ADCSS-2014 workshop Day 2

ESTEC – October 28, 2014

Melody Advance - System Engineering Modeling Tool

28/10/14

Ref.:

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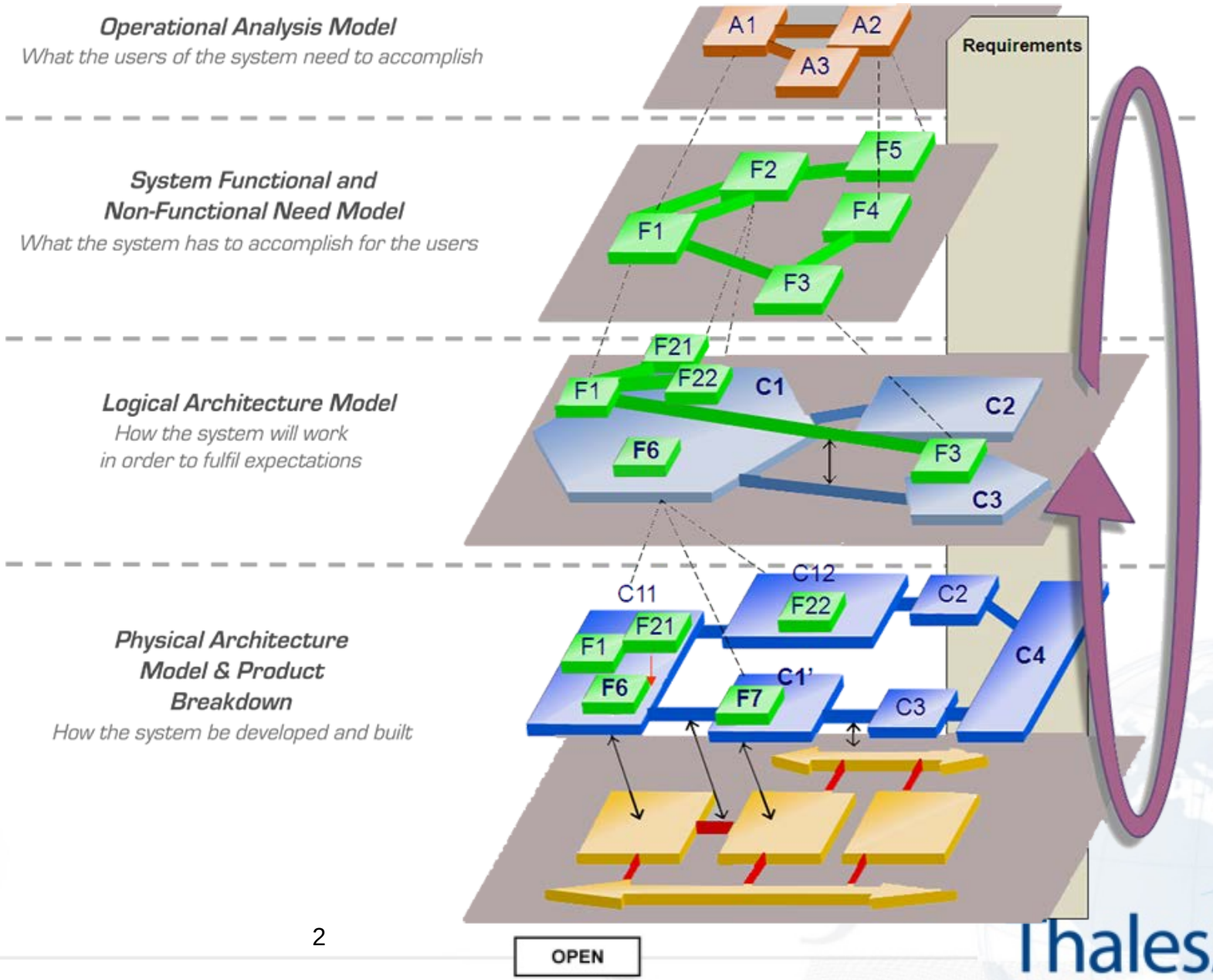
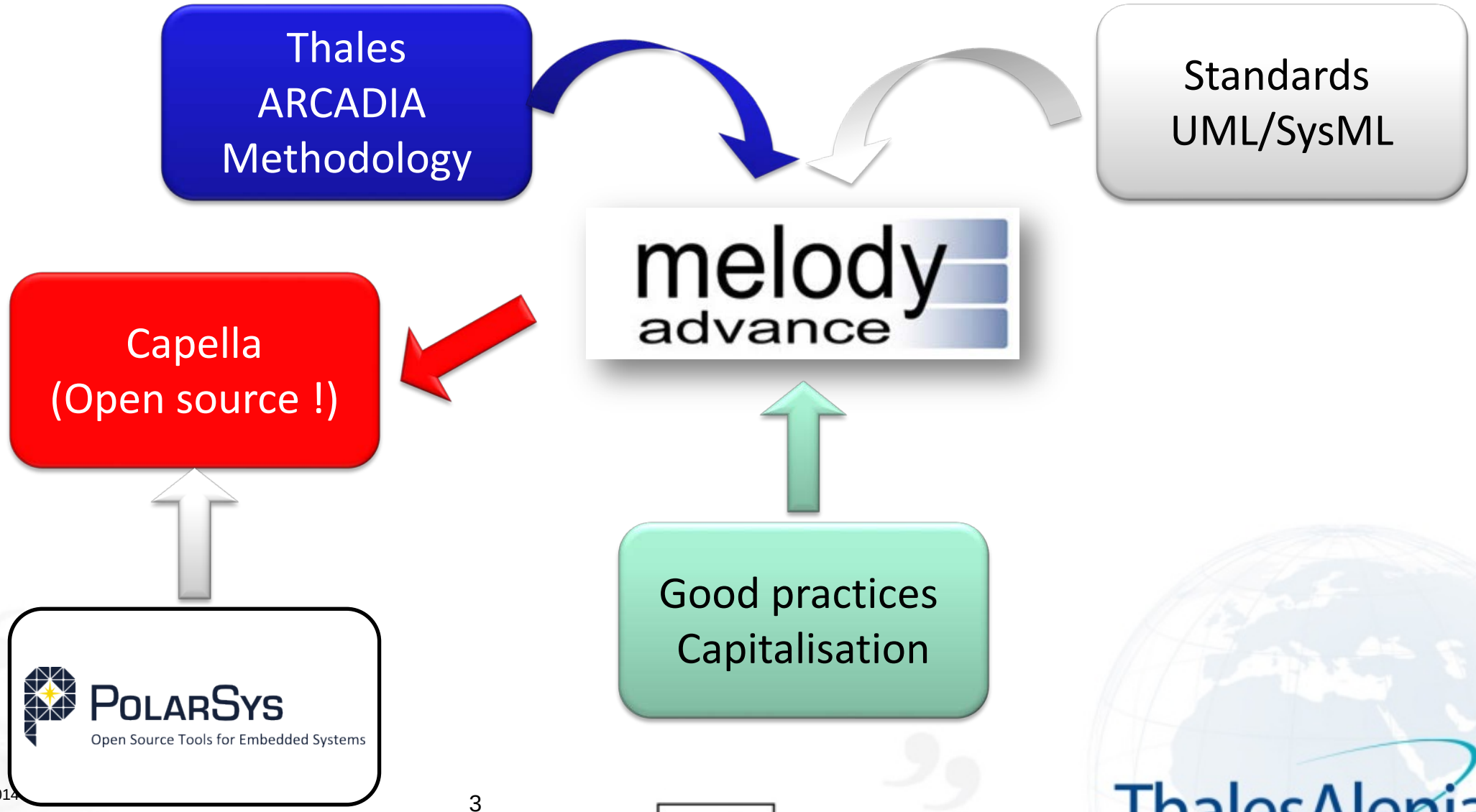
ARCADIA method



