Elements (REC-RPL)

Model instances, manage building blocks

Core principles



Synchronized copies
Different compliance rules

Blackbox

Constrained Reuse

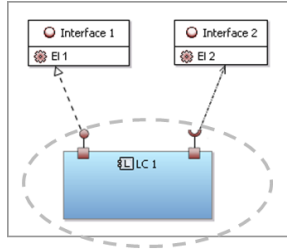
Inheritance



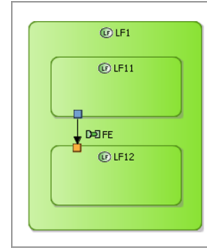
Customized

Examples of replicable elements

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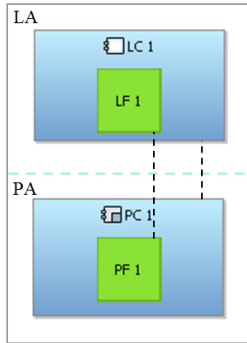
A Component, with references towards its provided / required Interfaces



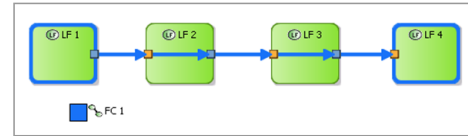
A Function and its children (mono root)



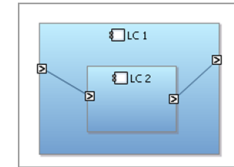
Two Functions and their Functional Exchanges (multi root)



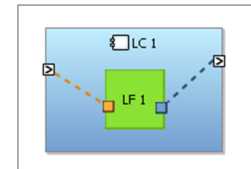
A Physical Component and the Logical Components it realizes, including Functions, etc.



A Functional Chain and its Functions / Functional Exchanges

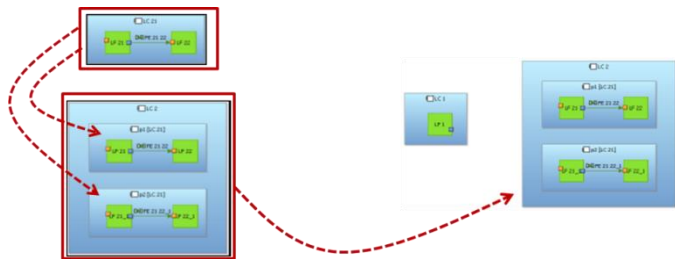
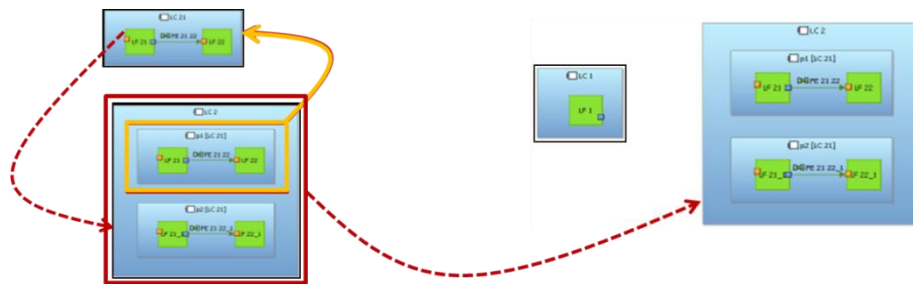
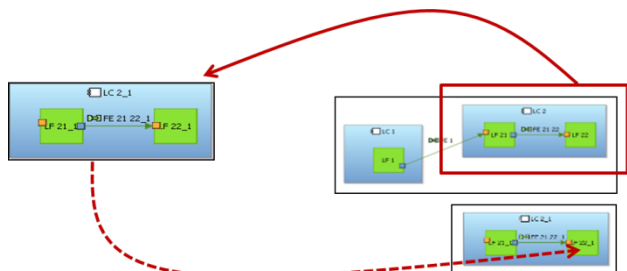


