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EICOSE

European Institute for COMplex and Safety critical
embedded Systems Engineering

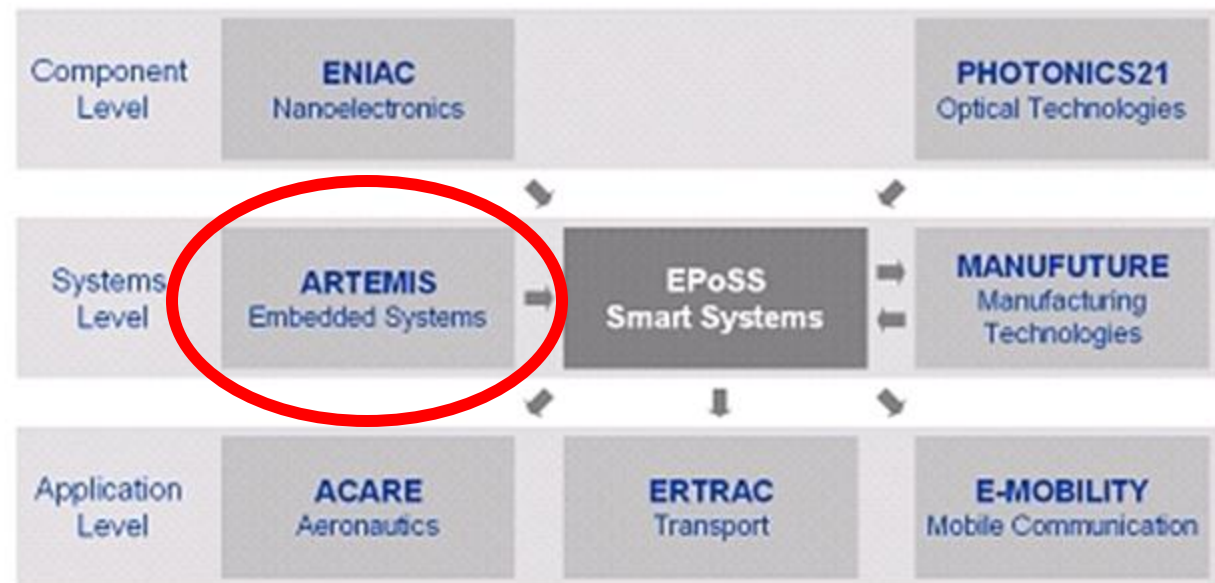
is the Center of Excellence concerning processes and
methods for complex safety critical systems in the
transportation domain (car, plane, train) for ARTEMIS

EICOSE

European Institute for Complex Safety
Critical Systems Engineering



ETPs (European Technology Platforms)



Artemis

- Artemis is one of 34 European Technical Platform
- Artemis is one of the 6 ETP with a JTI
- Develop and drive a joint European vision and strategy on **Embedded Systems**
- A strong economic impact : figures related to embedded systems:

	2002 : software R&D expenses (Billion EUR)	% of Global R&D expenses	2015 : software R&D expenses (Billion EUR)	% of Global R&D expenses
Aerospace	11	34%	23	45%
Railway & Car	17	22%	45	35%
Consumer electronics	7	44%	13	62%
Medical equipment	7	25%	28	33%
Telecom equipment	16	50%	23	64%
Automation	0,1	10%	0,5	17%
TOTAL industrial sectors	58,1		132,5	

The ARTEMIS Technology Platform

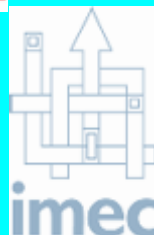
Advanced research and technology in embedded intelligence and systems

Aim and scope

- Develop and drive a joint European vision and strategy on Embedded Systems
 - R&D and educational challenges
 - structural challenges: IPR, open source software, standards, research infrastructure,...
- Align fragmented R&D efforts in the ERA along a common strategic agenda at Community, intergovernmental and national levels

Partners

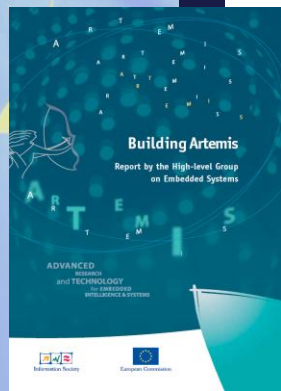
9 of the 25 top-ranked EU companies are members of the ARTEMIS Board spending € 31 bn p.a. in R&D (30% of total R&D of TOP500 EU companies)