Thales Modelling Tool:



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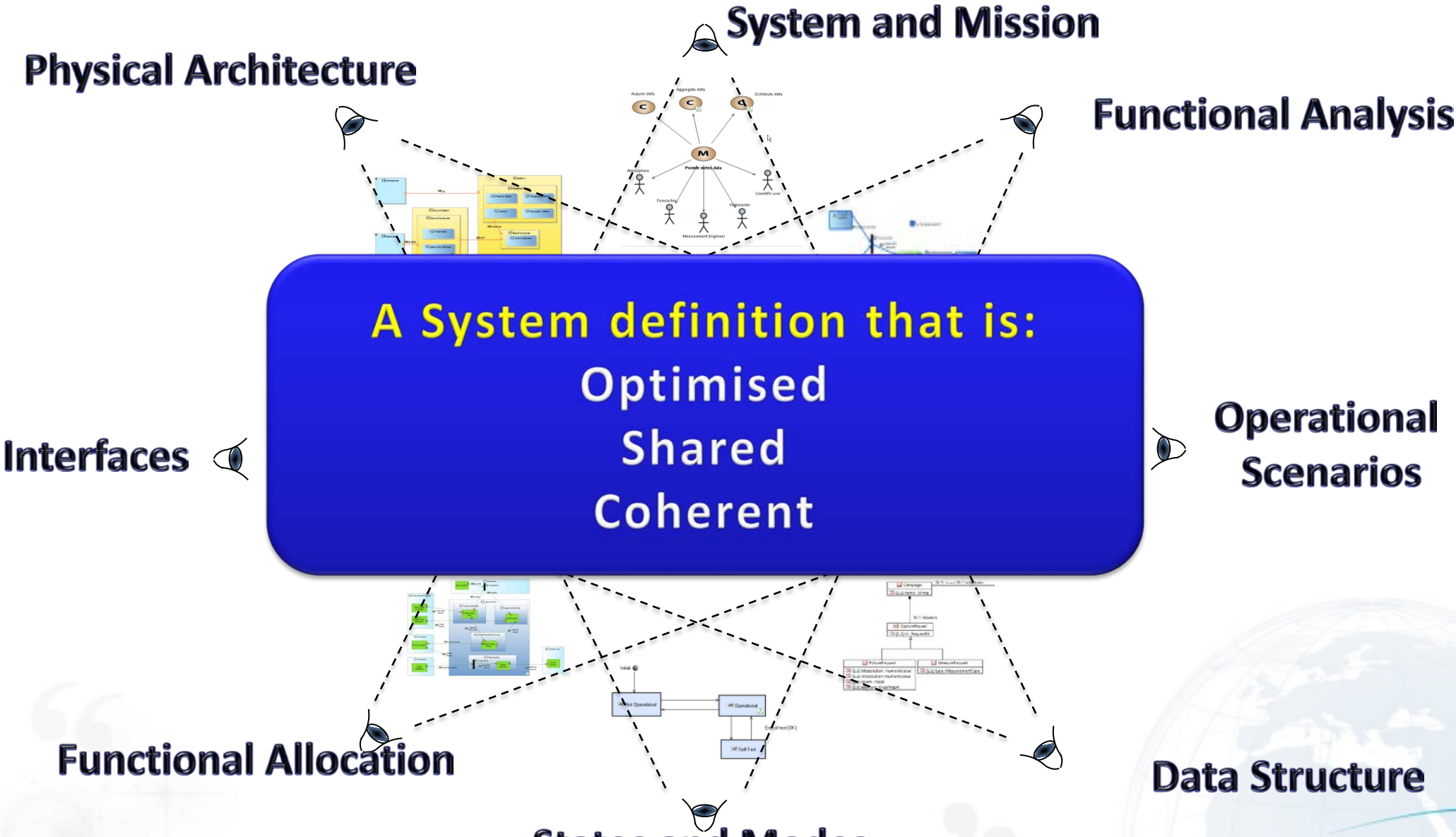
Capella views



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Context : New unit SDIU Mk2 development (1/2)

New SDIU Mk2 (Standard Distribution & Interface Units)

