



# **Inputs from ARTEMIS Centers of Innovation Excellence**

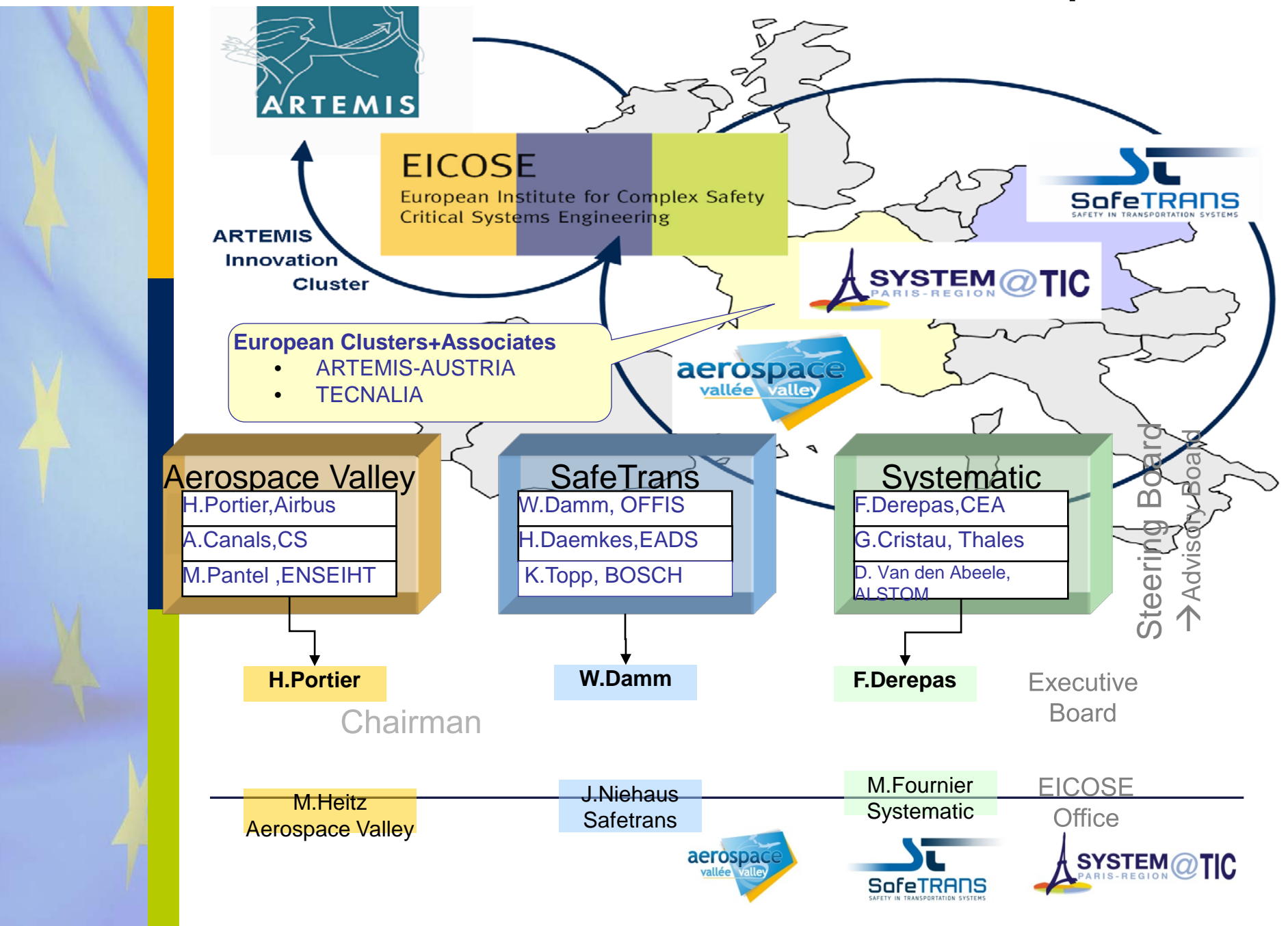
## **EICOSE**

# **ARTEMISIA Summer Camp**

**June 6th, 2012 – Copenhagen**



# EICOSE – The ARTEMIS Innovation Cluster on Transportation

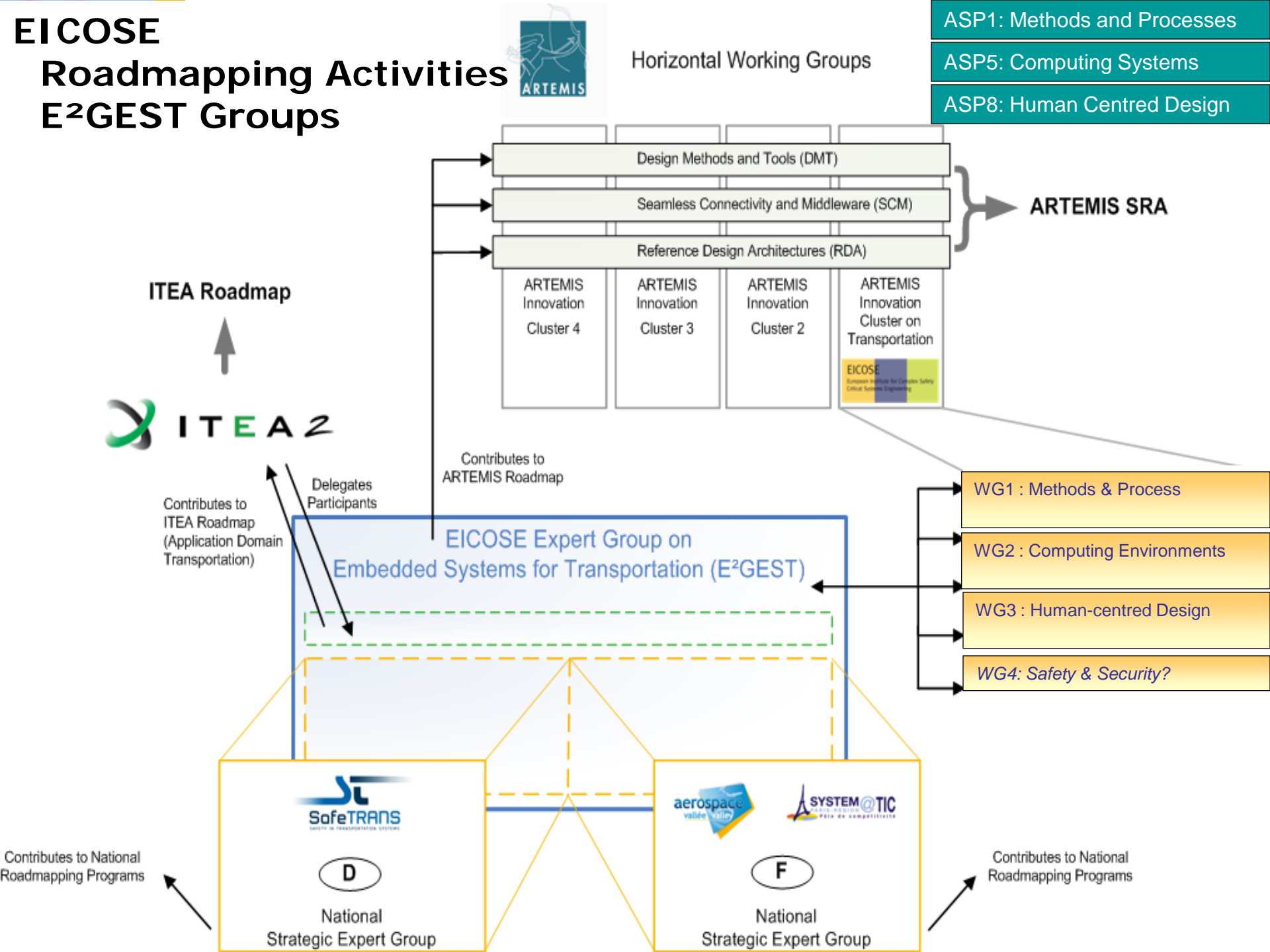


# EICOSE

## Roadmapping Activities

### E<sup>2</sup>GEST Groups

- ASP1: Methods and Processes
- ASP5: Computing Systems
- ASP8: Human Centred Design



# EICOSE Roadmap & Priorities

## Preparation Process

- **Definition of EICOSE Topics**
  - **Design, Tools Integration, V&V, HMI, OS & Middleware Services, Dependability**
  - **WG1** Methods and Processes for Safety-enabling Embedded Systems
  - **WG2** Computing Environments for Embedded Systems
  - **WG3** Human Centered Design of Embedded Systems
- **Formulation, Refinement, Evolution, Prioritization of EICOSE topics / items**
  - e.g. 'Design for diagnosis' , 'Product Line design' under 'Design' topic
  - Prioritization of items
    - importance (medium, high),
    - urgency (short-/medium-term)
- **Contribution to ARTEMIS roadmaps (SRA,RA,MASP)**
- **Liaisons & information exchange**
  - ARTEMIS WG activities & Meetings
  - and other non-ARTEMIS groups

