



Open Source Tools for Embedded Systems

Introduction to PolarSys and Use Cases

Gaël Blondelle, Eclipse Foundation

Ada Conference, June 2014



POLARSys

Open Source Tools for Embedded Systems

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PolarSys Working Group

- ✓ Open Innovation to create better methods and tools
- ✓ Software tools for critical systems
- ✓ Interoperability based on Open Standards
- ✓ Foster exchanges between academics and industrial partners
- ✓ Quality and maturity assessment
- ✓ Very Long Term Support for more than 10 years

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Component Highlight

TOPCASED migrates to PolarSys

One of the original reasons why PolarSys has been created is for organizing the Very Long Term Support of TOPCASED. Now that PolarSys begins to be operational, it is time to start migrating TOPCASED components to their new home. This migration will occur component by component and step by step: preparation of the source code, adaptation of the dependent plug-ins, code freeze, IP

Events

SAE AeroTech Congress and Exhibition

Date & Time:

September 24, 2013 - 12:00 to September 26, 2013 - 13:00

Join us for the [SAE AeroTech](#) conference in Montreal this September.

[Read more](#)

News

PolarSys talk at SAE Aerotech

Dominique Toupin, from **Ericsson** and **Patrick Farail** from **Airbus**, will present a talk entitled: [More](#)

New Community link

Maybe you have noticed the new [Community](#) item on PolarSys front page? [More](#)

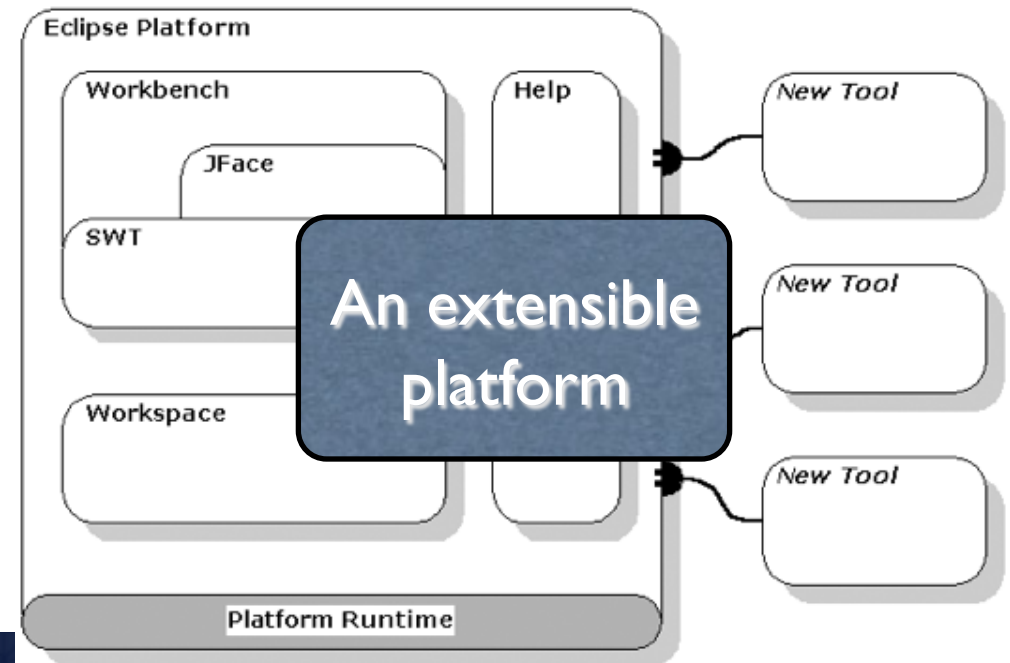
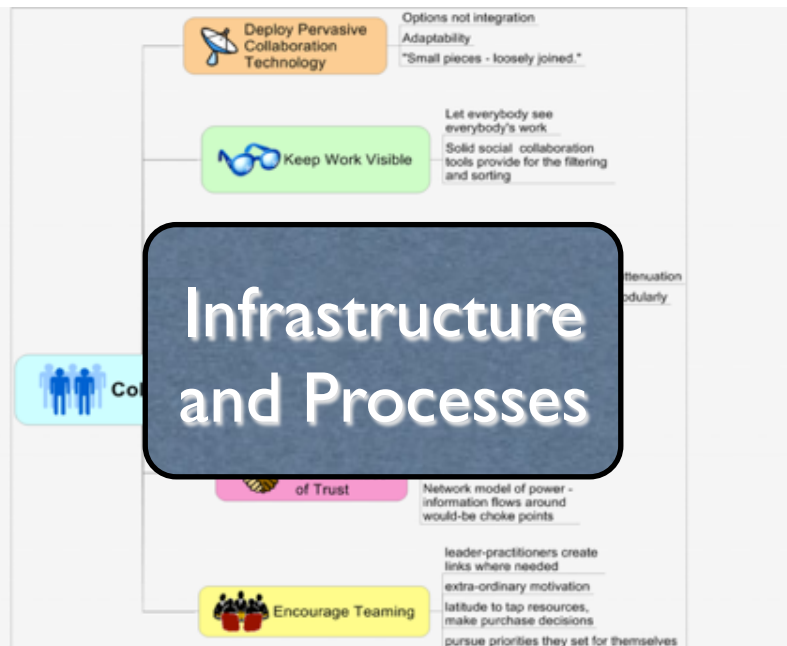
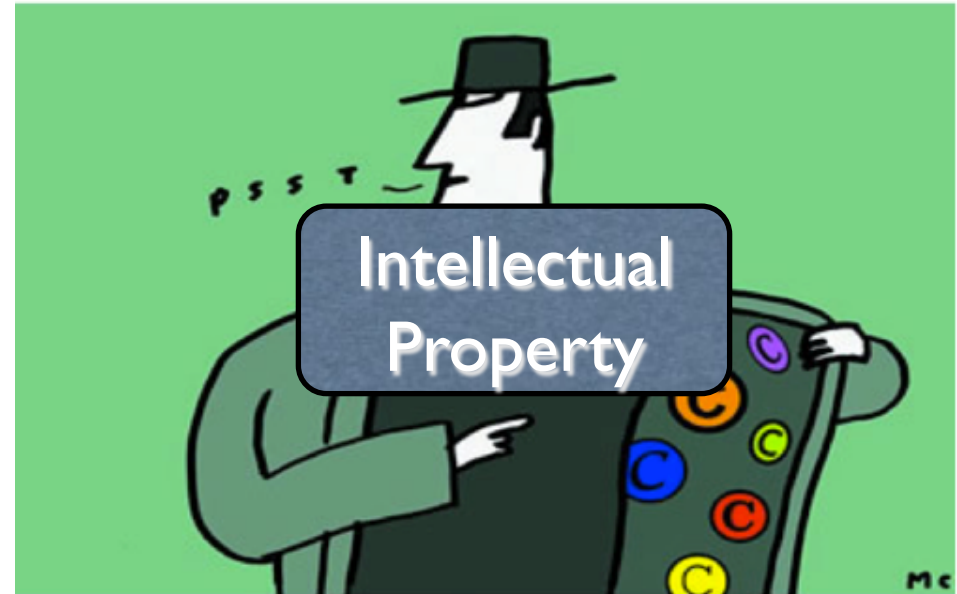


eclipse



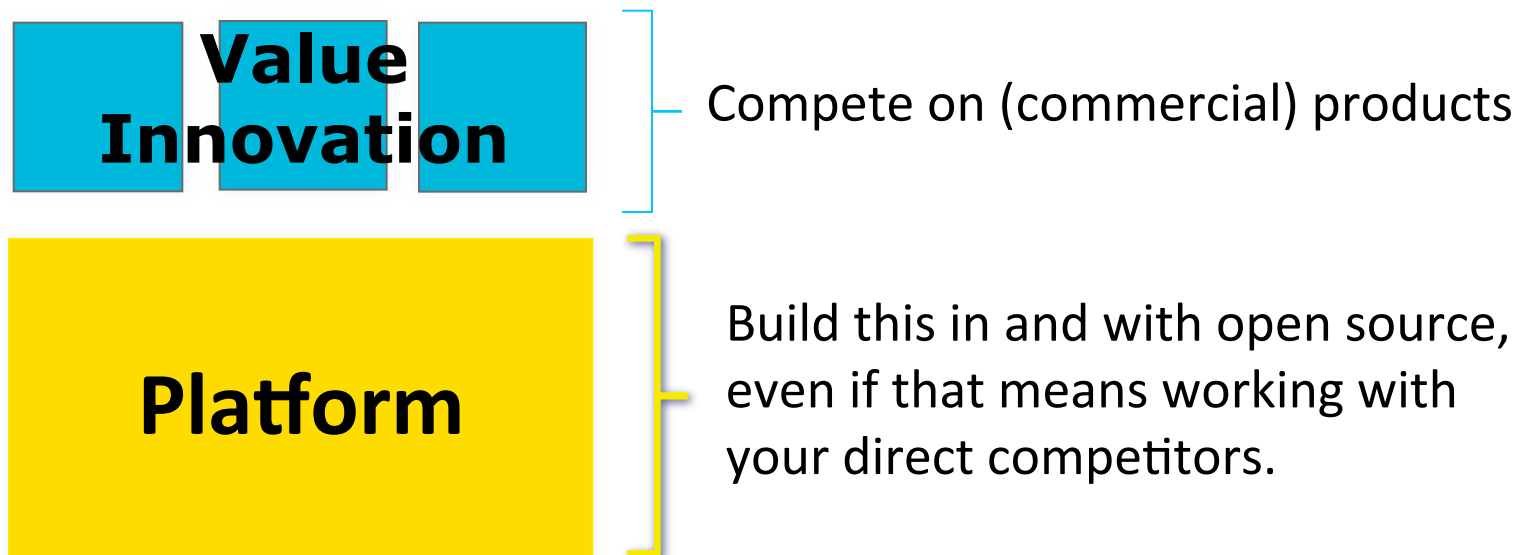
History

- 2001 - Eclipse Project by IBM
- 2004 - Rich Client Platform
- 2004 – Independent Organization: Eclipse Foundation
- 2006 - Callisto Release Train
- 2008 - Top Level Runtime Project
- 2009 - Industry Working Groups
- 2013 – Eclipse Foundation Europe GmbH is incorporated