A Component and its Sub Components



A Component and its allocated Functions

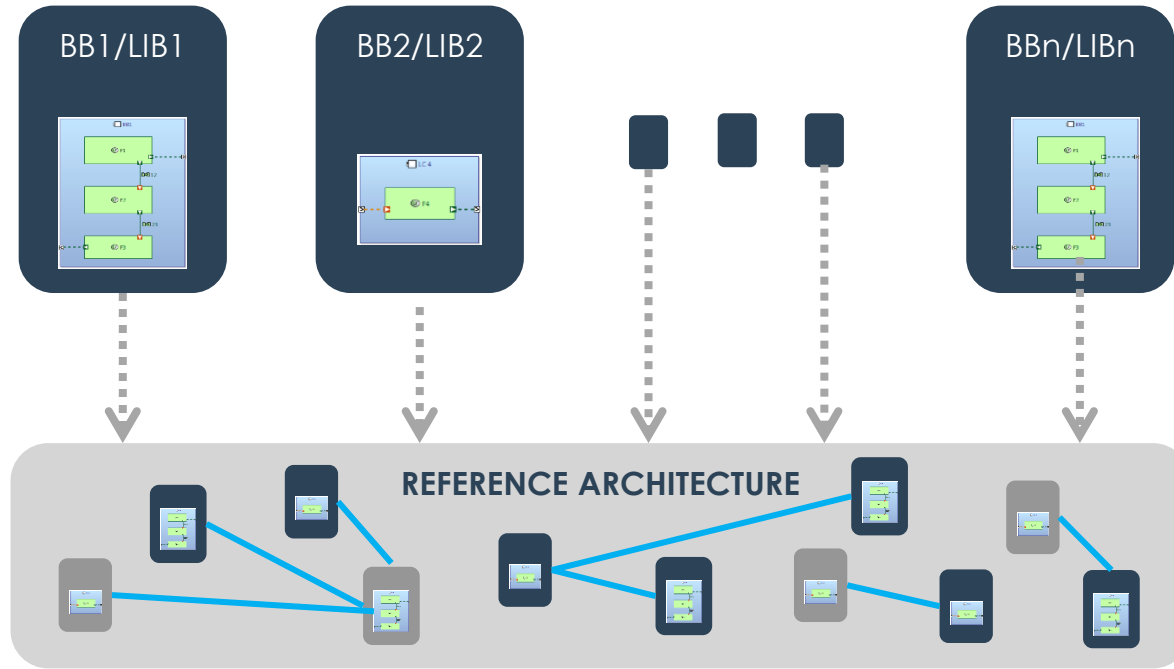
« Usages » and « Definitions », very different workflows



Working theme of SysML v2 SST Specification Group

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One library = One REC



Easier REC management, enable "REC" versioning (see Yuzu)

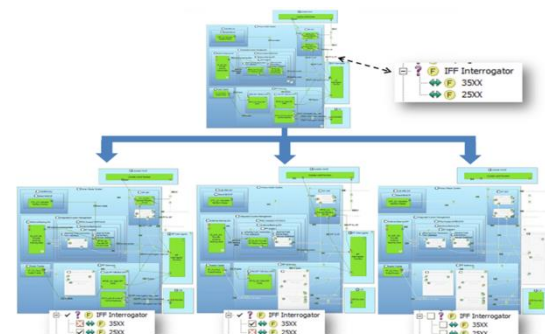
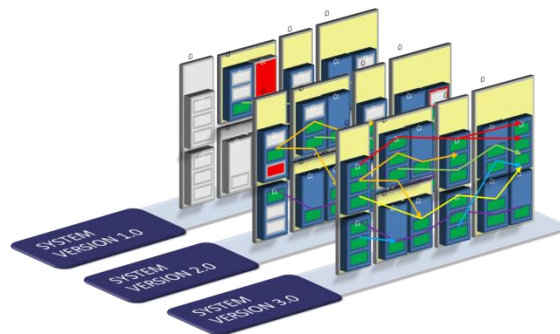
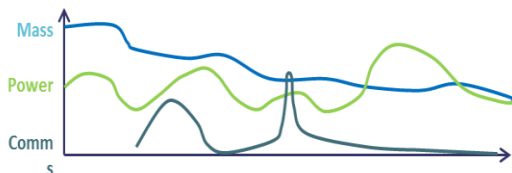
#6 - Comprehensiveness