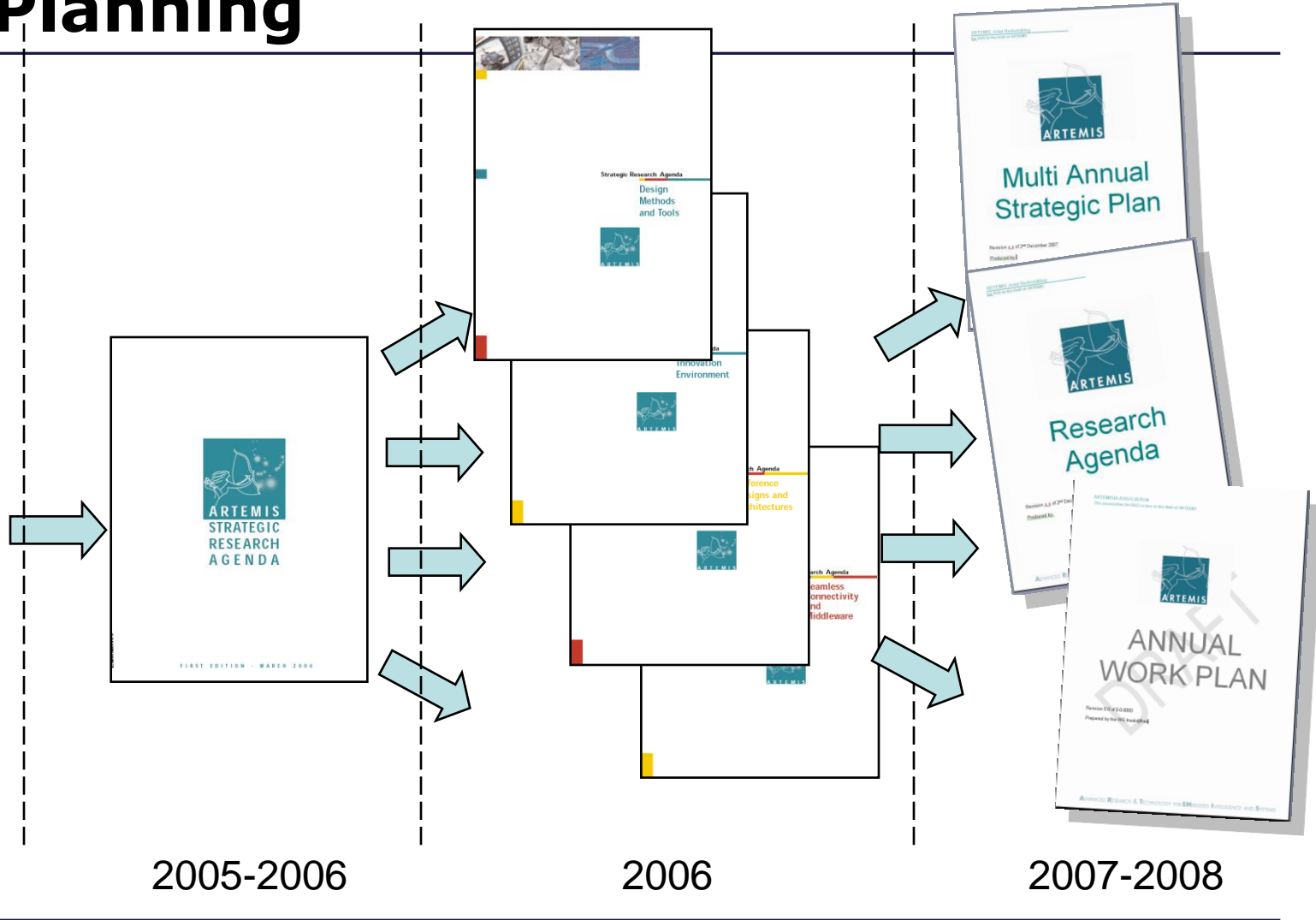
The ARTEMIS Vision

- Europe takes a leading role in ES development
 - Requires committed investment in research and development
- ARTEMIS will facilitate and stimulate success by:
 - Avoiding fragmentation, ensure effective use of resources
 - Focused research and development
 - Establishing an environment supportive of innovation
 - Cooperation and competition in technological development
 - Proactively stimulating the emergence of a new supply industry
 - Components, tools, design methodologies