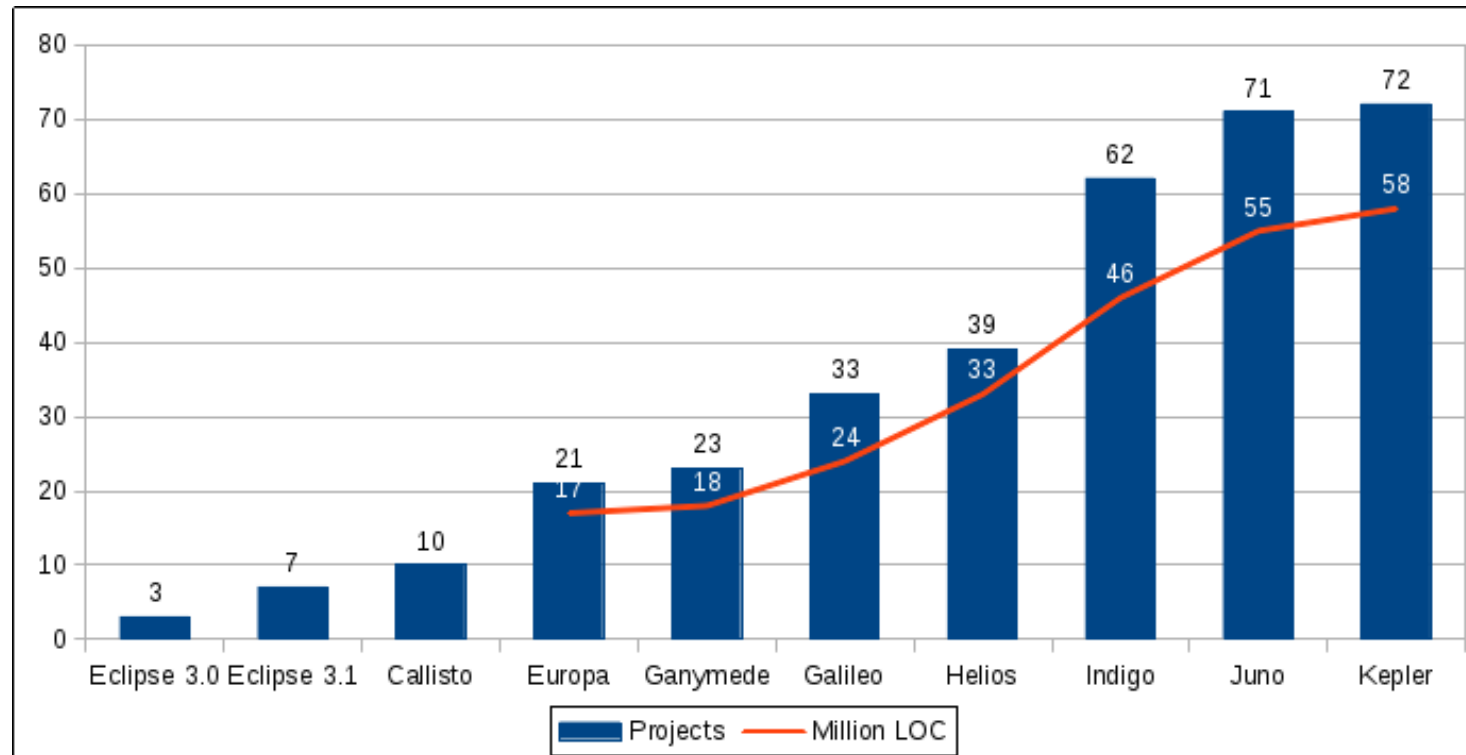
An eco system relying on an extensible platform

- Identify precisely what your competitive differentiators are for your customers
- Focus all possible energies there, and acquire everything else from OSS, or help build it in OSS





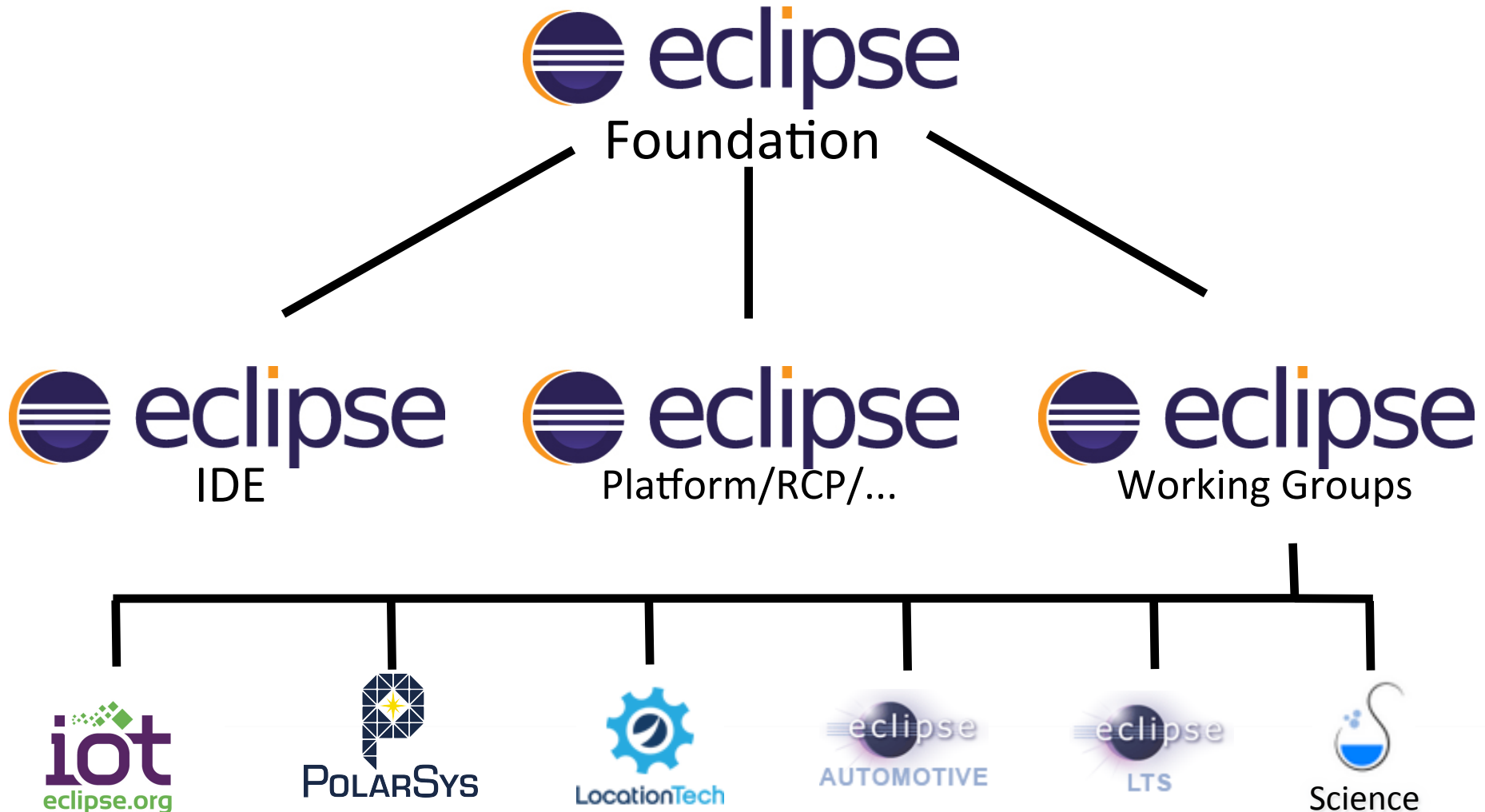
72 Projects, 58 MLOC



**Next release « Luna »
to be launched this Wednesday!**



Eclipse Working Groups





Members of Eclipse





So Eclipse Has...

- Millions of users
- Thousands of products
- One thousand developers
- Hundreds of companies, hundreds of projects
- Predictable schedules
- World class intellectual property management
- ~20 employees



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PolarSys Members (2014/06)