- Developed for TAS Spacebus telecom platform
- Main functionality
  - To distribute commands / To acquire data
  - From satellite platform and payload units not interfaced on main Data Bus
- Architecture fully reviewed
  - Function / Module allocation
  - Interfaced on DBN1553 : new communication protocol to be defined
  - Based on DPC micro-controller, with dedicated Firmwares (1 per module type)
    - Local processing capabilities

Context : New unit SDIU Mk2 development (2/2)

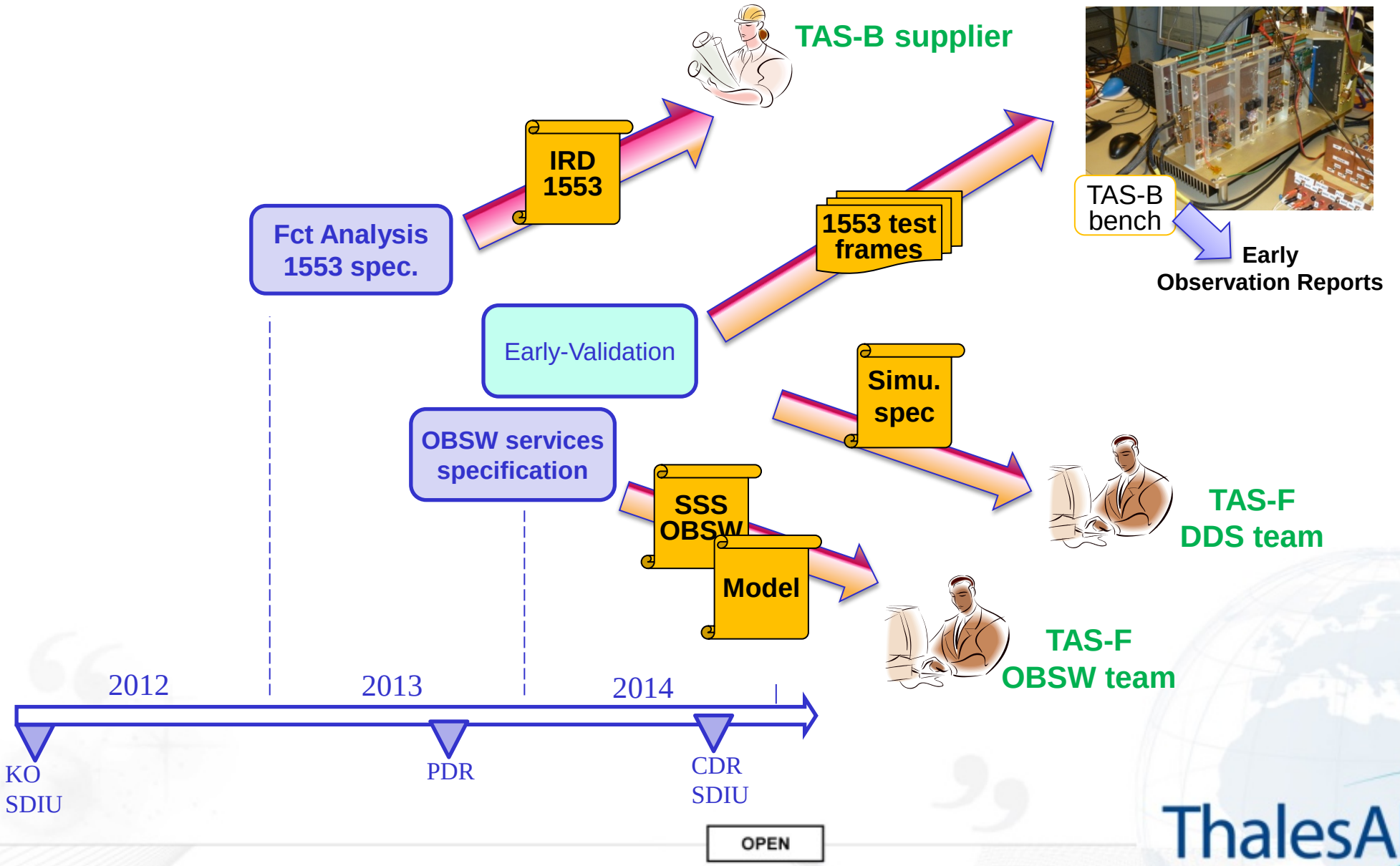
- MK2 evolutions implies :
  - Review of functional allocations OBSW / Firmwares SDIU
  - Definition of communication protocol on DBN 1553
  - Specification of new OBSW component (unit driver)
- Unit supplier : TAS-B
  - Willing to co-engineering with TAS-F to ensure the unit will fulfill the operational need
- Software supplier : TAS-F
  - Willing to bootstrap component models (CCM / SCM) from system level models
- Use of MBSE in TAS-F to secure this development, with Orchestra Suite tools :
  - Melody Advance : System Engineering modeling tool
  - Rhapsody (UML) : for model animation (early validation)