ARTEMIS Research Strategic Planning

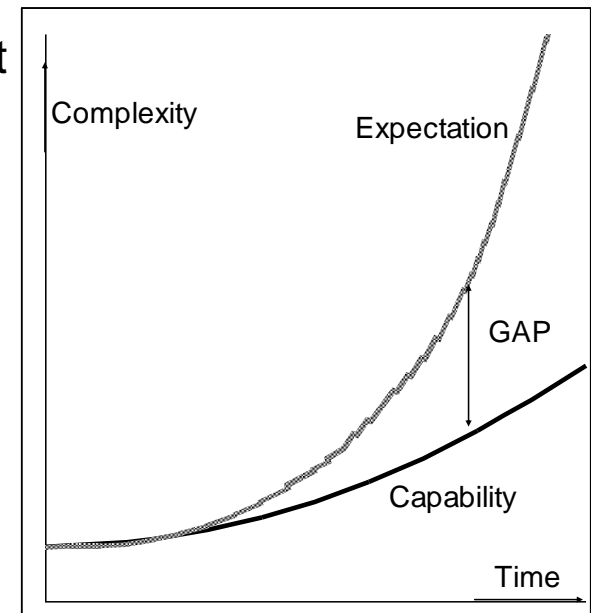


2004



The ARTEMIS SRA

- **ARTEMIS aims to close the design productivity gap**
 - Reduce cost of system design by 50%
 - Achieve 50% reduction in development cycles
 - Manage complexity increase of 100% with 20% effort reduction
 - Reduce by 50% the effort for re-validation and re-certification
 - Achieve cross-sectoral reuse
 - E.g. automotive, aerospace, railway and manufacturing