Steering Committee Members



THALES



Participating members



Atos

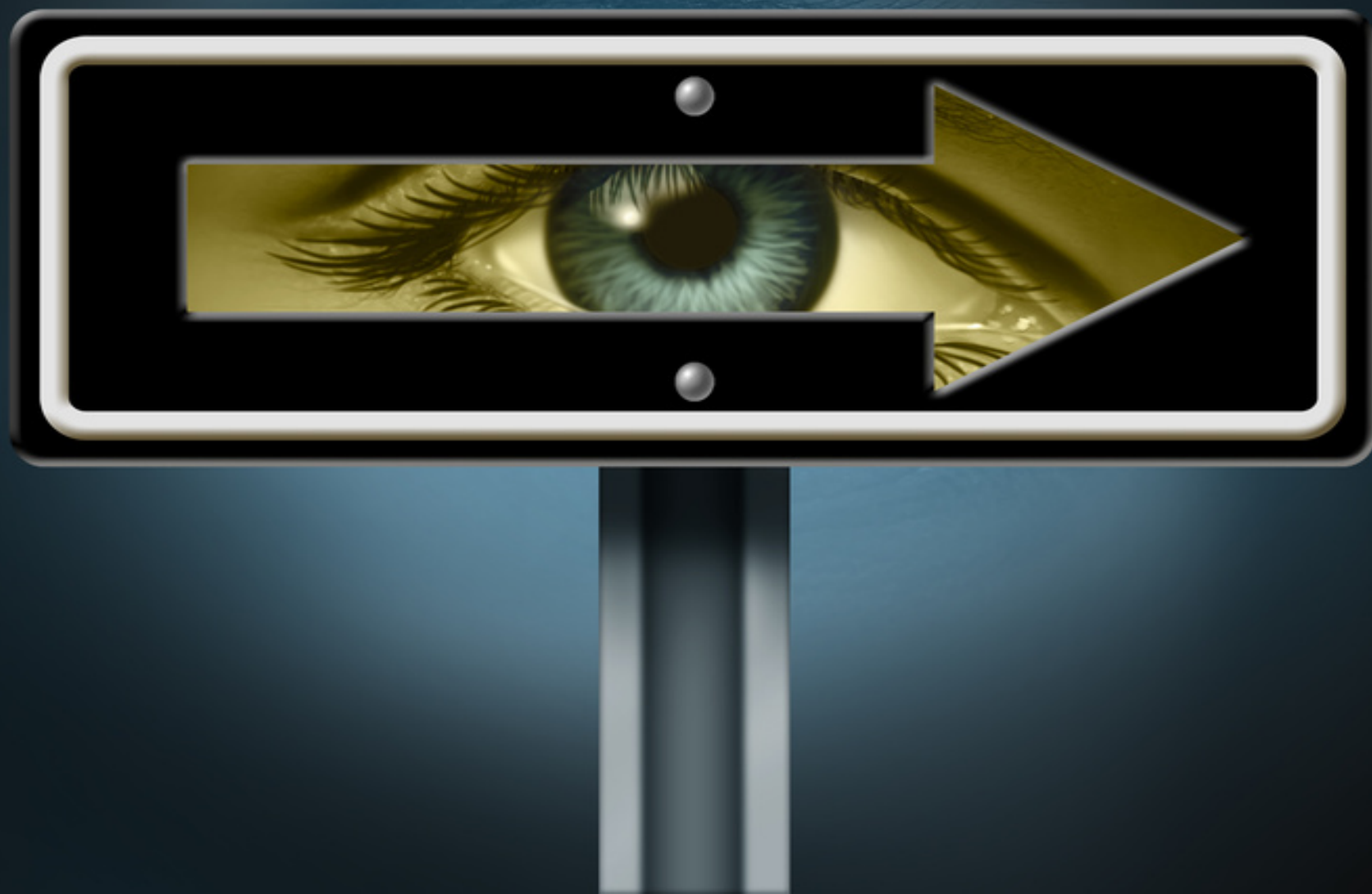
COMBITECH



Academics / Universities



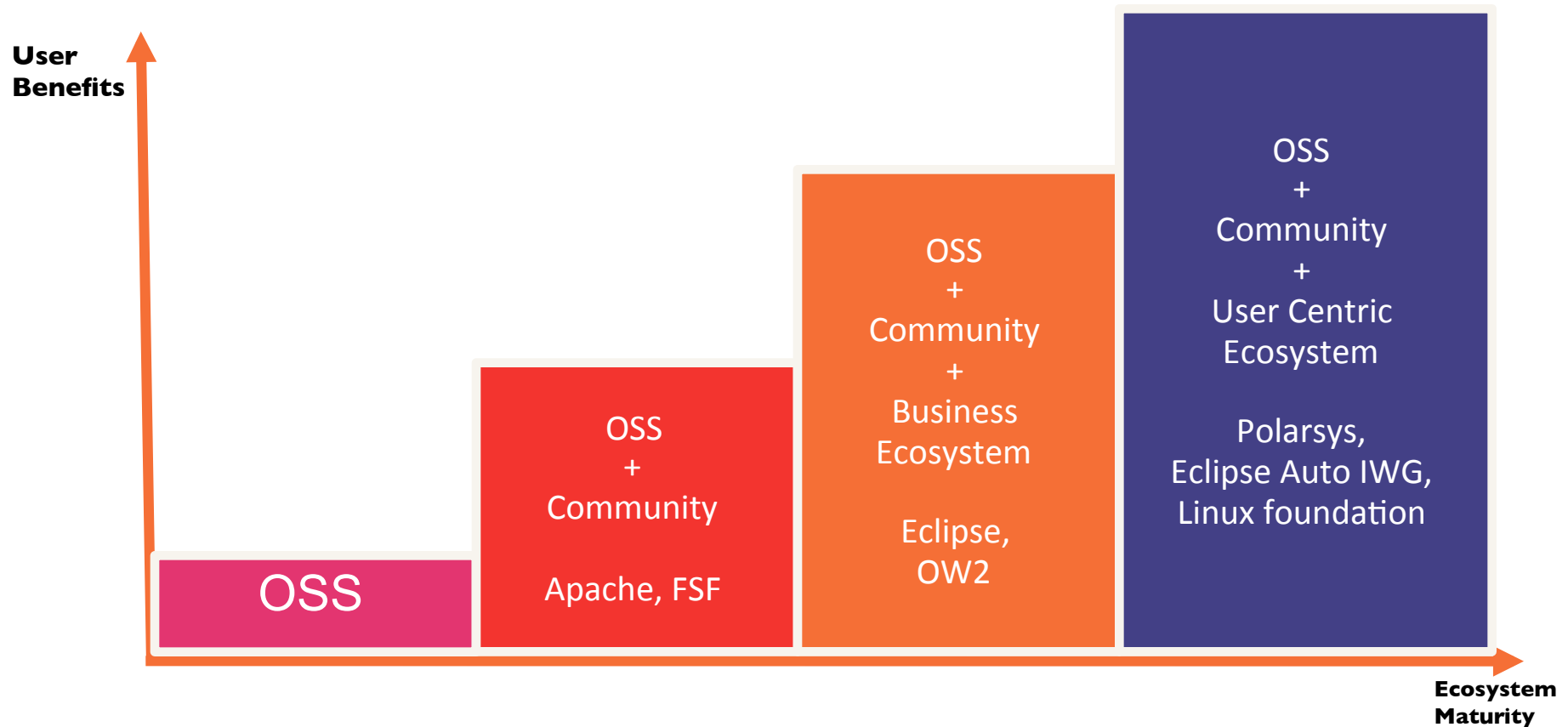
More universities joining



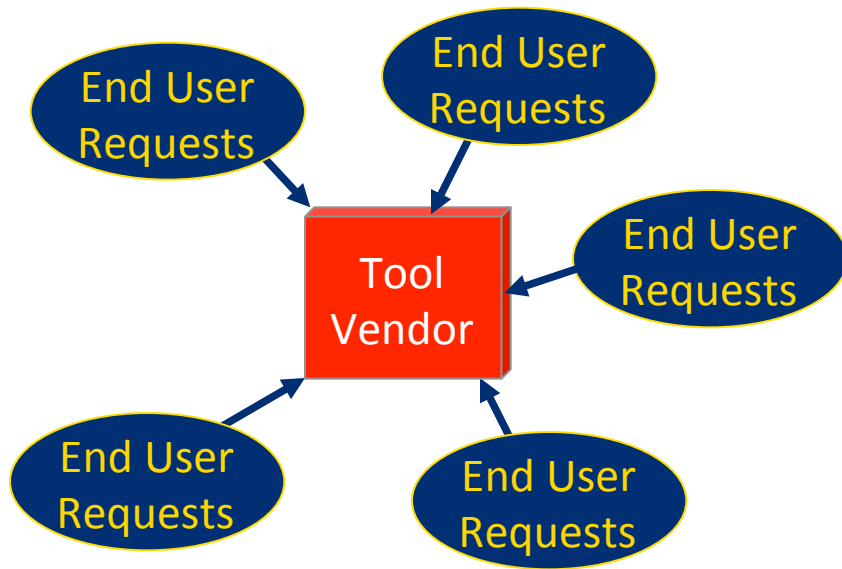


Super communities

New generation of OSS ecosystems



A balanced ecosystem where users Control and Secure their Destiny!



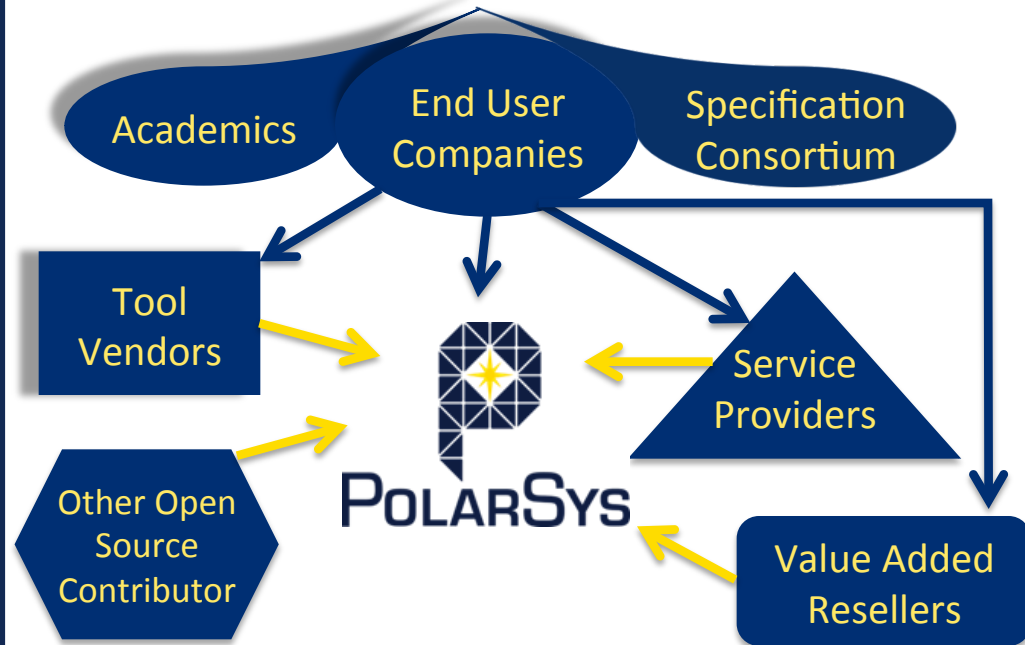
Typically less than **20%** of Requests For Enhancement (RFE) get into the tool



Proprietary Tool Vendor Ecosystem

No lock-in!