Architecture evaluation

Other important (and addressed) aspects of engineering

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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	Mode X		Mode Y
	3 Mode I	Mode J	Mode I	Mode J	Mode I	Mode J



Modes and states

Analyzing the variability of the system during its operation

Model-based V&V

Driving v&v activities by expected functional content

Product line

Variability management based on feature models

Architecture early evaluation

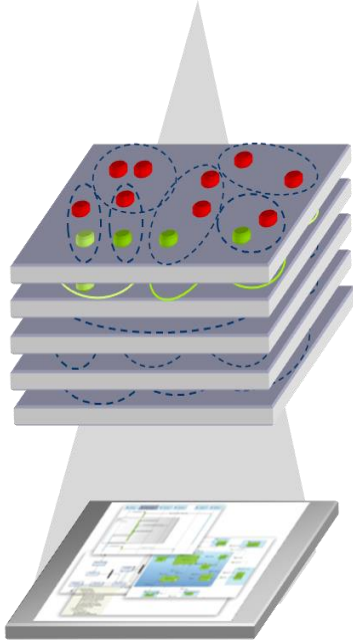
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Performance

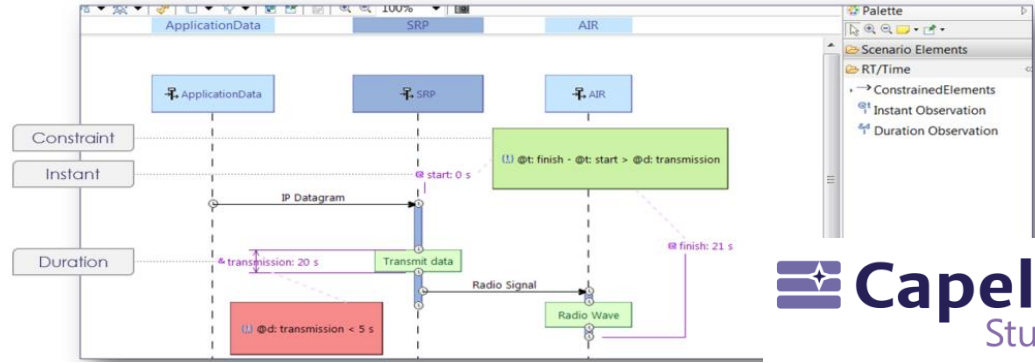
Mass

Safety

...

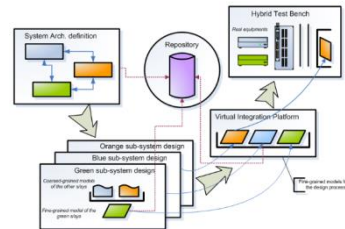


Autonomous viewpoints

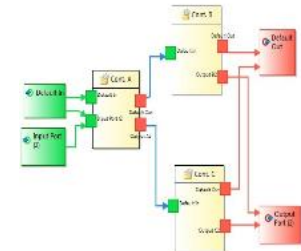


Capella
Studio

Birectional coupling with specialty tools



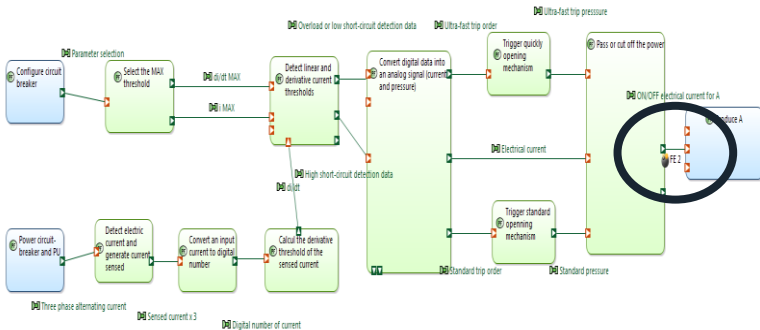
Citrus
simulation
env.