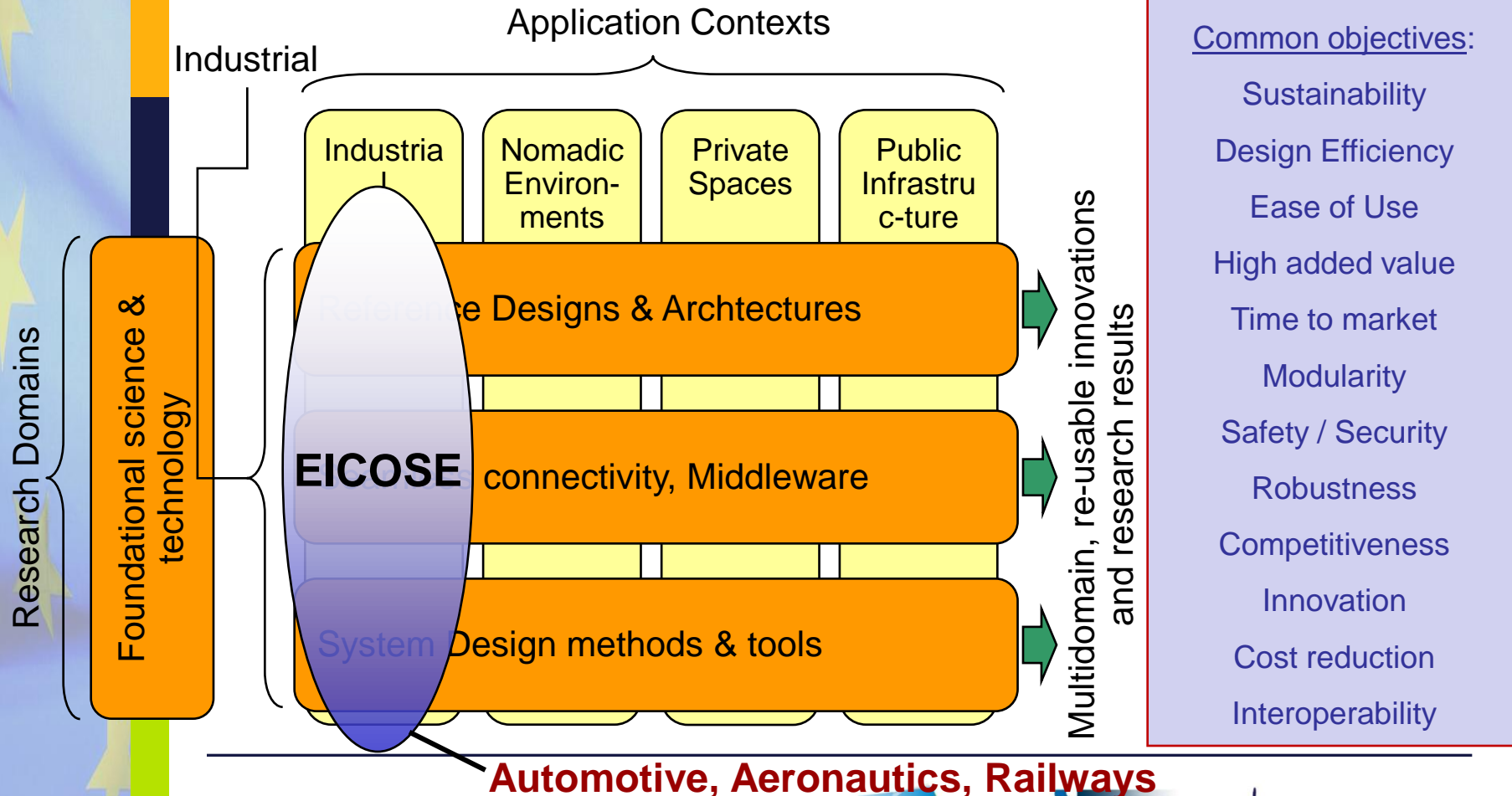
ARTEMIS : The priorities



	Sub-Programme
1	Methods and Processes for Safety-enabling Embedded Systems
2	Person-centric Health Management
3	Smart Environments and Scalable Digital Services
4	Efficient Manufacturing and Logistics
5	Computing Environments for Embedded Systems
6	Information Security, Privacy and Dependability
7	Energy Management and Eco Sustainability
8	Human Centred Design of Embedded Systems

ARTEMIS' Pan-Application-Context approach

ARTEMIS approach cuts barriers between application sectors, stimulating creativity and yielding multi-domain, re-usable results





FP

JTI

EUREKA

National Programs

ARTEMIS

European Technology Platform on Embedded Systems

Advanced Research and Technology for Embedded Intelligence & Systems



Industrial
steering board

Strategic Research Agenda

ARTEMISIA = ARTEMIS Industrial Association

EICOSE : European Institute for Complex and Safety
critical embedded Systems Engineering

Center of Excellence (CoE) for transport industry
(aeronautics-automotive-railways)

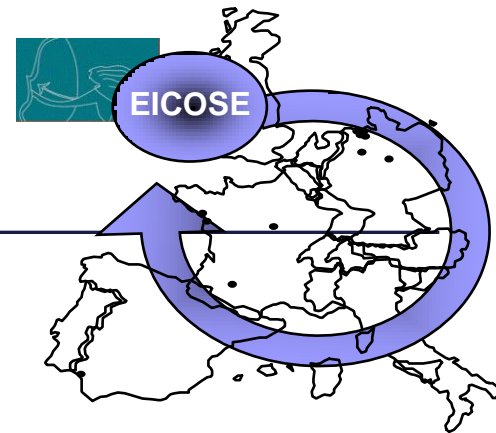
SYSTEM@TIC
PARIS-REGION

EICOSE : rationale

- Why ?
 - Develop enabling technologies for mastering safety, security, reliability & robustness of future embedded systems
 - Create an eco-system for innovation which will enable us to share software tools and technologies across the Automotive, Railway & Aeronautic fields
- Who ?
 - Clusters of competitiveness and similar organisations integrated into the ARTEMIS model
- How?
 - Industrial exploitation of SRA results:
 - By running integration platforms and testbeds
 - By providing business development instruments and spin-offs

SME's : key actors in launching emerging technologies

EICOSE Key Members



- Industrial
 - Aerospace Valley
 - Airbus, Latécoère, Dassault-Aviation, Sogerm, Alcatel Space, Astrium, CNES, EADS ST, SNECMA, Alstom, Motorola, SiemensVDO, Thales
 - SafeTRANS
 - Airbus, Bosch, Continental Automotive Systems, DaimlerChrysler, SiemensVDO, SiemensTransportation Systems
 - Systematic
 - Alstom, Dassault Aviation, Delphi, Freescale, Renault, Renault Trucks, Siemens VDO, Valeo, Visteon, ...
- Research Institutes
 - ARMINES, CEA, CNES, CNRS, DLR, ENSC, Ecole Polytechnique, IERSET, INRETS, INRIA, IRC SCS , LAAS, OFFIS, ONERA