Melody Advance : Objectives & Outputs

- Perform **Functional analysis**
  - Share understanding of system needs and operational concepts (Use Cases)
  - Functional breakdown and mapping on SDIU internal architecture
  - Share understanding of SDIU internal design
- Specify communication protocol to supplier (**IRD 1553**)
  - Detailed data model : messages including parameters
- **Specify OBSW** component (SSS)
  - Interface TC/TM, interface 1553, …
- Inputs for **functional simulation** for design early-validation
  - Model animation (Rhapsody UML) to generate 1553 frames injected in input of supplier testbed
- Inputs for satellite **simulator specification** (DSS) for SDIU unit
- Optimize Avionics missionisation process
  - Reduce parameters in the Satellite data base, optimize OBSW customization process

MBSE for SDIU Mk2 : Objectives

Main outputs – Planning :



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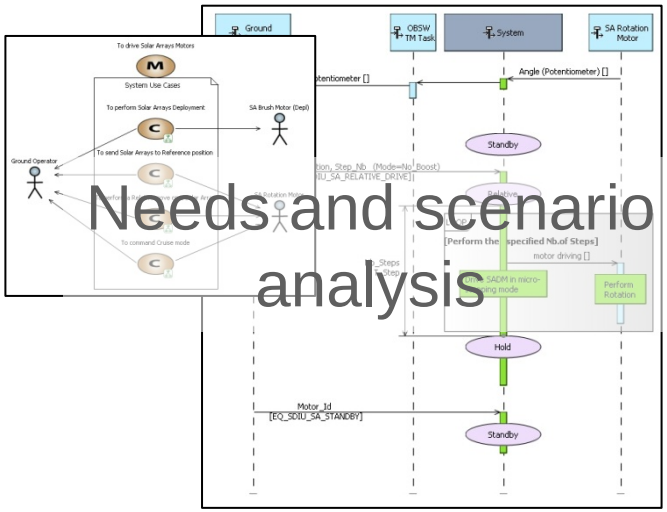
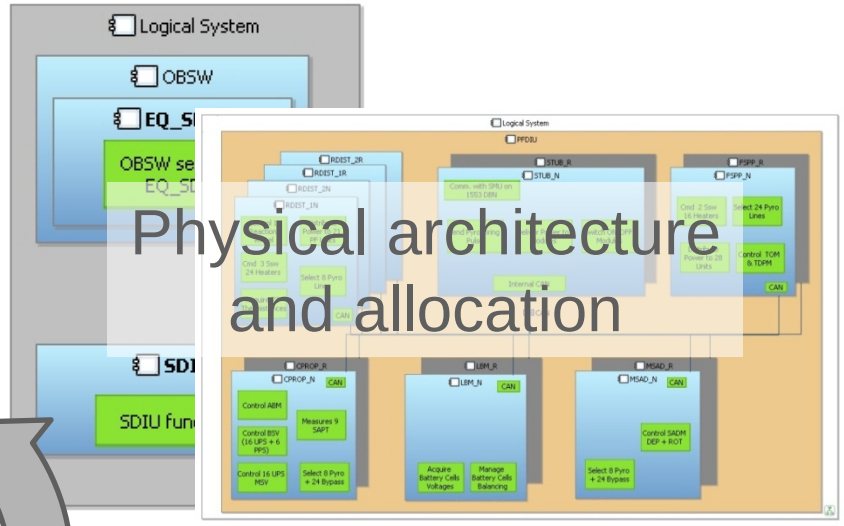
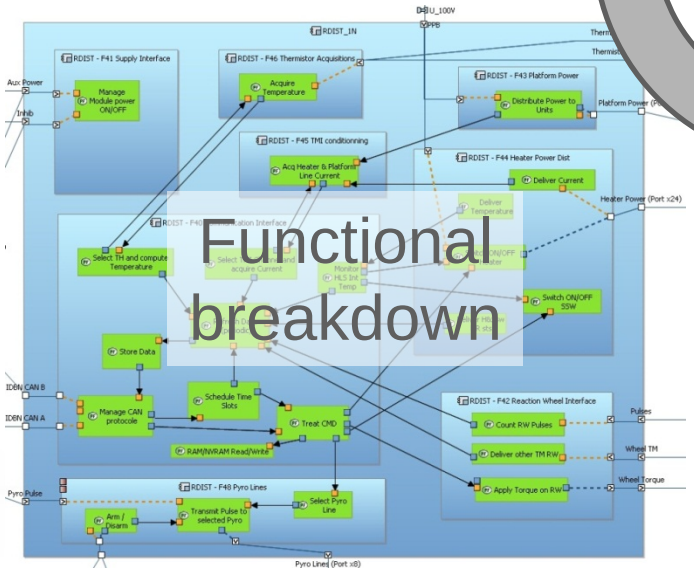
Overview of model views



