Long Term Availability

AIRBUS A300 Life Cycle
Program began in 1972, production stopped in 2007
2007-1972 = 35 years...
Support will last until 2050
2050-1972 = 78 years !!

On board software development for very long lifecycle products
Software Development Tools
A more and more complex context

Growing complexity of embedded SW
Growing need for Engineering Tools

Full MBSE
Formal methods
Requirement engineering
Dependability
Long Term Durability
Maturity
Productivity
Extended Enterprise

Dependability
Long Term Durability

Aircraft Programs

A320 A340 A380 A350 A3OX

Data flow
Process management
SW production framework
**Software Development Tools**

**A brief History**

**“In-House” development**
- Process and conf. mgmt: MARCEL, PALLAS
- Design support: PICL, SAO
- Requirements traceability: TabTrace, Gmat, Ouate
- Test environment: AUTAN
- Code Generation: CLARA, CAPITOLE …
- Rules verification: VerifNRC

- Developing tools requires specific skills e.g.: ergonomic HMI, complex mathematical basis, collaborative support…
- Heavy costs of developpt / maintenance
- **Clearly out of Airbus core business**

**Commercial tools**
- Process and conf. mgmt: Clearcase
- Design support: STOOD, SCADE, ObjectGeode, Rose
- Requirements traceability: RTM, DOORS, Reqtify
- Test environment: RTRT, System Test
- Code Generation: SCADE/KCG …
- Rules verification: Prolint

- Risk of vendor lock-in
- Customization to support our process is required and deployment in extended enterprise is often expensive
- **Long term availability not guaranteed**
Open Source
A possible Solution for Engineering Tools?

**Requirements**
- Control tools
- Ensure tools durability
- Adapt tools easily to our process
- Use Open Standards for interoperability
- Lower vendor lock-in
- Lower deployment costs in extended enterprise
- Optimize Evolution & Maintenance costs
- Provide Training & Maintain Knowledge

**Open Source Strengths**
- Availability of source code
- Community of Users and Contributors
- Based on Open Standards
- Low Deployment Cost
- Involvement of Universities/Schools

**Success Conditions**
- Build a viable community
- Organize the Support
TOPCASED History & Future

First ideas
Aerospace Valley
French Cluster

Industries

SMEs

School/Universities

Laboratories

2005
2008
2009
2010
2011

v 1.0
v 2.0
v 3.0
v 4.0
v 5.0

Start of experimentation
Start of operational usage

Need to organize recurring maintenance

Migration of legacy projects to TOPCASED

ATOS Origin etc.
Mission

- Ensure very long-term availability of critical/embedded systems engineering technologies including Topcased and other projects (Geneauto, Frama-C, etc.)

Towards a federation of Industrial Users, Service Providers and Academics

- Build a sustainable ecosystem around OPEES technologies: share components and core services
- Avoid the creation of one ecosystem per industrial user: share roadmap and maintenance costs
Towards a User Centric Strategy

Tools are adapted to user needs

User share solutions and efforts on common parts

Our goal in OPEES:

- At least 80% Features Requests implemented as generic features
- 20% implemented as user extensions
Polarsys
Industry Working Group
inside
eclipse
New generation of OSS ecosystems

User Benefits

OSS + Community
Apache, FSF

OSS + Community + Business Ecosystem
Eclipse, OW2

OSS + Community + User Centric Ecosystem
Polarsys, Eclipse Auto IWG, Linux foundation

Ecosystem Maturity
OSS collaboration infrastructure (provided by Eclipse)

- Collaboration infrastructure
  - Source code repositories, forum, mailing list, wiki, ...
  - Development process, meritocracy, ...
- Intellectual Property Management
  - License management
  - Copyright
  - Contribution traceability & ownership
  - Manage licenses compatibility
Long Term Support
(Polarsys Service)

- Vendor neutral approach for
  - Long Term Availability
  - Ensure shared best practices
  - No vendor lock-in on build processes
- Not an intermediary between Providers and Users
- Common infrastructure (CBI) operated by the Eclipse Foundation
- Provides VLTS
- Foster the Long Term Support Ecosystem
Qualification kits (Polarsys Service)

- Qualification Kits are Polarsys private documents
- Provide base documents to be adapted for specific certification process
  - Component development plan
  - Component test plan
  - ...

Labeling Process
(Polarsys Service)

- Structures the Providers eco-system
- Labeling process identifies
  - Committed service providers
  - Skilled service providers
- Label recognize a proven expertise and investment in the technology
- Complements the OSS meritocracy
Change Control Boards for OSS projects (Polarsys Service)

- Change Control Board
  - Manage the change process
  - Users prioritize new developments and fixes
- Complements Project Management Committees
  - PMC are driven by developers and committers
- Balancing innovation and industrial quality
Main Need

Tool Vendors  Industry (driver)  Academics Collaborative Projects

Availability of an integrated and sustainable technological platform for critical systems
Main Need

Availability of an integrated and sustainable technological platform for critical systems

Selection of components
Consistency & Completeness: at the technical and engineering levels, in a roadmap
Main Need

Availability of an integrated and sustainable technological platform for critical systems

TOOL VENDORS

INDUSTRY (driver)

ACADEMICS COLLABORATIVE PROJECTS

Availability of an integrated and sustainable technological platform for critical systems

Eclipse as a development platform of reference

Services of Very Long Term Support
Main Need

Availability of an integrated and sustainable technological platform for critical systems

Demanding level of TRL (i.e., maturity) of the components: relevance, quality, reliability
Main Need

**Availability of an integrated and sustainable technological platform for critical systems**

- **TOOL VENDORS**
- **INDUSTRY (driver)**
- **ACADEMICS COLLABORATIVE PROJECTS**

Being user- instead of technology-driven

Definition of orientations for Key Technologies and Engineering domains
Main Need

TOOL VENDORS

INDUSTRY (driver)

ACADEMICS COLLABORATIVE PROJECTS

Availability of an integrated and sustainable technological platform for critical systems

Polarsys becomes an incubator between all types of actors

Examples of projects: AGeSys, MBAT
Two examples explaining the Thales involvement in Polarsys
In-house & Polarsys Platforms

**COMPANY-SPECIFIC TOOLING**

**TECHNOLOGICAL DOMAINS LEVEL**

**ENGINEERING DOMAINS**

**CORE TECHNOLOGY DOMAINS**

---

**POLARSYS**

**TECHNOLOGICAL DOMAINS LEVEL**

**ENGINEERING DOMAINS**

**CORE TECHNOLOGY DOMAINS**

---

**EXTENDS**

Gap analysis for each Component:

- Existence
- Functional
- Non Functional
In-house & Polarsys Platforms

Decision for each Component

- Reuse
- Remains Specific
- Open sourcing
- New Expectation
Synergy between Actors – Ex: Requirement Mgt

Eclipse.org/rmf
OMG-ReqIF Implementation

Requirement Traceability within models

Convergence

[Polarsys Partners and Others]
[Experience and Expectations]

Motivation
Polarsys pillars

Open innovation
Maturity & Quality Assessment
Long term availability

For tools for the development of critical embedded systems
Join us!