You or many third party can add features



100 % of RFE are able to get into the tool
e.g. **80%** generic, **20%** as user extensions



PolarSys Open Source Ecosystem

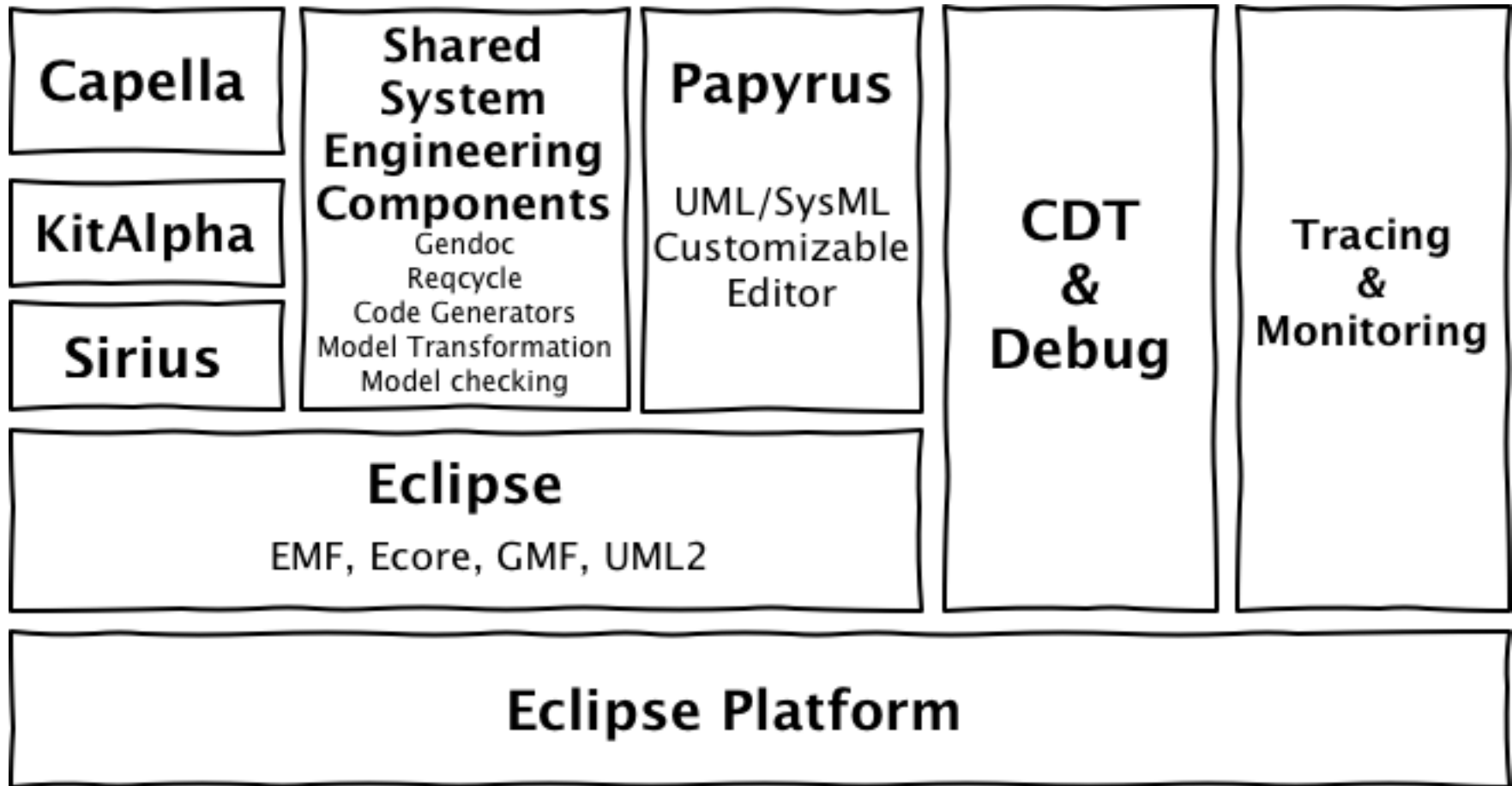


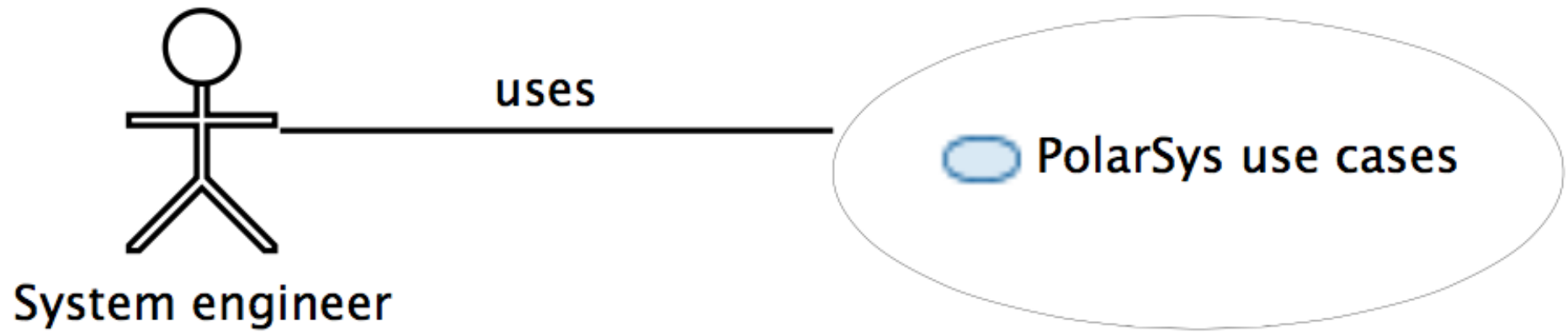
- Automotive
- **Aeronautic**
- **Aerospace**
- **Defense**
- **Energy**
- Health
- **Telecom**
- Railway