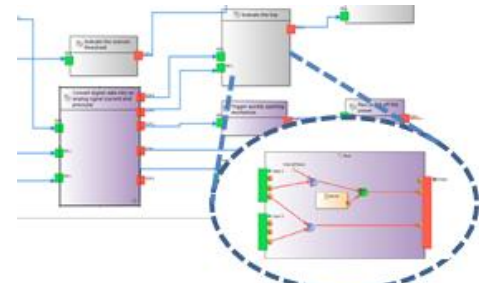
All4Tec
Safety
Architect

Example: Capella – Safety Architect (All4Tec)

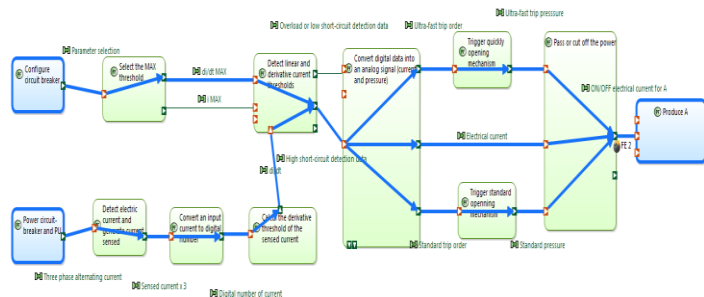
Feared event added to Capella
dataflows (viewpoint)



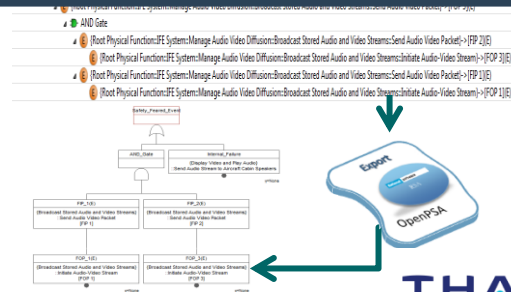
In Safety Architect, analysis of
block local failure conditions



In Capella, visualization of fault
trees as critical functional chains



In Safety Architect, automated
generation of fault-trees



#7 - Engineering continuity

From wishful thinking to implementation

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SYSTEM PHYSICAL ARCHITECTURE

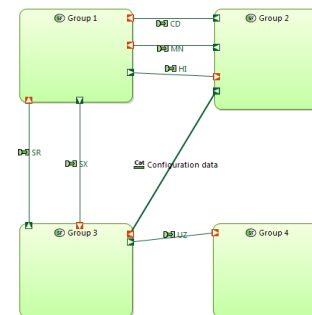
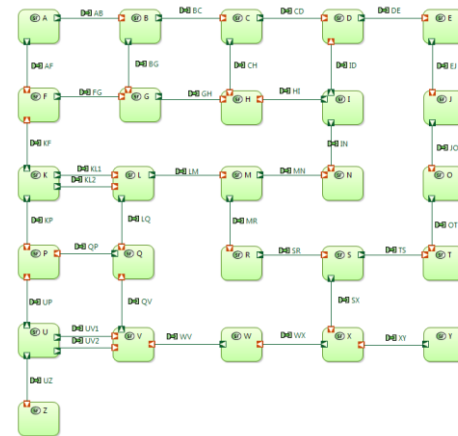
AUTOMATICALLY INITIALIZED AND MAINTAINED SUBSYSTEM

#8 - Scalable

Cope with complexity

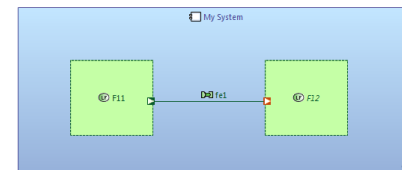
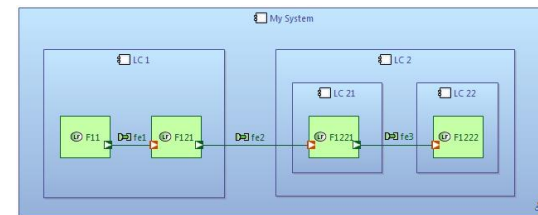
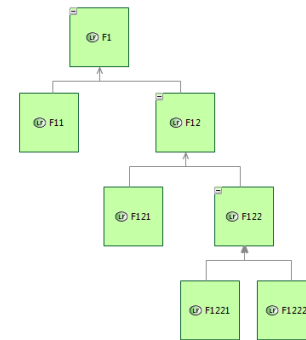