# Update of latest EICOSE priority list for 2013

---

- Topics kept the same importance ranking
- Urgency Criteria moving to short term
- Some Methods & Tools topics in WG2 moved to WG1
- Security topic common & transverse to WG1 & WG2

# WG1 Prioritised Items (1)

---

- **DESIGN**

- Systems of Systems (D16)
- Automated design exploration and synthesis (D11)
- Building Ontologies (D1.2)
- Design for diagnosis (D2)
- Evolvability (DT3)

- **TOOLS INTEGRATION**

- Large scale cross domain tool interoperability & Standards (T1)

# WG1 Prioritised items (2) - V&V

---

- **Composability of V&V technologies** (V1)
  - **Product line** (V3) - Variability /delta analysis
  - **Co-simulation for V&V** of multi Physics systems (V3)
  - **Cost effective qualification** of Verification & synthesis tools<sup>1</sup> (V9)
  - **Verifiability & Testability** technologies (V10)
  - **Verification of large models** with large parameters set (V12)
  - **Verification of non functional properties** (V13)
-

# WG2 Prioritised items

---

- **Multiple criticality** (time predictability + safety)
- **Distributed systems** (with safe , robust, reliable communication links )
- **Security** (protection from outside hacking, privacy/data integrity)
- **Virtualization system splitting the criticalities on the various cores** (included redundancy tasks)
- **Integration of services** (mixed of all functions in a system, sharing resources)



# WG3 Prioritised items

---

- **Automated analysis of consequences of non-conforming behavior** (incl. non-conforming operation of hardware elements)
  - **Modeling of different user types / modeling user variability** (behavior/concern)
  - **Exploration of already available results and availability for system designers through specific evaluation tools or guidelines**
  - **Investigation of human behavior in traffic situations in order to identify needs for additional assistance or for improving existing assistance**
  - **Investigation of the holistic user experience with HMIs** (emotions, satisfaction, user value)
-

# EICOSE Priorities - Results

ARTEMIS WG	EICOSE Topics	No.	EICOSE Items	Importance	Urgency
DMT	Design (Airbus)	D1	Requirements management (system of systems aspect)	H	S
		D2	Design for diagnosis	H	M
		D3	Component based design	H	M
		D4	Systems interfaces management (supply chain)	H	M
		D5	Architecture trade-offs (including robustness metrics, resource and behavior prediction)	H	S
		D6	Product line design	H	M
		D7	Large scale deployment of model based design	H	S
	Tools integration (Continental)	T1	Large scale cross domain tool interoperability	H	M
		T2	Standards	H	S
	V&V (IRIT)	V1	Composability of v&v technologies	H	M
		V2	Product line	H	M
		V3	Co-simulation x in the loop	H	S
		V4	Local verification techniques & tools (static, dynamic v&v)	H	M
		V5	Simulation platform	M	M
		V6	Model based v&v	H	S
	Dependability (OFFIS)	DP1	Similarity analysis	H	S
		DP2	Controllability of hazardous situations	H	S
		DP3	Evaluation and verification of dependability	H	S
		DP4	Design for dependability	H	M
		DP5	Safety	H	S
	HMI (Visteon)	H1	Prototyping (including menus)	H	S
		H2	V&V and simulation	H	M
		H3	Modeling (including formal language)	H	S
		H4	Demographic development	H	S
SCM	Middleware services guarantee prescribed QoS. (CEA)	M1	Multiple level of safety	H	S
		M2	Support for deterministic behavior (RT)	H	S
		M3	Fault isolation/containment	H	S
		M4	Reconfiguration (static, dynamic, incl. multi process or multi core, redundancy management)	H	M
		M5	Support for diagnosis	H	M
		M6	New communication concepts wrt. reconfigurability, robustness, security	H	M
		M7	Security (as a safety issue)	H	M
RDA/SCM	Design support for emerging HW platforms  (Numatec)	DS1	Methodology and tools for HW/SW co-design	H	M
		DS2	Extending design tools for support of multicore architectures	M	M
		DS3	Embedded multi-process architecture platforms for multi sensor applications (standard API/services between appl. HW & basic SW)	H	S
		DS4	Execution platform modeling	H	M
		DS5	Impact on and adaptation to standards (AUTOSAR, ...)	H	S
RDA	Design patterns (OFFIS)	DT1	Patterns Supporting COTS, fault isolation, DASL/ASIL level reduction, similarity arguments	H	S
		DT2	Patterns to support composibility	M	M
		DT3	Evolvability	M	M