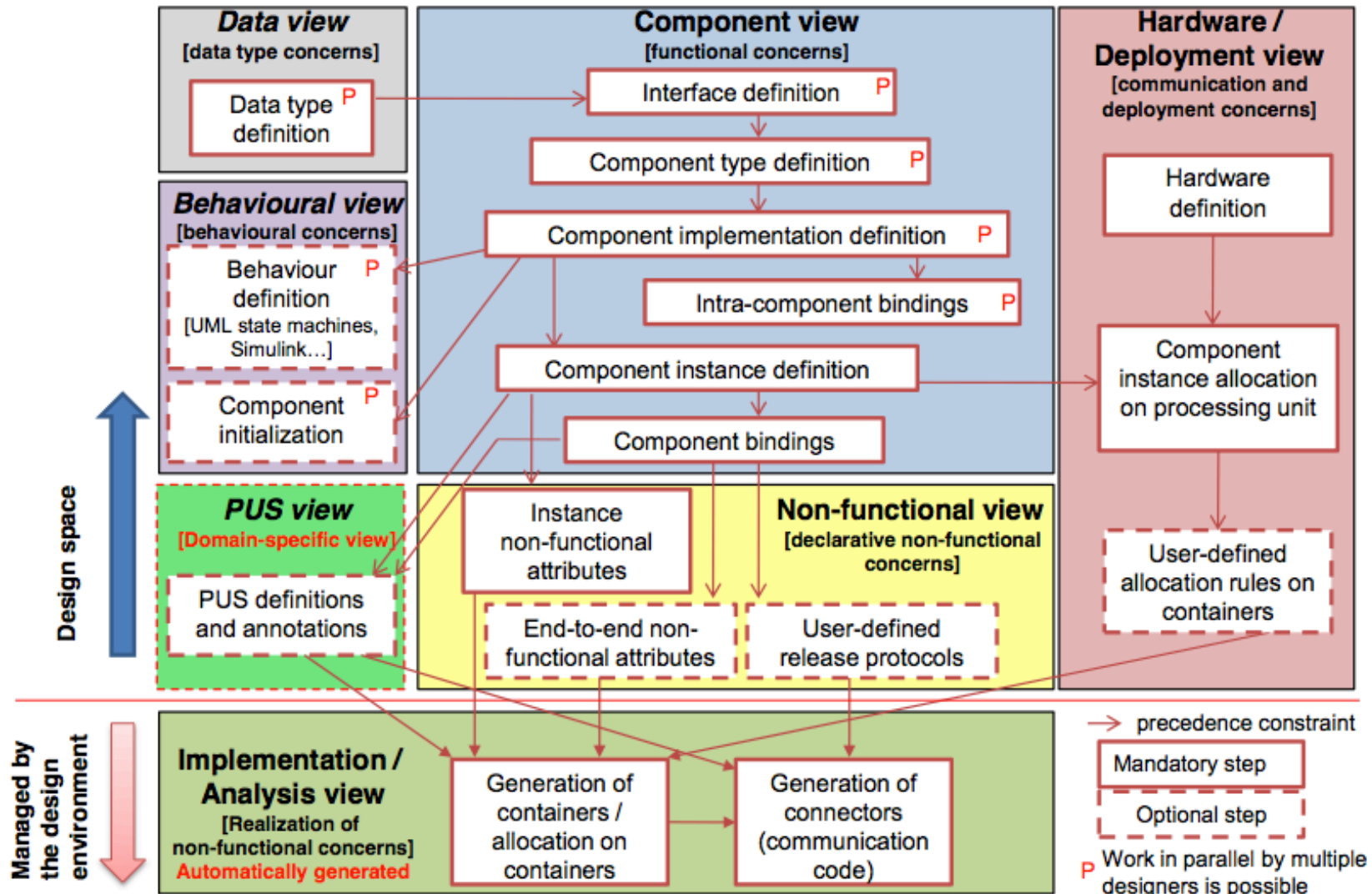
A technology vision





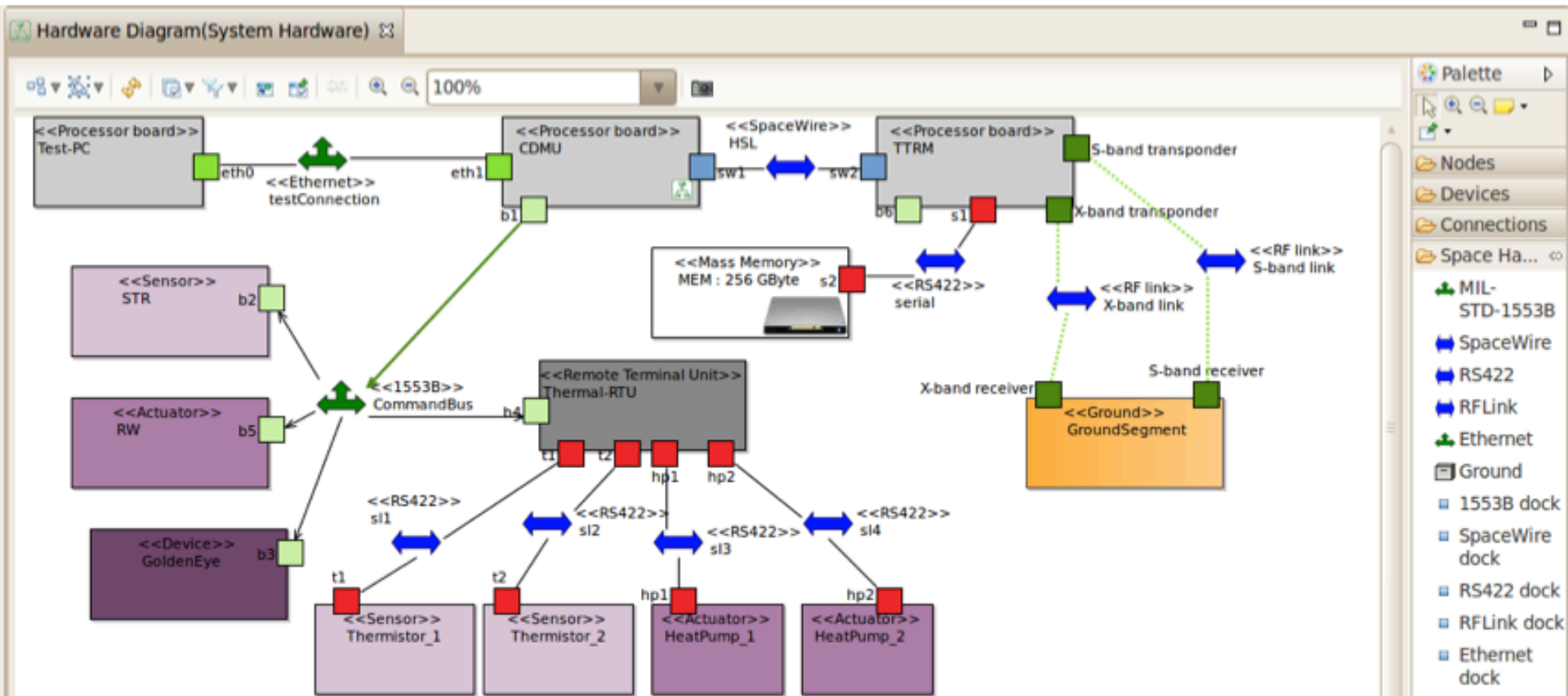
ESA use case: Cordet

Developed by University of Padova



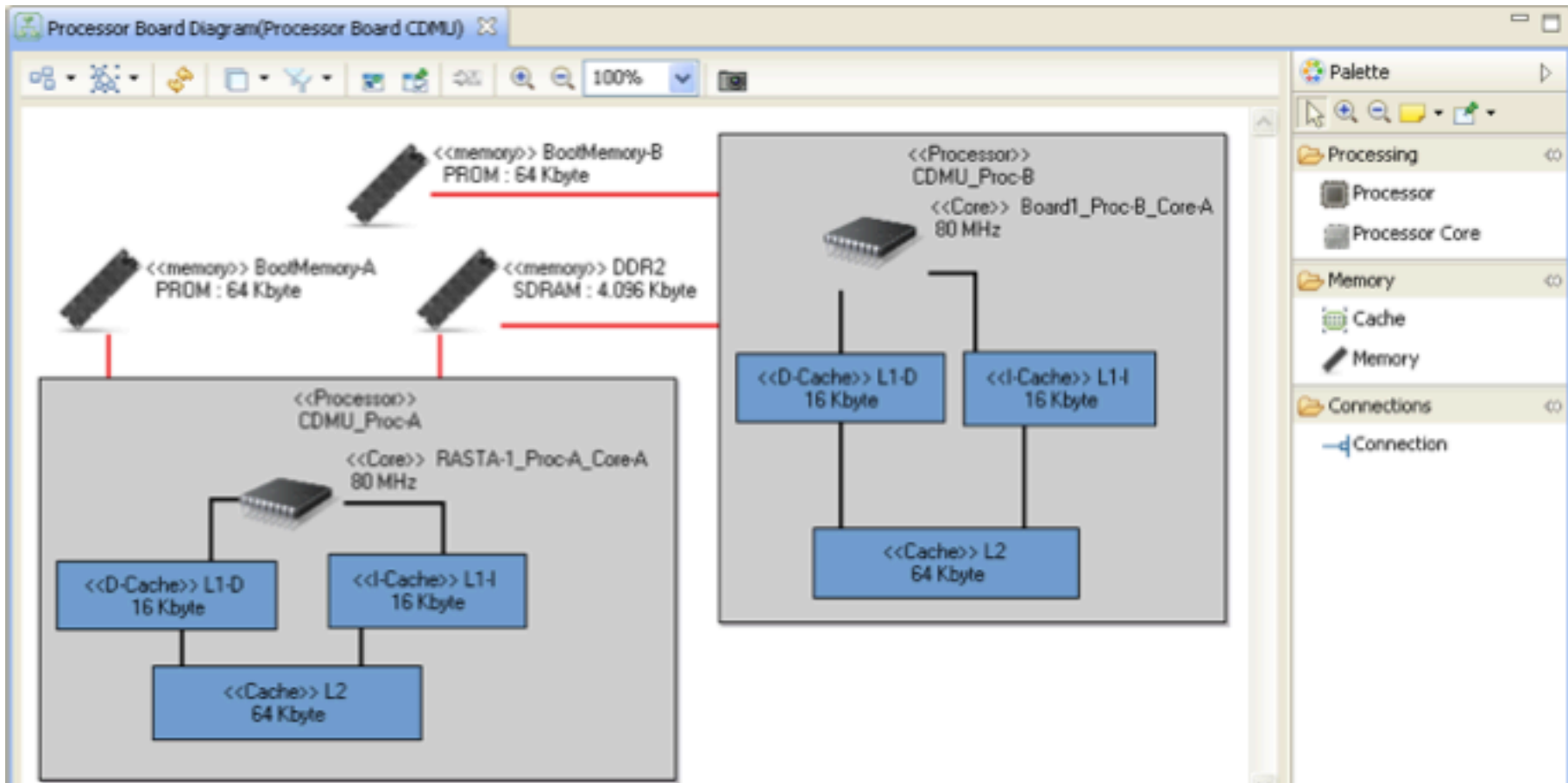


Cordet: Hardware Diagram





Cordet: Process Board Diagram





Chess Goals

Definition of a Multi-Concern Component Methodology and Toolset

- Provide a Multi-Concern Component Modeling Language and a Graphical Modelling Environment that fits multiple industrial domains
- Enable the specification of functional and extra-functional properties of software components
- Integrate tools for the verification of extra-functional properties
- Preserve verified properties at code level and run time



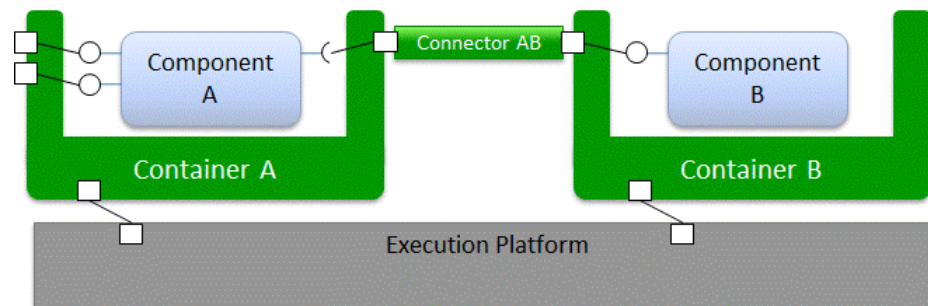
Chess Goals

Adaptation of standards and open sources

- OMG modeling languages
- Eclipse Environment
- Validation through multi-domain industrial case studies