DEMO





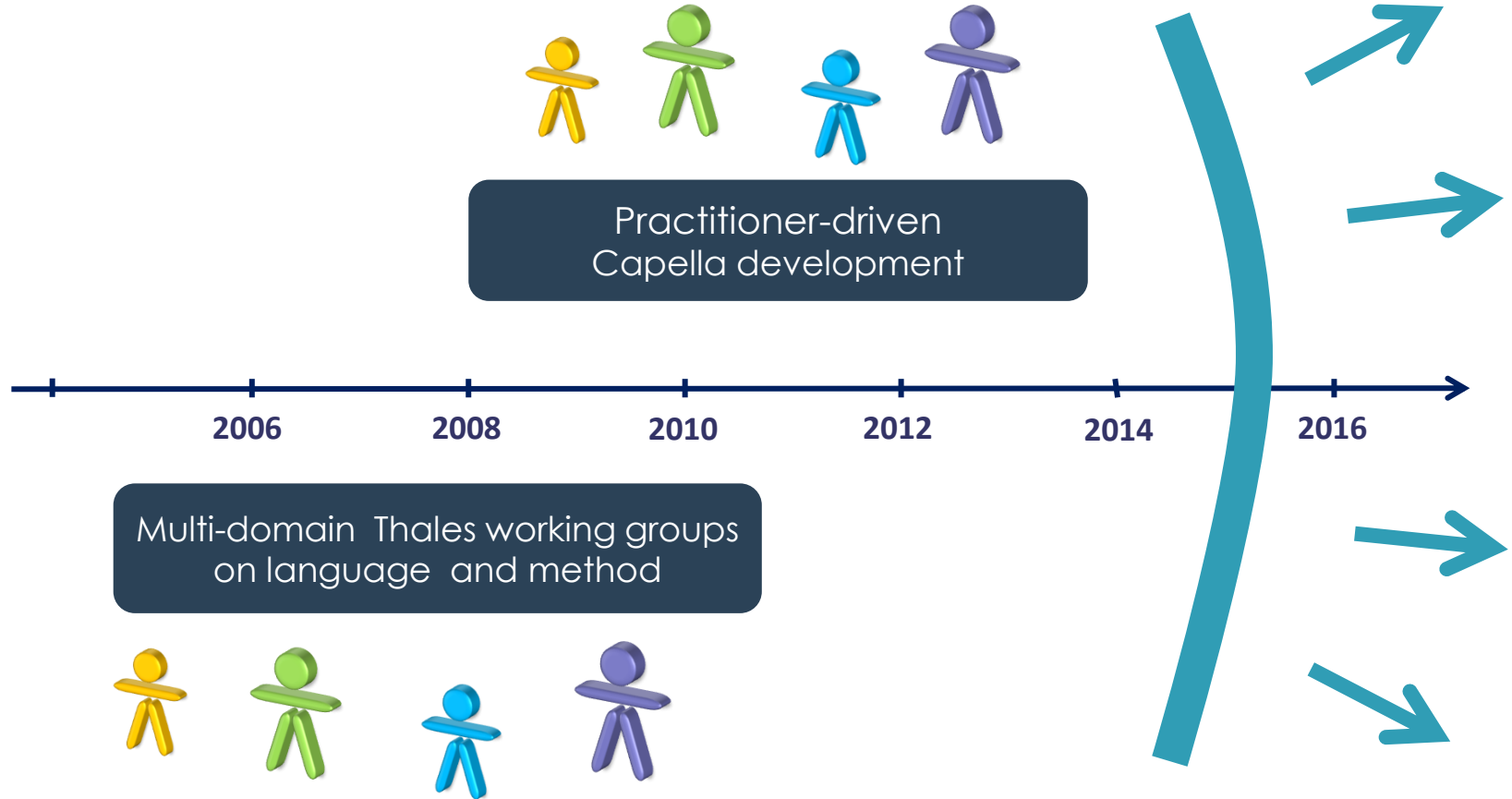
DEMO



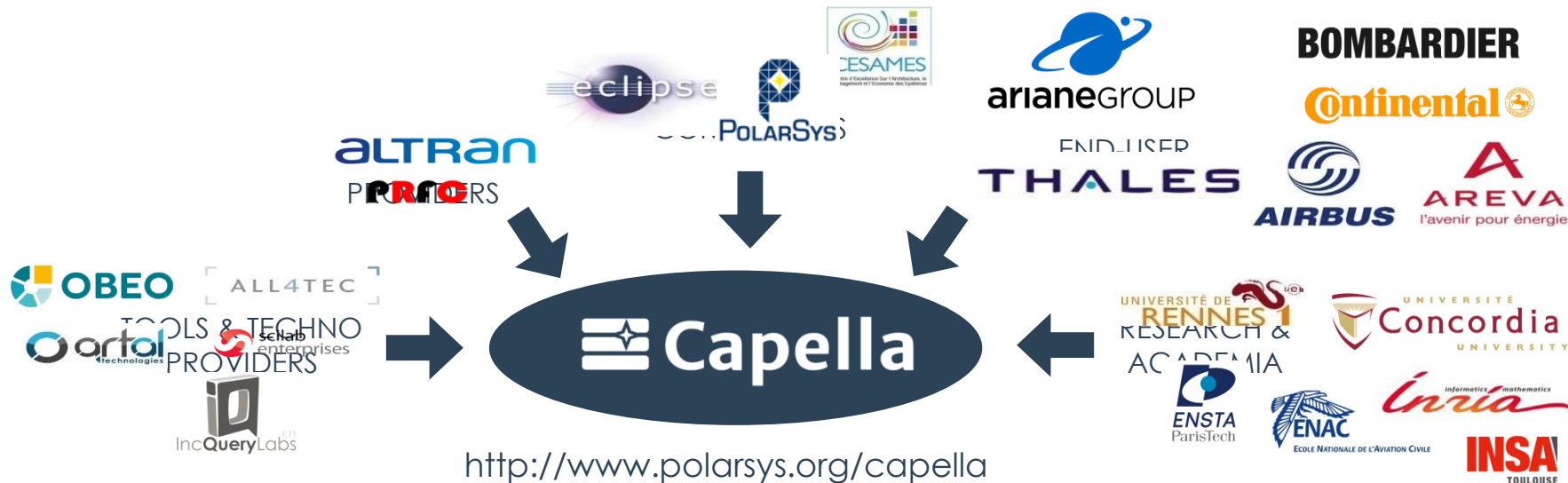
#9 - Open Source

What does it mean FOR YOU?

A practitioner-driven journey started in Thales...



... now open source (it's free!)



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CASE-STUDIES



AEROSPACE

ArianeGroup

Model-Based Systems Engineering must become a team sport!!