EICOSE Mission and Priorities wrt ARTEMIS SRA

- Mission** → Develop enabling technologies for mastering safety, security, reliability & robustness of future embedded systems
- Create an innovation eco-system able to share tools and technologies across Automotive, Railways & Aeronautics

Priorities

References design and architectures

Composability

Robustness and self organization

Diagnosis and maintenance

Seamless connectivity & middleware

System design methods and tools

Model-based system engineering

Product-based assurance and certification

Capabilities engineering – Integration tools

Design implementation & verification tools, including proof-based tools

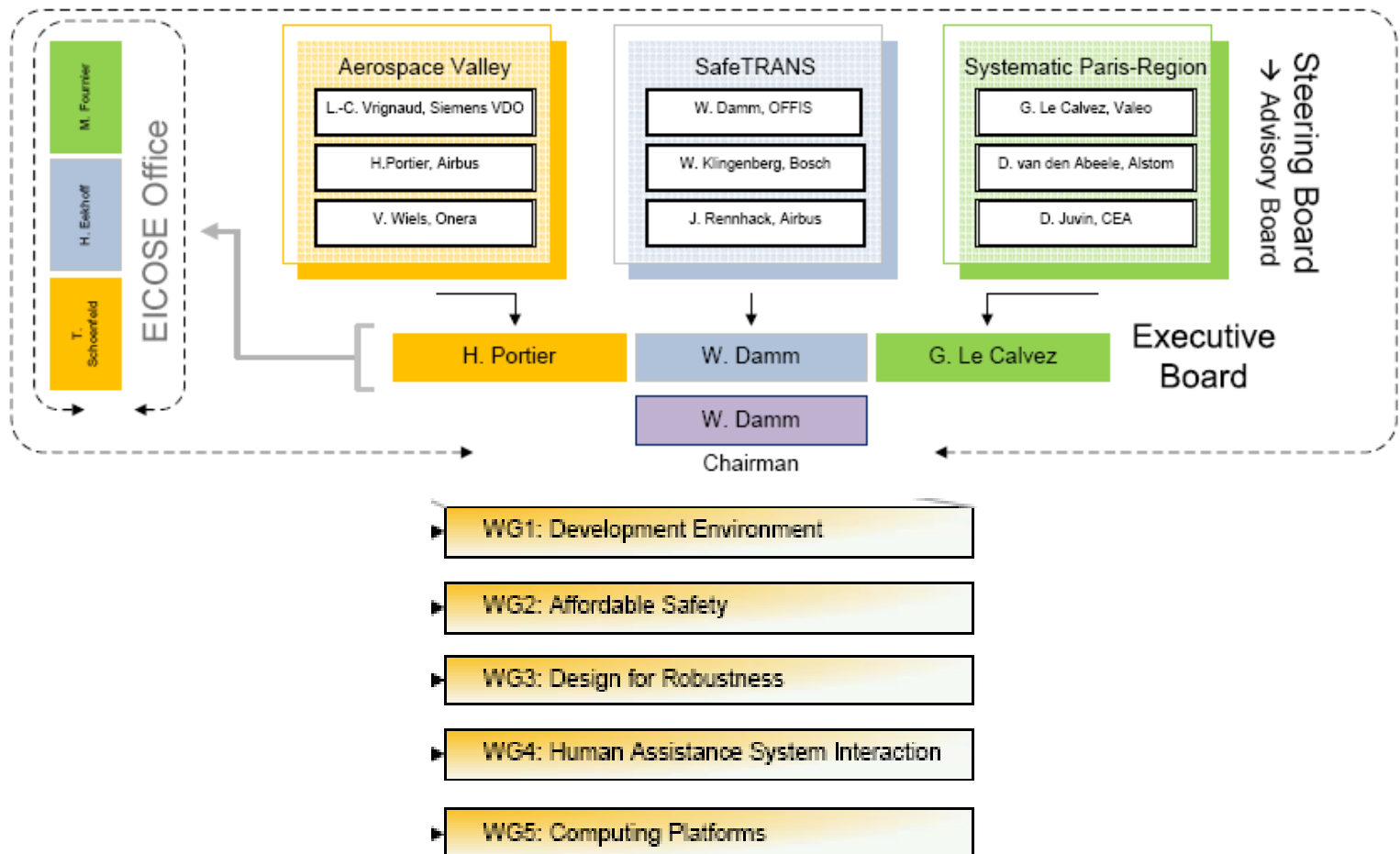
Model based validation & verification flow optimisation