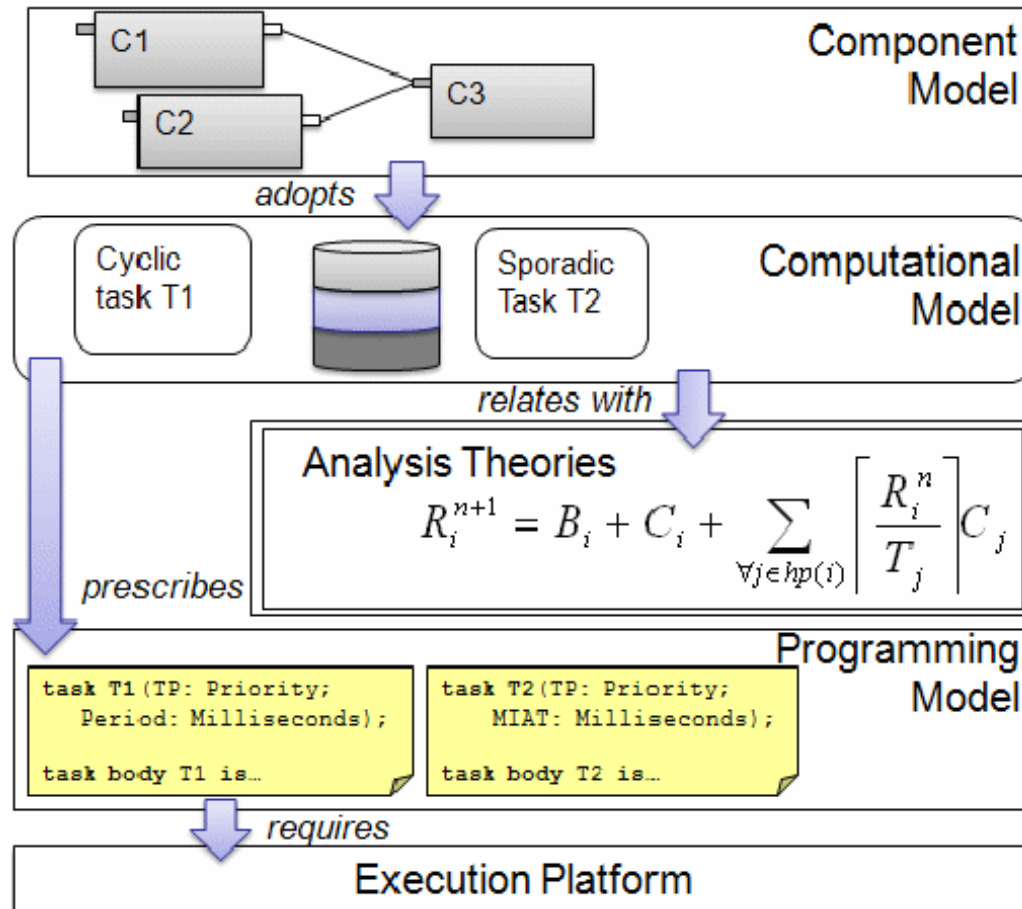
Chess results contributed to PolarSys

Chess Continued by the Concerto project





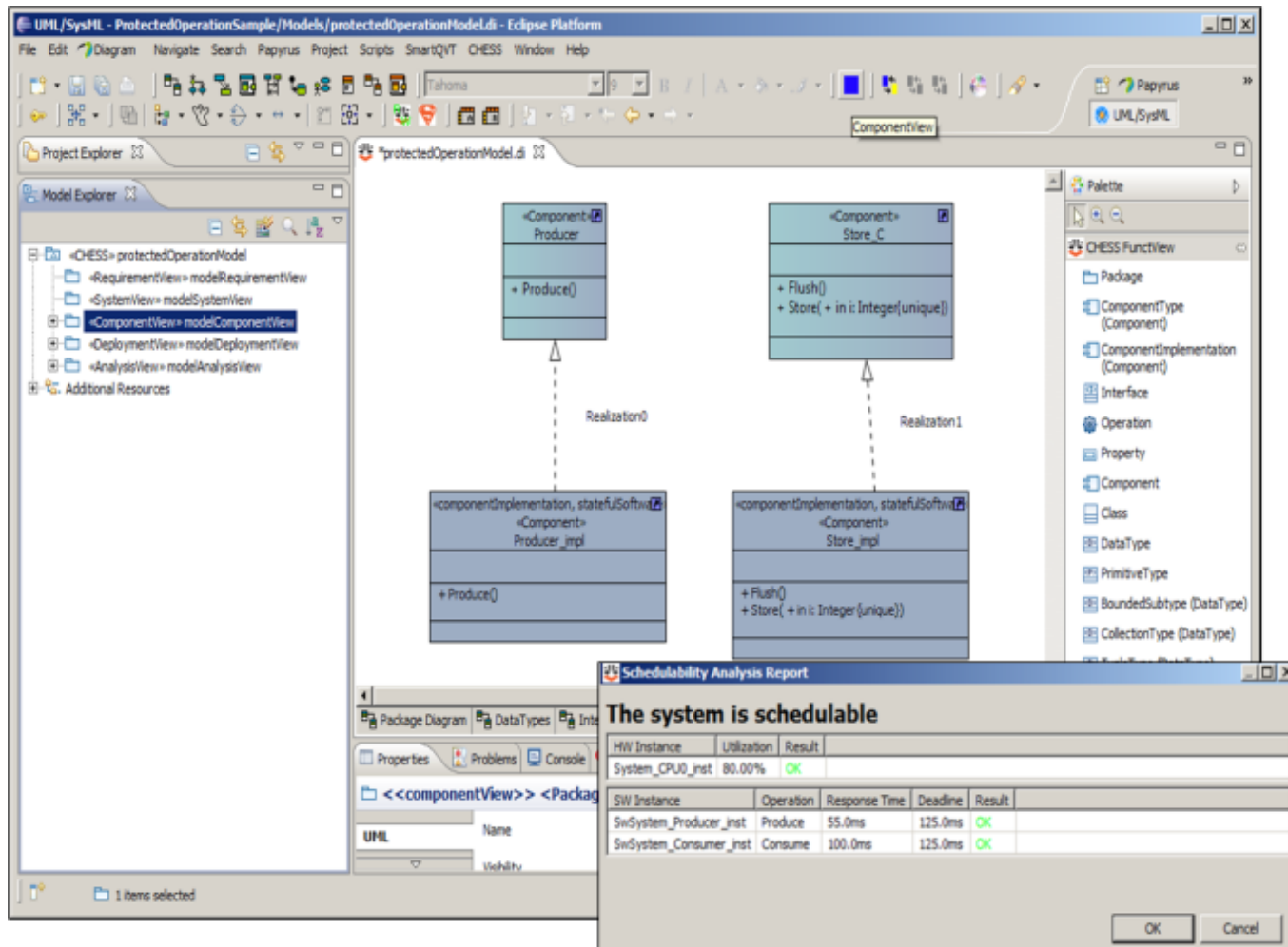
Chess methodology





Chess modeling tools

Papyrus customization by Intecs and Univ of Padova

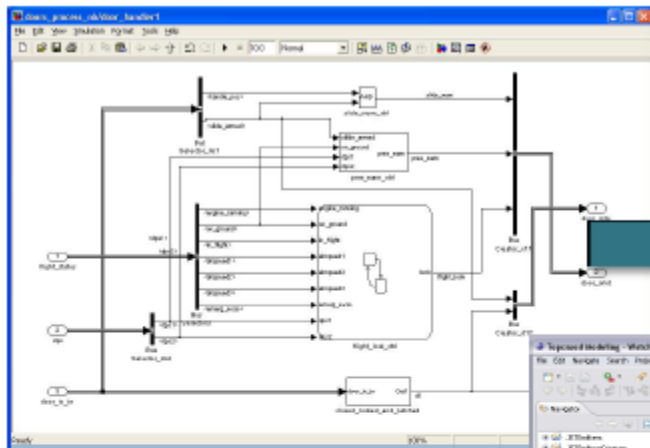


POP

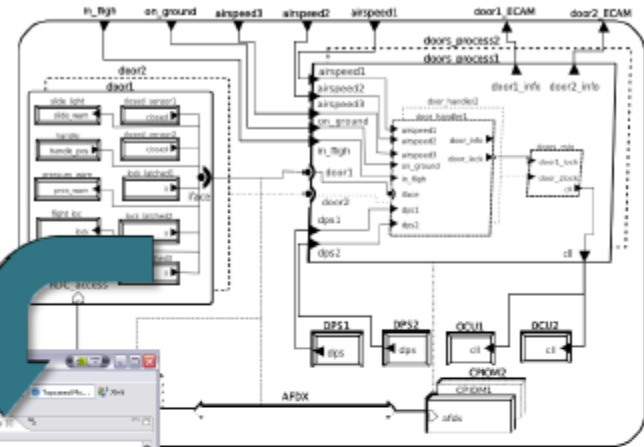
Contributed by Inria



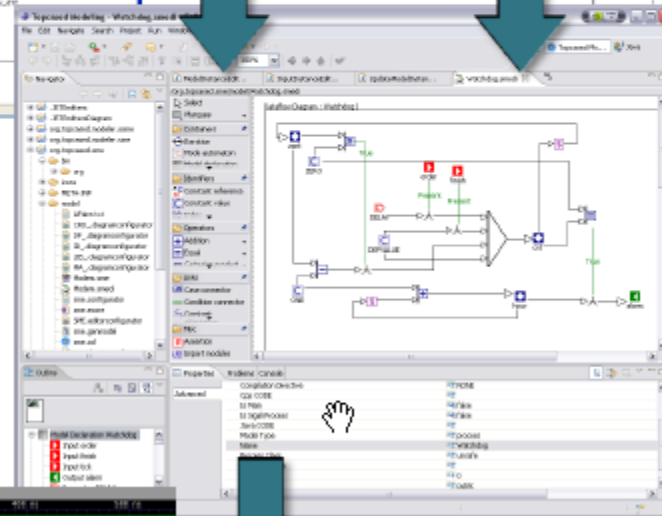
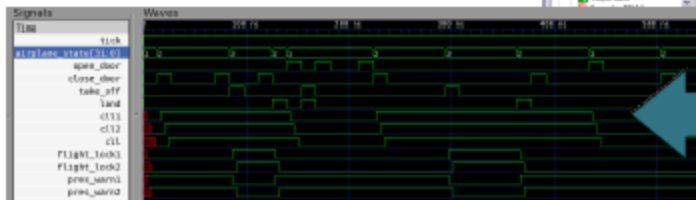
Simulink functional models



