Capella

A MBSE SOLUTION FOR SYSTEM ARCHITECTS

Aurélien PINSONNEAU
Thales Corporate MBSE Coach

aurelien.pinonneau@thalesgroup.com
Open Source Solution for Model-Based Systems Engineering
Scope

What is Capella meant for?
Enterprise Architecting (operational capabilities and need, orientations, etc.)

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

Algos, Real-time Analysis, NF, Etc.

Detailed design, development

ARCADIA

Capella

Method

Workbench

V&V
Objectives

- Better understand the customer need
- Define and share the solution among stakeholders
- Secure SYS/SW/HW engineering, prepare subcontracting
- Early evaluate and justify architectural design
- Prepare and master V&V
Method-coupled
What does this mean?
Tight coupling method/tool
Project-specific modeling strategies and guidelines
Productivity enablers
How can it help users?
1

Relations between functions and structure
Functional analysis + structure + interfaces

Functional exchanges & ports carry exchange items

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

Exchange items group data to be carried together

Interfaces group & reference exchange items

Interfaces are provided/required by component Ports

Functional exchanges & ports are allocated to component exchanges & ports
Functional analysis + structure + interfaces

DEMO

Modeling accelerators

Validation rules
2

Traceability between need and solution
Traceability between the different Arcdia steps
Traceability between the different Arcdia steps

DEMO

Automated transitions

Contextual diagrams
Functionalities under development
How to go further?
1

Definition of system configurations
<table>
<thead>
<tr>
<th>Mission</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
<th>Phase 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System</strong></td>
<td>Mode 1</td>
<td>Mode 2</td>
<td>Mode 3</td>
<td>Mode 4</td>
</tr>
<tr>
<td><strong>Subsystems</strong></td>
<td>Mode A</td>
<td>Mode B</td>
<td>Mode C</td>
<td>Mode A</td>
</tr>
<tr>
<td>1</td>
<td>Mode X</td>
<td>Mode Y</td>
<td>Mode Z</td>
<td>Mode X</td>
</tr>
<tr>
<td>2</td>
<td>Mode I</td>
<td>Mode J</td>
<td>Mode I</td>
<td>Mode J</td>
</tr>
<tr>
<td>3</td>
<td>Mode</td>
<td>Mode</td>
<td>Mode</td>
<td>Mode</td>
</tr>
</tbody>
</table>

Mode combinations. Identical issue with states
Relate atomic configurations to specific modes and states
2

Transition to Model-Based Safety Analysis
Example: Capella – Safety Architect (All4Tec)

- Feared event added to Capella dataflows (viewpoint)
  - In Capella, visualization of fault trees as critical functional chains
  - In Safety Architect, analysis of block local failure conditions
  - Functional Hazard Analysis (FHA)
  - In Safety Architect, automated generation of fault-trees

Example: Capella – Safety Architect (All4Tec)
Open Source
What does it mean FOR YOU?
A practitioner-driven journey started in Thales…

Practitioner-driven Capella development

Multi-domain Thales working groups on language and method
... now open source *(it’s free!)*

http://www.polarsys.org/capella

Collaborative funded projects (Europe & Canada)

Capella Industry Consortium
CASE-STUDIES

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

ENERGY
AREVA NP
Progressive deployment of MBSE methods in French nuclear industry

AUTOMOTIVE
Continental Automotive
Driving intelligent transportation systems with Capella

READ MORE
READ MORE
READ MORE
Shape the future of Capella

- **2014:** Modes and States
- **2016:** Model Querying Tool
- **2018:** Import of Requirements (REQIF) and Documentation Generation (M2DOC)

**Your own use case**

**Your own evolution**

**Your own contribution**
Thank You! Questions?

Capella website:
http://www.polarsys.org/capella/
LinkedIn
https://www.linkedin.com/groups/8605600
Twitter
https://twitter.com/capella_arcadia
Arcadia forum:
https://polarsys.org/forums/index.php/f/12/
Capella forum:
https://polarsys.org/forums/index.php/f/13/
IFE model & doc.:
http://www.polarsys.org/capella/start.html
www.thalesgroup.com