System architecture co-design and co-simulation

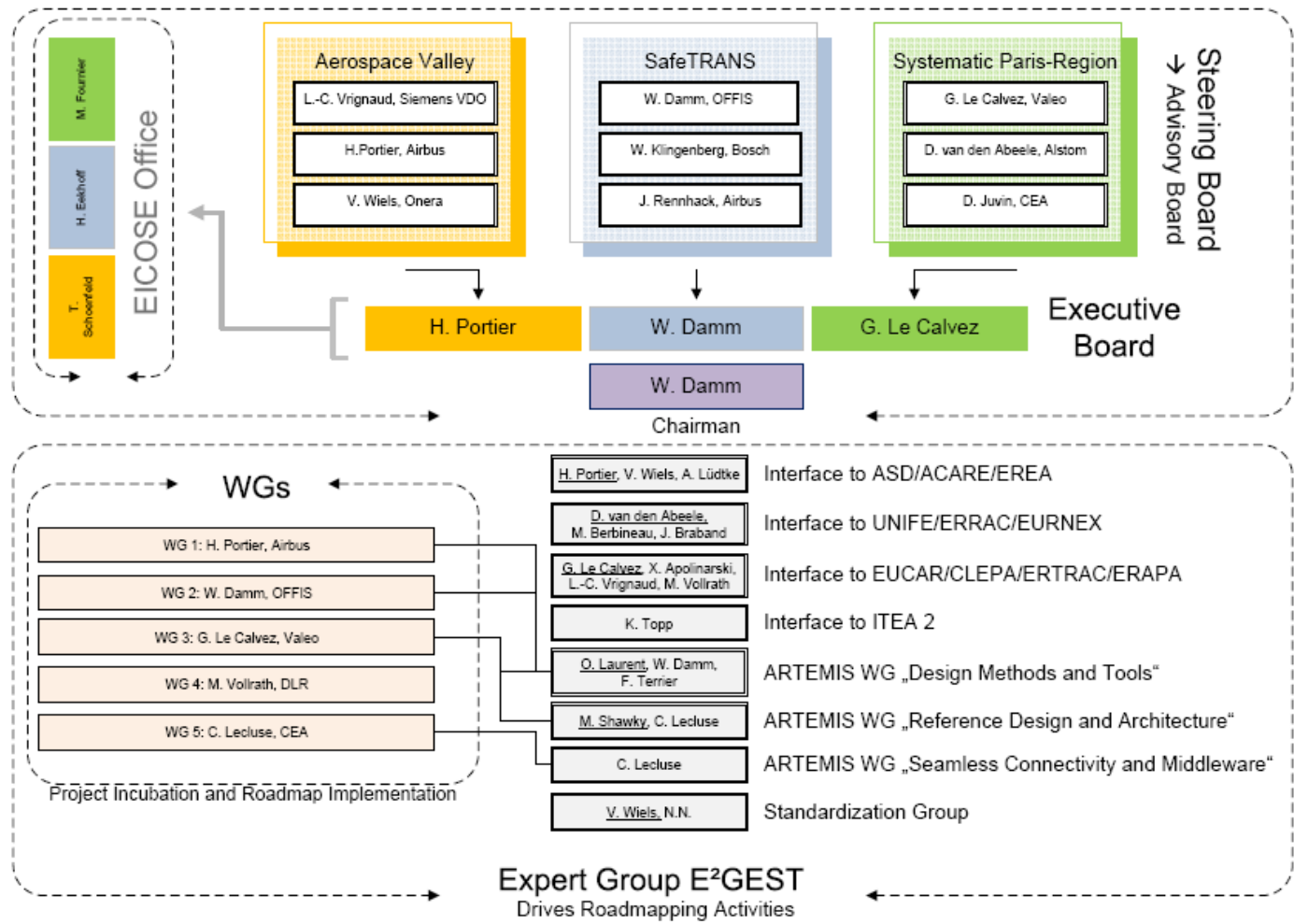
EICOSE Organization

- Virtual organization capitalizing on structure and services provided by underlying clusters
 - Steering Board
 - EICOSE office
- Roadmapping and project deployment under guidance of EICOSE on-going Working Groups
 - WG 1: Critical ES development environment
 - WG 2: Affordable certification
 - WG 3: Design for robustness
 - WG 4: Human assistance system Interaction
 - WG 5: Computing platform