READ MORE



ENERGY

AREVA NP

Progressive deployment of MBSE methods in French nuclear industry

READ MORE



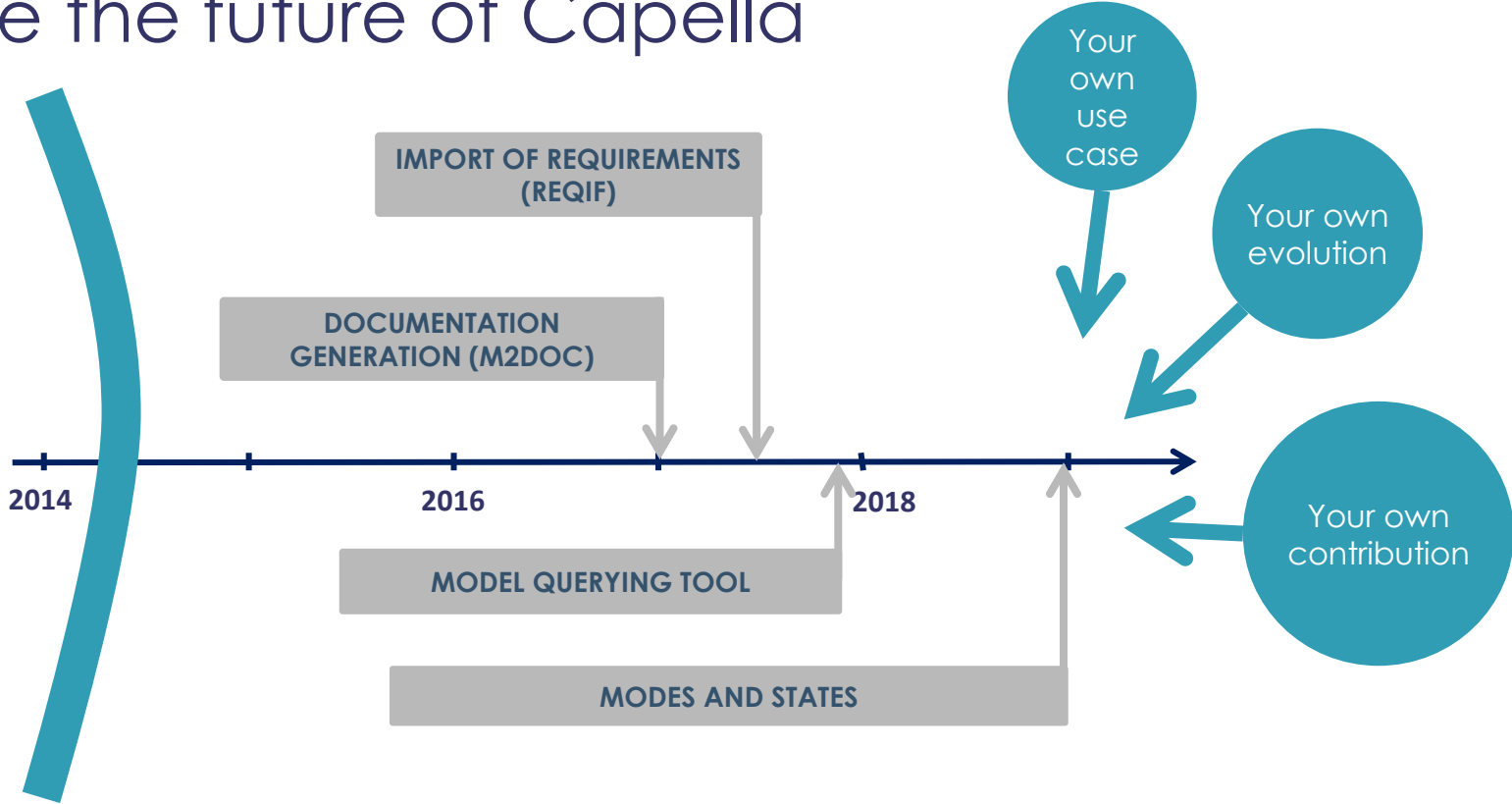
AUTOMOTIVE

Continental Automotive

Driving intelligent transportation systems with Capella

READ MORE

Shape the future of Capella



Public APIs, forums, wiki, commercial offers

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#10 - User-driven

Specified (and monitored) by its end-users



Enabling components



Thales modeling community



Thales need capture

Thales end-user needs



Capella Industry Consortium

Funded evolutions



Open Source Community



Shared, public repositories



Partnerships

Collaborative projects



Current Sprint & Demo registration



Sprint starts on **24 Apr 2017** and the demonstration will be **05 May 2017 - 11h-12h.**

Click to register

All voters :

(If you want to have a permanent invitation to assist to all demos, don't hesitate to [send a mail to Michel BISPO \(Product Owner\)](#)... or register to [this Outlook meeting \(iCalendar\)](#))

Sprint #58

➤ Current Sprint Goal: Provide a new connector for Melody 4.2.1 compatible with both Orchestra 5.5.2 (TOSA specific Work On Quotation) and Orchestra 5.6

Status



Schedule:

1. coming soon...