---

# **Inputs from ARTEMIS Centers of Innovation Excellence**

## **EICOSE CRTP**

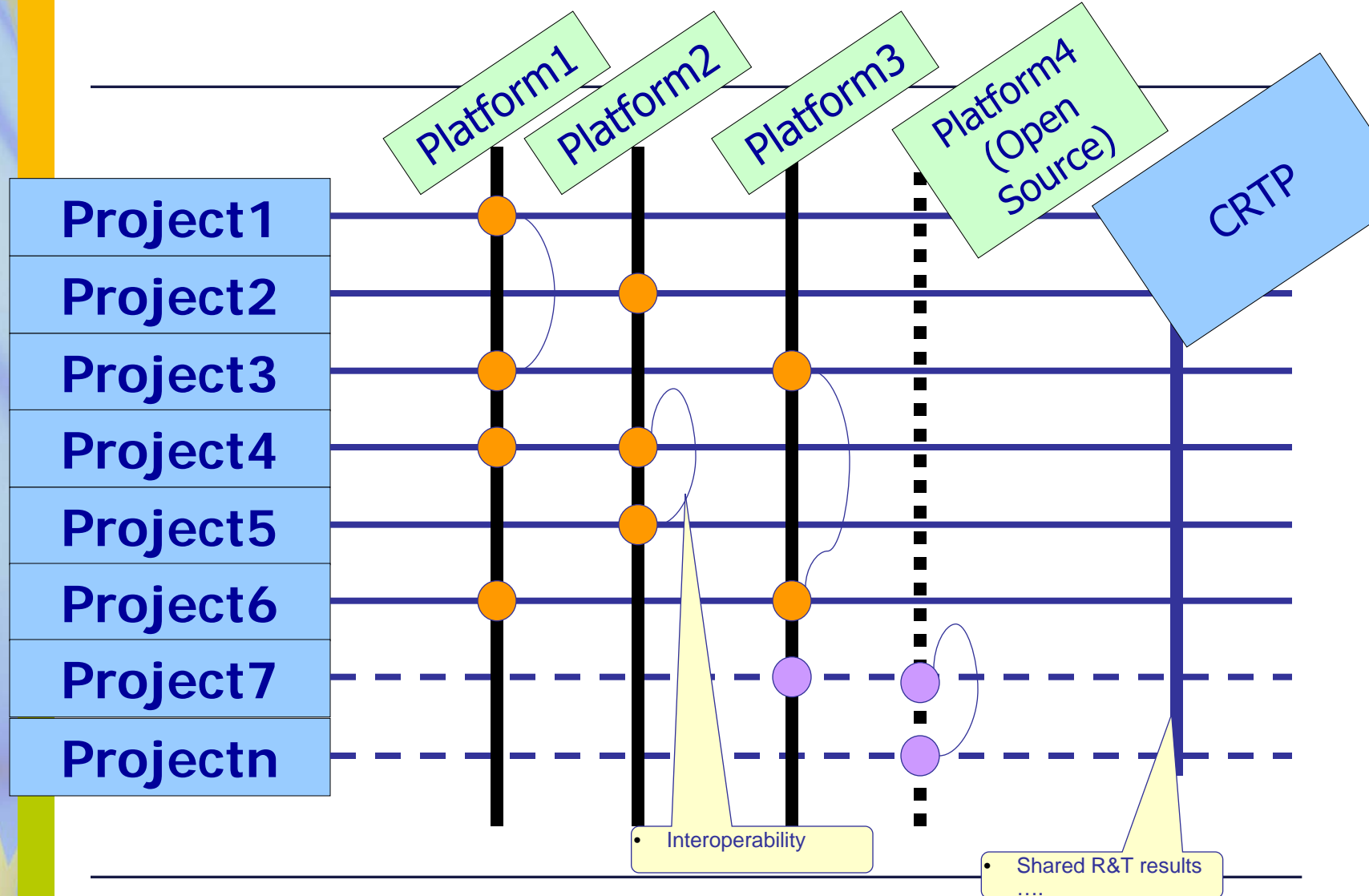
### **ARTEMISIA Summer Camp**

**June 6th, 2012 – Copenhagen**

---



# ARTEMIS Tool Platforms



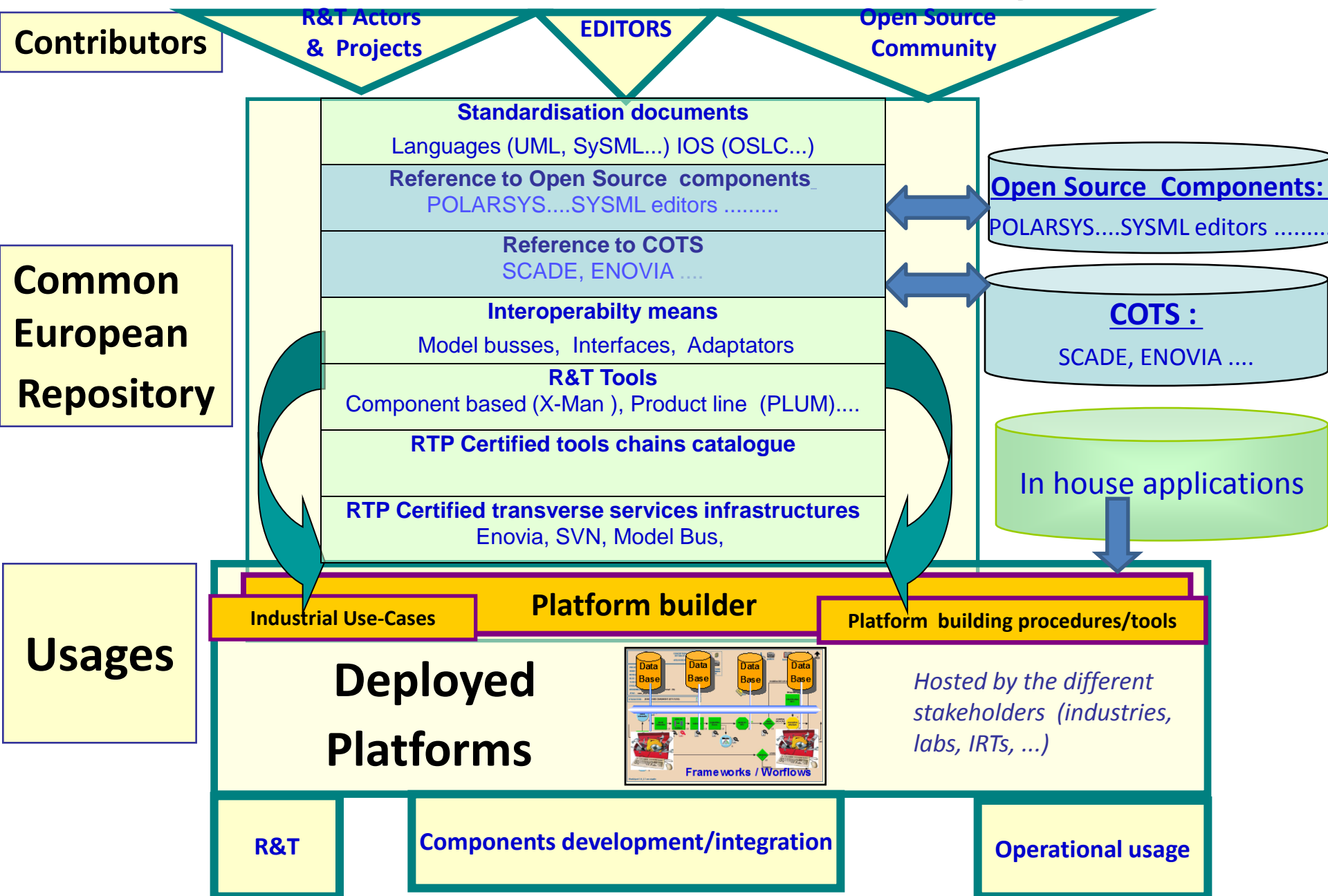
# EI COSE CRTP

( Cooperation Reference Technology Platform)

---

- **The CRTP is an ARTEMIS RTP** in which a set of system engineering assets ( **Technology Bricks or Building Blocks** ) **for critical embedded systems** development are stored and managed under configuration.
  - It is **hosted and operated on** a dedicated Information System (that might be distributed on different sites in Europe) and **offers services to Users** :
    - download, upload, manage under configuration, display the components/technological bricks.
    - Qualify these components (i.e. document & test components vs inter-operability , maturity & certification standards )
  - **Users will generate Tool Platforms from CRTP components.** They can rely on a Platform builder to do it automatically.
-