AADL architecture model



VCD interface

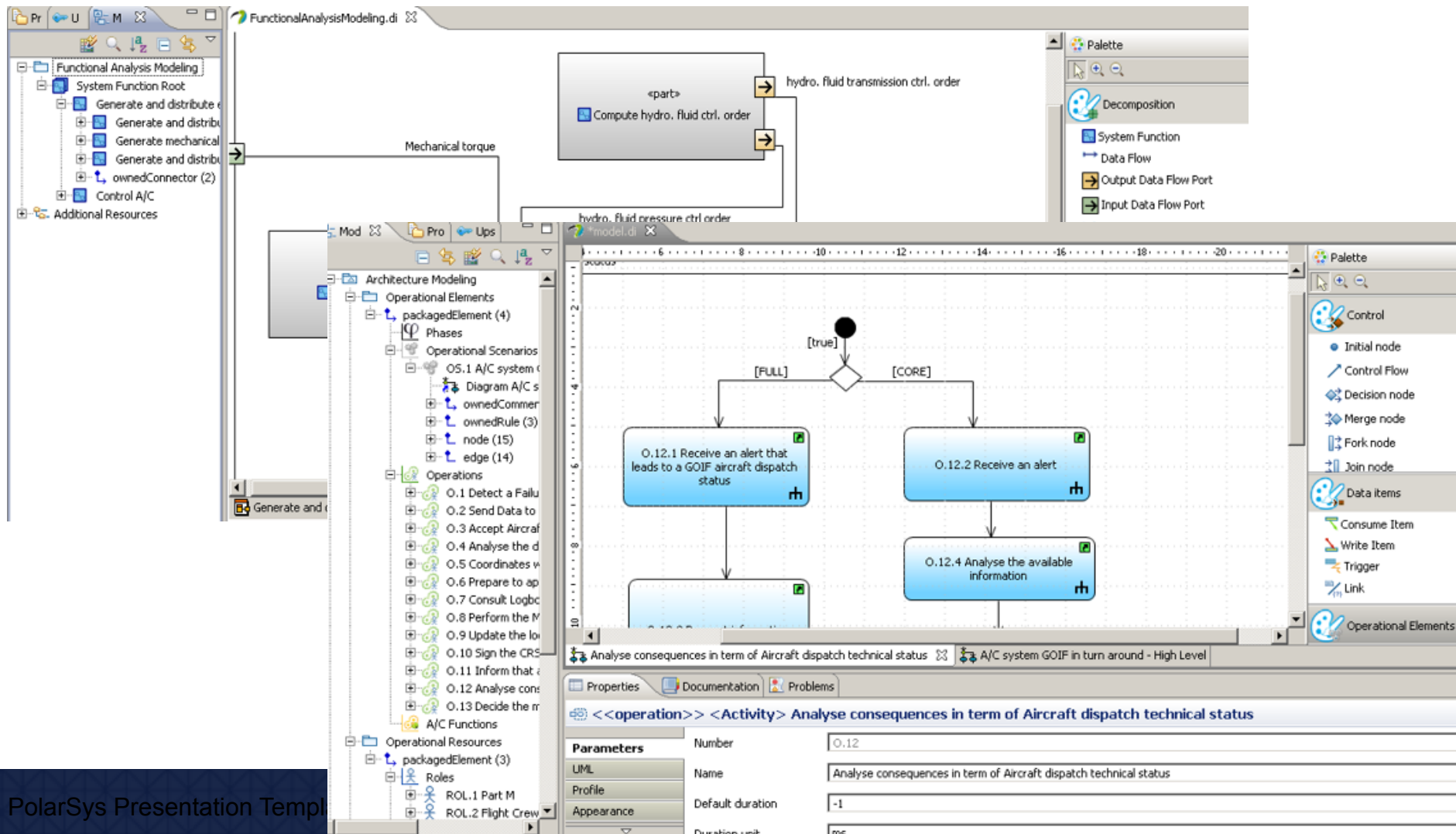


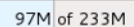
verification and
simulation code
generation
infrastructure

Co-simulation, profiling, scheduling,
verification, performance evaluation



Fast Papyrus customization by Airbus





Capella

Thales contributes Melody Advanced tools



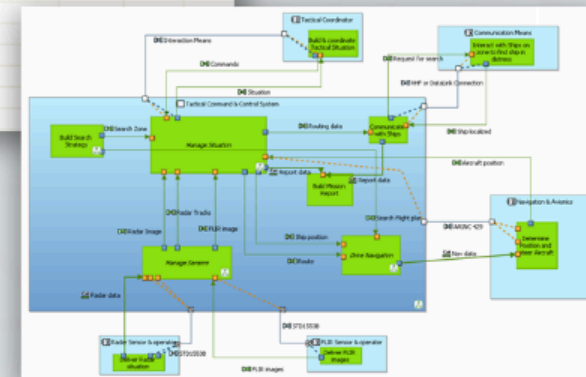
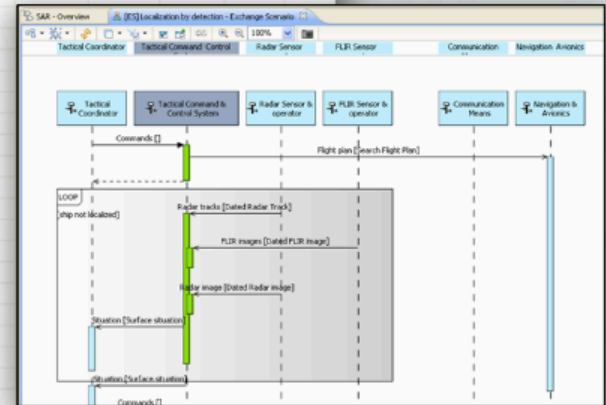
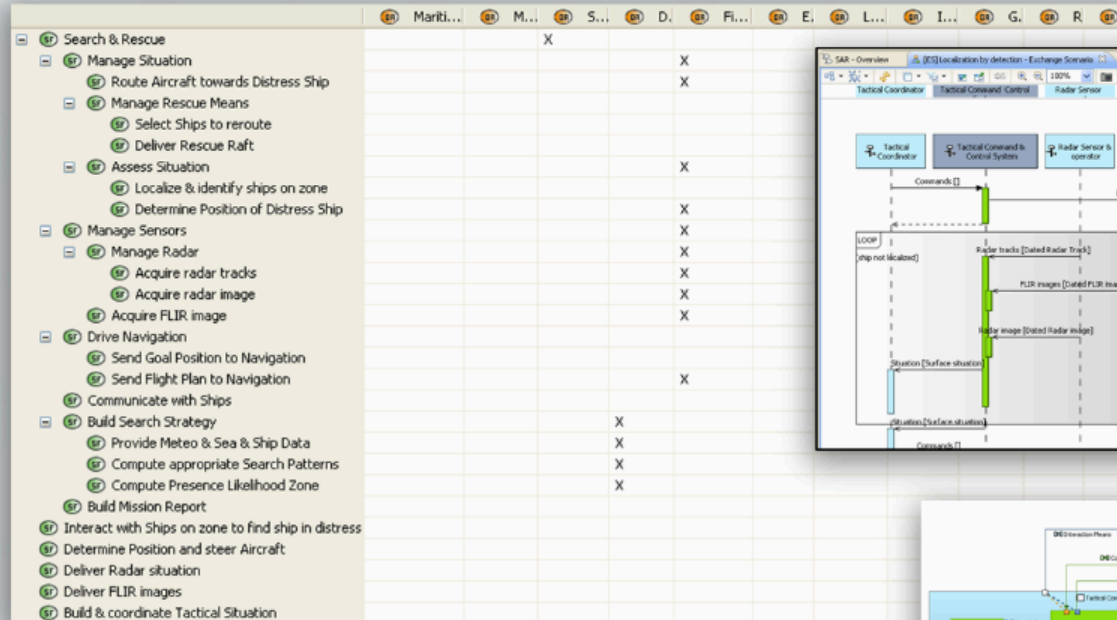
Operational
Analysis

System
Analysis

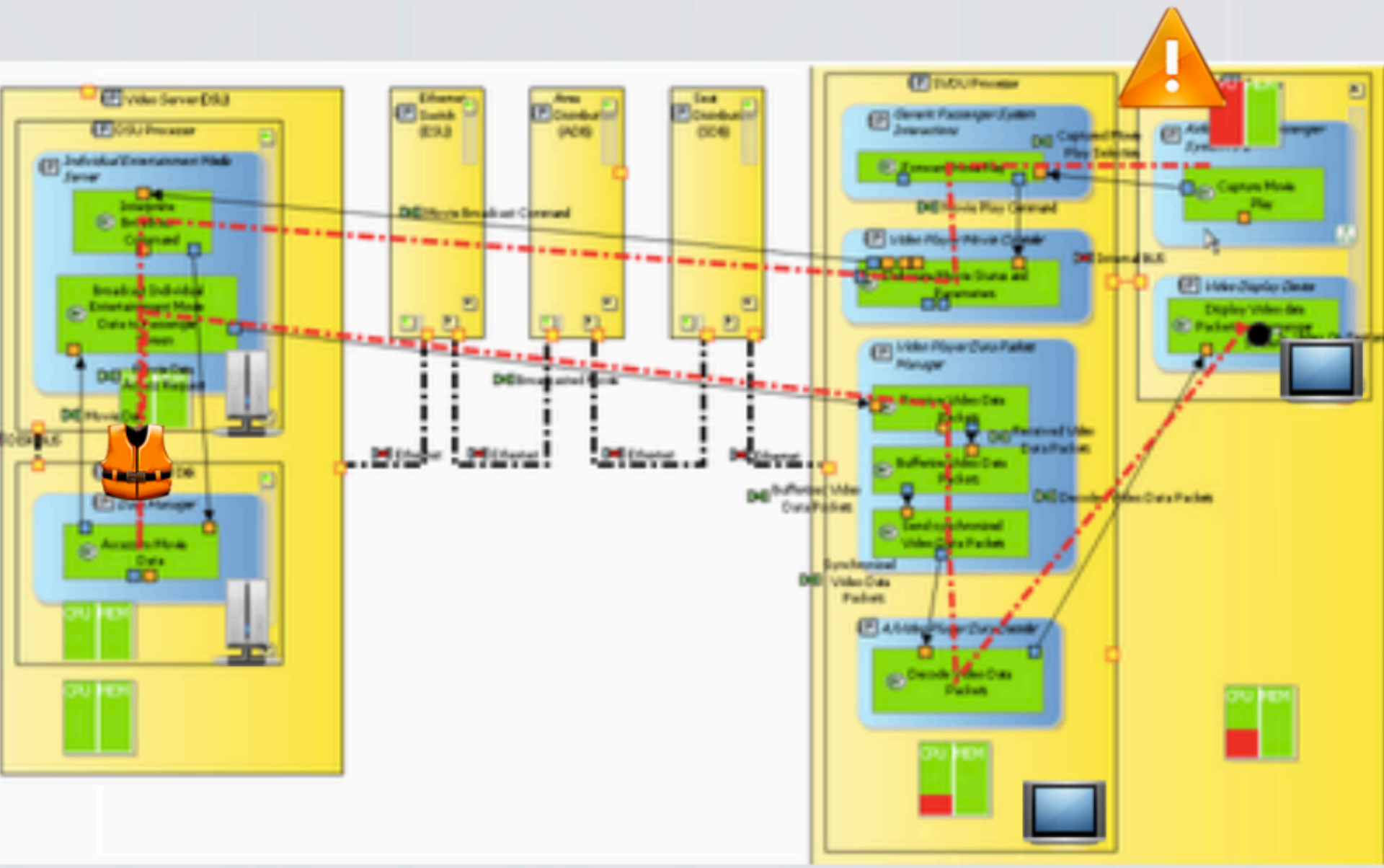
Logical
Architecture

Physical
Architecture

EPBS



Thales contributes Melody Advanced tools



Capella

Thales contributes Melody Advanced tools



Melody Advance - platform/resource/EOLE_AF/EOLE_AF.aired/[LDFB] EOLE - Logical Data Flow Blank(Logical Function Root Logical Function) - Melody Advance

File Edit Diagram Navigate Search Project Run Window Help

Segoe UI

8 | B I A | 100%

Melody A...