See topics below with tags

DEMO

or

PRES

5.7(*)



- (TC) [MA-NC-003-3] Integrate a new DiffMerge release to simplify merge policies (technical debt)
- (TC) OCD 2017 [MA-NC-001] Upgrade of Eclipse Neon and foundation components : **Team for Capella - Melody 4.3 based on Neon**

1. **NO DEMO**

2. **NO DEMO**

5.6.1(*)



- (US) MELODY-7868 [OCD MA-NC-011] Ease the Constraint edition for Guards, Pre/Post condition, Exchange Context, Change Event, Time Event and Owned Specification
- (US) MELODY-7869 [OCD MA-NC-011] Diagram palette tool ergonomics: merge insert Function and insert Actor Function tools

1. **DEMO**

2. **DEMO**

5.5.2(*)



- (US) CONMELODY-577 [WOQ003-TOSA] Provide a new connector for Melody 4.2.1 compatible with both (for TOSA) Orchestra 5.5.2 and Orchestra 5.6
- (US) (WoQ TAS) **EI management from functional analysis towards Interfaces: Propagate EI to Function**

1. **NO DEMO**

2. **DEMO**

-  [Personnes](#)
-  [Historique des constructions](#)
-  [Relations entre les projets](#)
-  [Vérifier les empreintes numériques](#)
-  [Disk usage](#)

File d'attente des constructions
Pas de construction en attente.

État du lanceur de construction

Status 3/4

En construction [capella-v1.1.x](#) #118


En construction [capella-gerrit](#) #3043

En construction [capella-studio-gerrit](#) #404



Jobs Status




Bugzilla


Gerrit


Sonar

All **Capella Addons** [Capella Studio](#) [Capella Viewpoints](#) [Capella-master](#) [Capella-v0.8.x](#) [Capella-v1.0.x](#) [Capella-v1.1.x](#)

S	W	Tâche ↓	Dernier succès	Dernier échec	Dernière durée	Console
		capella-addon-docgen-master	2 mo. 27 j (#736)	10 h (#821)	6 mn 49 s	
		capella-addon-docgen-v0.8.x	9 mo. 18 j (#130)	N/A	4 mn 27 s	
		capella-addon-docgen-v1.0.x	10 h (#479)	1 j 10 h (#478)	5 mn 32 s	
		capella-addon-docgen-v1.1.x	2 mo. 26 j (#8)	10 h (#92)	4 mn 22 s	
		capella-addon-transitionsystem2subsystem-gerrit-others	22 j (#28)	23 j (#27)	3 mn 3 s	
		capella-addon-transitionsystem2subsystem-gerrit-v0.8.x	4 mo. 17 j (#16)	4 mo. 17 j (#15)	2 mn 13 s	
		capella-addon-transitionsystem2subsystem-master	22 j (#468)	2 j 3 h (#469)	3 mn 27 s	
		capella-addon-transitionsystem2subsystem-v0.8.x	20 j (#459)	N/A	2 mn 42 s	
		capella-addon-transitionsystem2subsystem-v1.0.x	4 mo. 4 j (#94)	N/A	2 mn 52 s	
		capella-addon-transitionsystem2subsystem-v1.1.x	4 mo. 4 j (#6)	N/A	4 mn 25 s	
		capella-addon-xmlpivot-gerrit-others	3 mo. 23 j (#32)	N/A	4 mn 22 s	
		capella-addon-xmlpivot-gerrit-v0.8.x	N/A	N/A	N/A	N/A
		capella-addon-xmlpivot-master	3 mo. 23 j (#322)	N/A	3 mn 32 s	
		capella-addon-xmlpivot-v0.8.x	20 j (#122)	N/A	2 mn 57 s	
		capella-addon-xmlpivot-v1.0.x	4 mo. 11 j (#26)	N/A	2 mn 3 s	

Icône: [S](#) [M](#) [L](#)

Thank You! Questions?

Capella website:

<http://www.polarsys.org/capella/>

LinkedIn Discussion Group 

<https://www.linkedin.com/groups/8605600>

Twitter 

https://twitter.com/capella_arcadia

Arcadia public forum:

<https://polarsys.org/forums/index.php/f/12/>

Capella public forum:

<https://polarsys.org/forums/index.php/f/13/>

IFE model & documentation:

<http://polarsys.org/capella/community.html>

www.thalesgroup.com