# Cooperation Reference Technology Platform



# CRTP

## Activities & Services

---

- **Governance** defines and controls the rules for creating, and using the content of the CRTP..
  - **Operation**: this is the provision and maintenance of IT infrastructure services + support to usage and qualification
  - **Qualification** : Definition and application of procedures for qualification of bricks ( TRL assessment, interoperability assessment)
  - **Standardisation** : contribute to and rely on standardisation efforts e.g. interoperability standards, languages, etc...
-

# Conclusion

---

- **EICOSE contributes to ARTEMIS roadmapping** with identified priority themes from the transportation sector
- **EICOSE provides expert information** within the formulation of
  - the ARTEMIS Multi Annual Strategic Plan (MASP),
  - the Annual Work Programme (AWP),
  - ASPs & AIPPs
- **EICOSE fosters an innovation eco-system**, supporting strategic networking and the mobilisation of resources on a large scale with collaboration of all stakeholders.



## Organisations and companies cooperating in projects incubated by EICOSE:



For further information please contact:

### AEROSPACE VALLEY

Hervé Portier, Airbus France  
herve.portier@airbus.com

### SYSTEMATIC

Fabrice Derepas, CEA  
fabrice.derepas@cea.fr

### SafeTRANS

Prof. Dr. Werner Damm, OFFIS  
werner.damm@safetrans-de.org

### ARTEMIS Austria

Dr. Josef Affenzeller  
josef.affenzeller@avl.com

---

# Thank you !

---



---

# Additional Slides

---

# Overview EICOSE Topics

---

- Design
  - Tools integration
  - V&V
  - Dependability
  - HMI
  - Middleware services guarantee prescribed QoS.
  - Design support for emerging HW platforms
  - Design Patterns
-

# SP 1 'Methods and Processes for Safety-enabling Embedded Systems'

---

- SP1 will contribute to enhance the quality of final transportation services and products and to decreasing fatalities and injuries in transportation systems by
    - building cost efficient processes and methods supporting safety enabling embedded systems
  - SP1 will require technological breakthroughs in four research areas:
    - Requirement Management
    - Architecture Modeling and Exploration
    - Analysis Methods
    - Component Based Design
- and according to several transverse processes (task forces), e.g.
- Design for Safety
  - Design for Diagnosability
  - Design for Reuse

→ **Focal Points:** W. Damm, H. Portier

# SP 5 'Computing Environments for Embedded Systems'

---

- The main goal of SP5 is to contribute the transition from a vertically structured to a horizontally structured market for the embedded computing solutions
- In order to achieve this goal, SP5 will deliver the following key technologies :
  - Standardized interfaces (APIs) between hardware and low level software implementation and application software, sensors and actuators
  - Core technologies and associated Intellectual Properties in the following areas:
    - low level drivers
    - system software
    - multi-core architectures
    - sensor hardware
    - communication
  - Design tools and associated runtimes that will support composability, predictability, parallelization, aggregation and management of systems according to a service-driven approach, performance and energy modeling and analysis, verification, scalability ... while preserving system-level predictability and appropriate levels of safety
  - Solutions for variability management, at all levels

→ **Focal Point:** F.Derepas

# SP 8 'Human Centered Design of Embedded Systems'

---

- Projects within SP8 shall focus on one or both of the following main goals:
  - Develop cross-domain reusable technology to construct “intelligent” multi modal HMI (synthesis of HMI)
  - Develop cross-domain technologies to analyse the effectiveness and economy of interaction with “intelligent” multi modal HMI designs (analysis of HMI) by predicting human behaviour.
- Projects should consider the following aspects:
  - *Empirical studies* have to be performed to
    - identify the needs of end-users (e.g. pilots, drivers, train operators, plant operators, patients, care givers) and
    - to study the characteristics of human interactions with (partially) autonomous systems fulfilling these needs
  - *Industry needs* have to be acquired from different domains and commonalities
  - Developed technologies should be integrated in a generic *HMI Design Methodology* that fulfils the industry needs and can be easily instantiated in different domains
  - *Application & Evaluation* should demonstrate that the methodology is practical to drive design and that analysis produces valid predictions.

→ **Focal Point:** G. Cristau, A. Lüdtke