EOLE_AF - Overview

Logical Architecture

System Analysis **Logical Architecture** Physical Architecture

Develop System Architectural Design

Transition from System Functions

Refine Logical Functions, describe Dataflows

Define Logical Components and Actors

Perform an automated transition of System Actors

Create a new Logical Component Breakdown diagram

Create a new Logical Architecture diagram

Allocate Logical Functions to Logical Components

Operational Analysis System Analysis Logical Architecture Physical Architect... EPBS

Properties Problems

Measure Temperature

Melody/Advance

Semantic

Style

Appearance

Properties

Name: Measure Temperature

Summary:

Description:

Available in Modes and States:

[Logical Function] Measure Temperature

Referencing Elements

- Active In Modes
- Active In States
- Allocation Block
- Meteorological Data Acquisition
- Incoming Interactions
 - Raw Temperature Value
 - Make Meteorological Data
 - Temperature Capture
 - SensorFork
- In Flow Ports

Current Element

- Measure Temperature
 - Breakdown
 - Parent
 - Proceed to a Set of Measure

Diagrams

- All Relative Diagrams
 - [LAB] EOLE - Logical Architecture
 - [LDFB] EOLE - Logical Data Flow

Referenced Elements

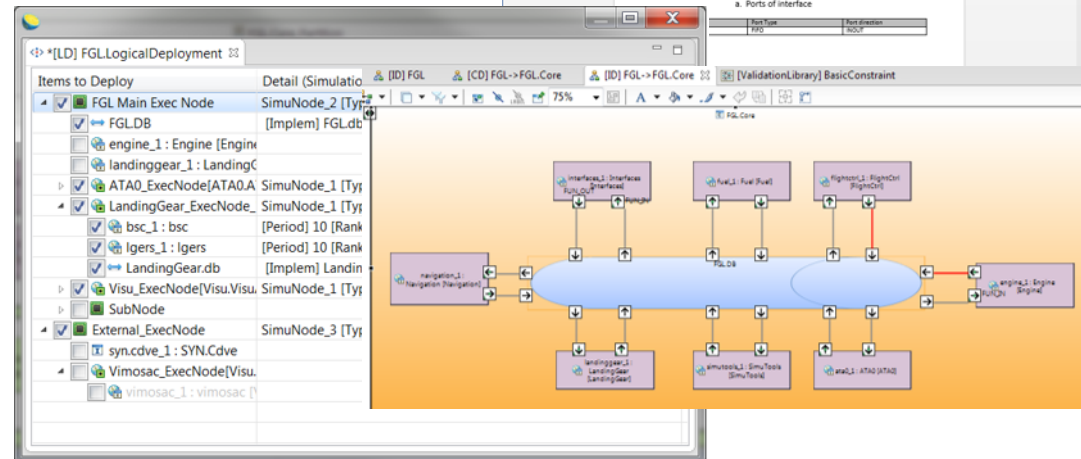
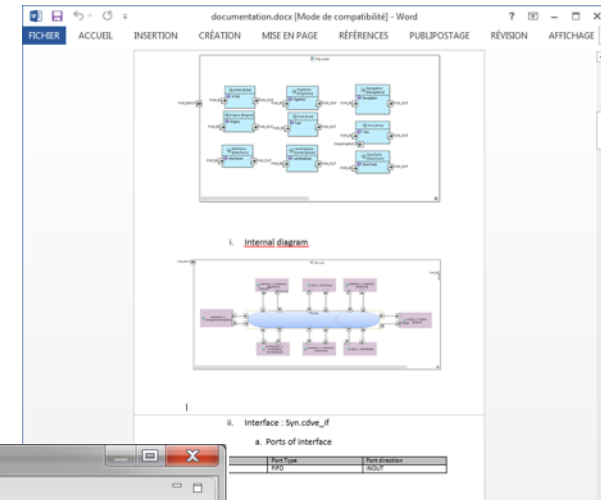
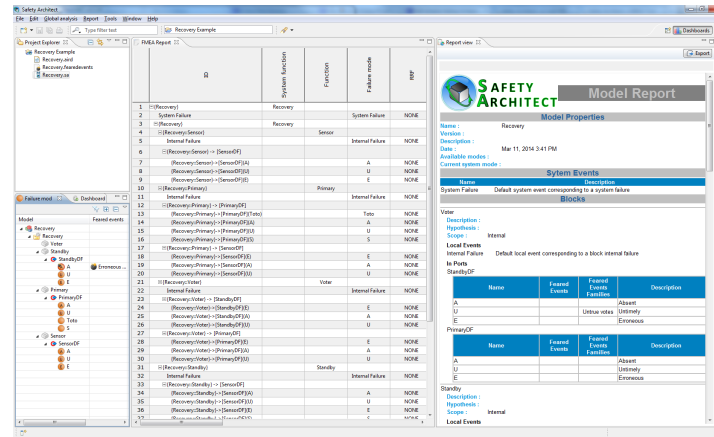
- Internal Outgoing Interactions
 - Out Flow Ports
 - FunctionOutputPort1
 - Outgoing Interactions
 - Temperature Measurement
 - Transmit Captured Data
 - Realized Functions
 - Requirements

68M of 127M

The screenshot displays the Melody Advance software interface. The main window shows a Logical Architecture diagram with a central green box labeled 'Proceed to a Set of Measurements' containing various measurement components like 'Wind Strength', 'Moisture', 'Wind Direction', and 'Temperature'. This central box is connected to other components like 'Launch a Capture', 'Schedule Measurement Campaigns', 'Subscribe to Capture Campaigns', 'Validate & Publish Captured Data', and 'Process Captured Data'. The left sidebar shows the 'Logical Architecture' view with a 'Logical Architecture' button highlighted. The bottom left shows the 'Properties' panel for the 'Measure Temperature' function, and the bottom right shows the 'Semantic Browser' for the same function, detailing its referencing and referenced elements.

Other domains

- Safety
- Doc Generation
- Simulation



OPPORTUNITY





UML or DSL?

DSL

with

Sirius 1.0
& Capella

AND

UML/SysML

with

Papyrus 1.0



MINS. SECS.
-00:11

APOLLO COUNTDOWN

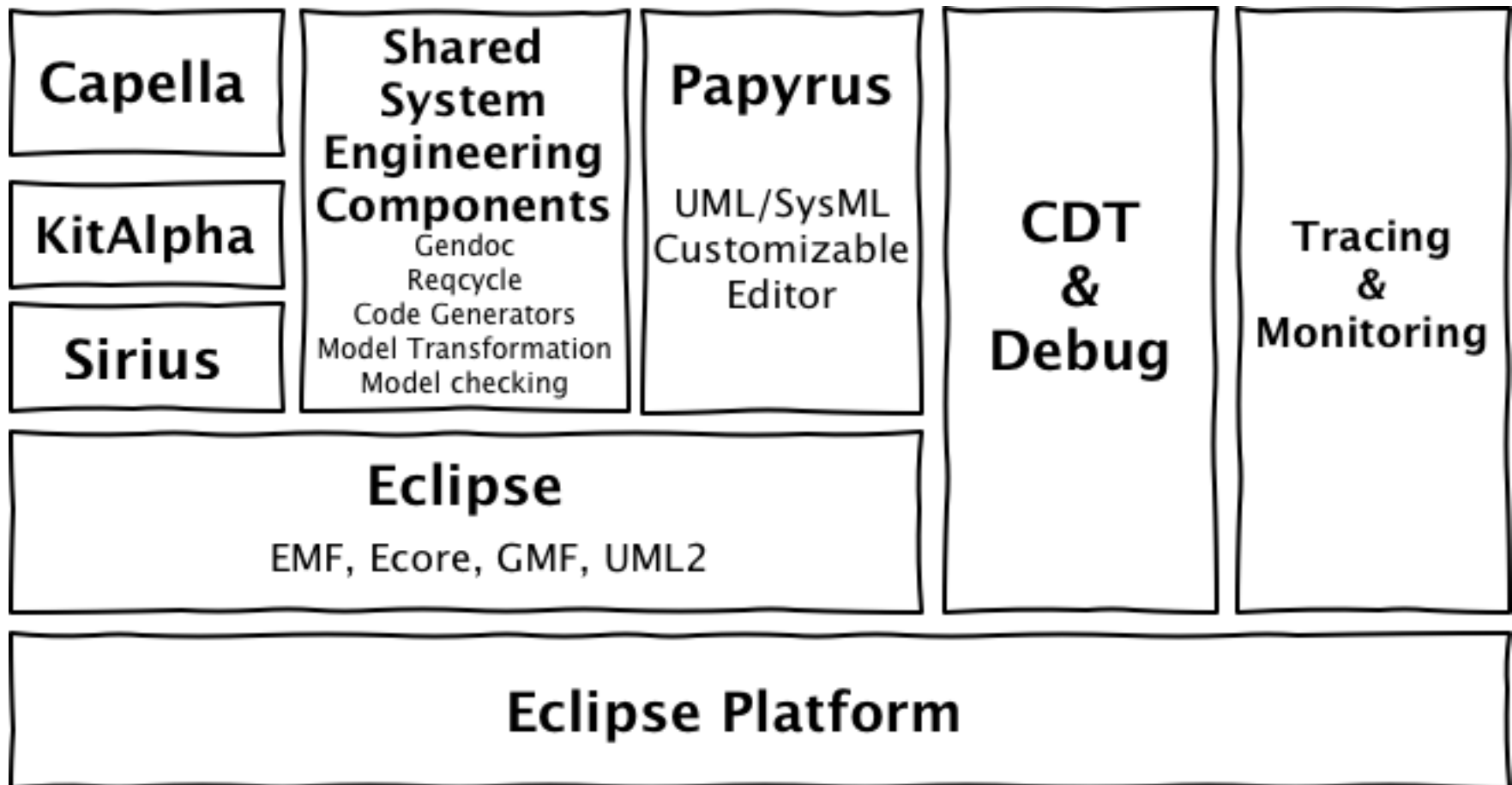
Luna





Add new components

Integrate the components





Join the initiative!

- Not only modeling
- We welcome
 - Users
 - Software vendors
 - Universities
- Open Governance
- Open to new technologies
- Outreach to a larger community of industrial users and partners





Photos credits

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- <http://www.freeimages.com/photo/1356931> by Guglielmo Losio