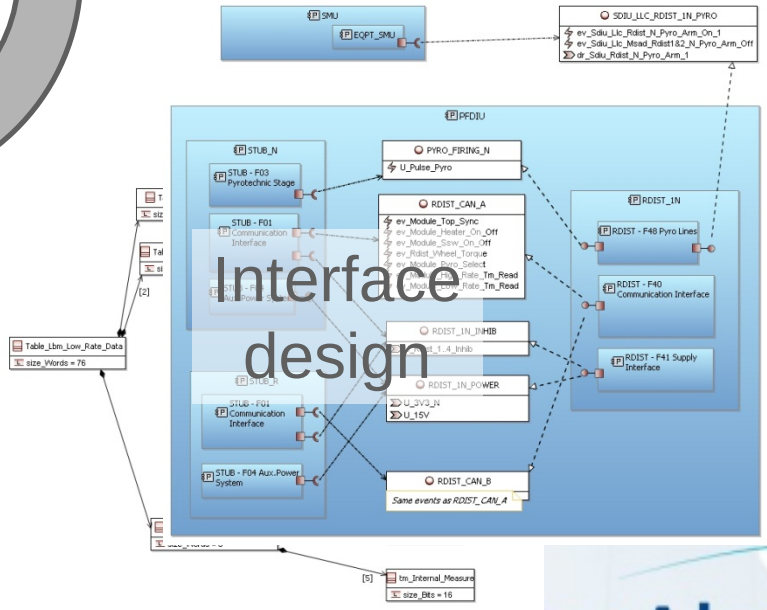
Needs and scenario analysis



Physical architecture and allocation



Functional breakdown



Interface design

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MBSE for SDIU Mk2 : Main savings

- Reduced non Quality Cost :
  - More effort in engineering phase (local lost, global win)
  - Savings spread over the whole avionics process (from SW/HW development to avionics I&V activities)
- Consistency between specs generated from a unique model
  - For HW supplier
  - For OBSW supplier
  - For simulator supplier
- Less parameters to manage in SDB
  - Better capture of system needs, reduction of variability

- Future work directions :
  - Extent the modeling scope :
    - System modeling
    - Further unit and sw definition modeling
  - Improve link functional modeling with functional requirement in RB
  - Use model in avionics IVVQ activities
    - To define scenario, configurations, …
    - Improvement of the traceability (functional traceability)
  - Improve system models to software models transition
    - Through shared data model

The major process building blocks are available as OSS !
https://www.polarsys.org/projects/polarsys.capella