EICOSE Organization

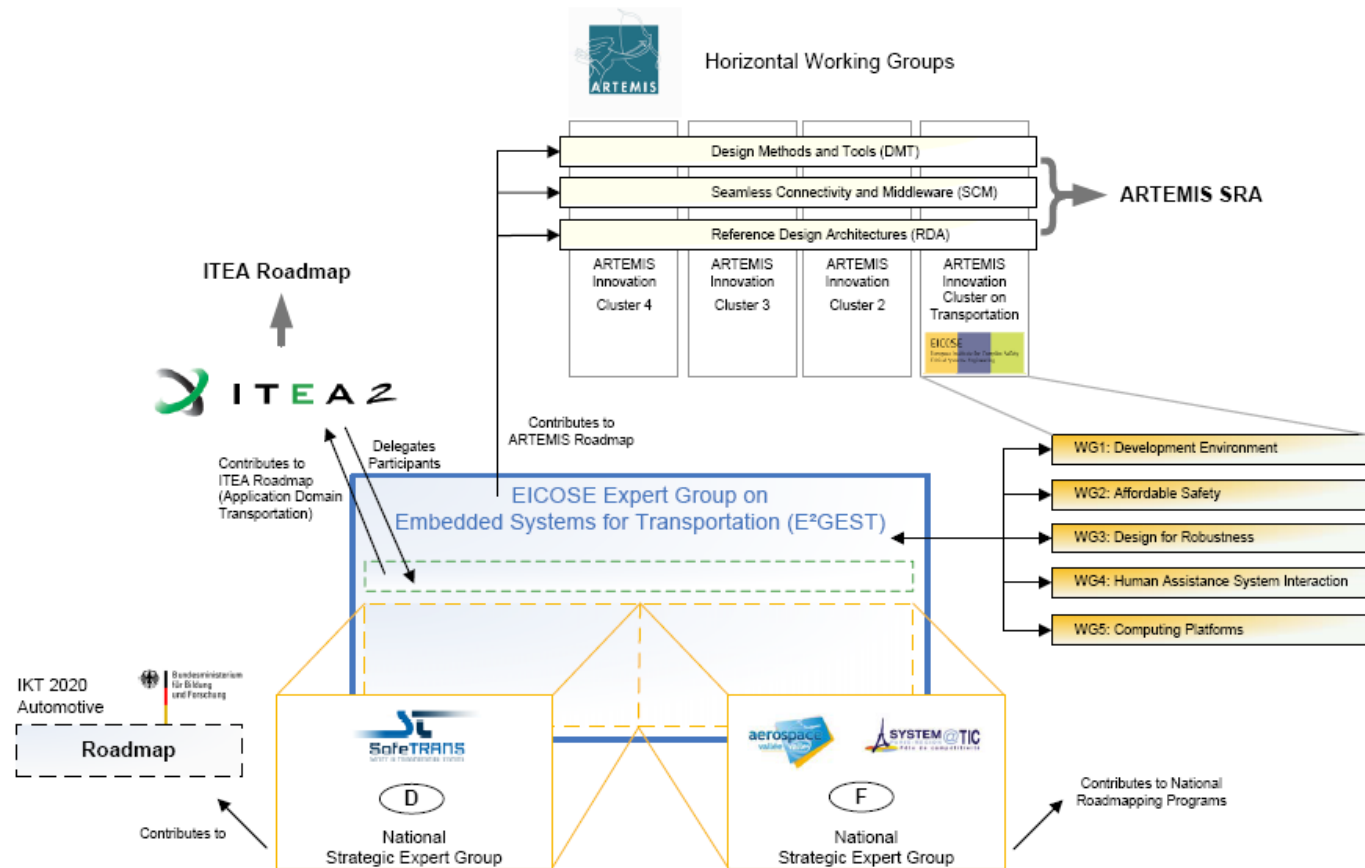


EICOSE Organization



Constitution E²GEST Group

Roadmapping Activities



Overview EICOSE Topics

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

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 COIS, fault isolation, DASL/ASIL level reduction, similarity arguments	H	S
		DT2	Patterns to support composibility	M	M
		DT3	Evolvability	M	M

2008 : EICOSE topics

- Theme 1: **Cost-Efficient** Methods and Processes for **Safety Relevant** Embedded Systems
- Theme 2: Advanced Human Modelling for HMI Design
- Theme 3: Embedded Multi-Processor Architecture platforms for Multi-Sensor Application

SP 1 „Methods and Processes for Safety-enabling Embedded Systems“

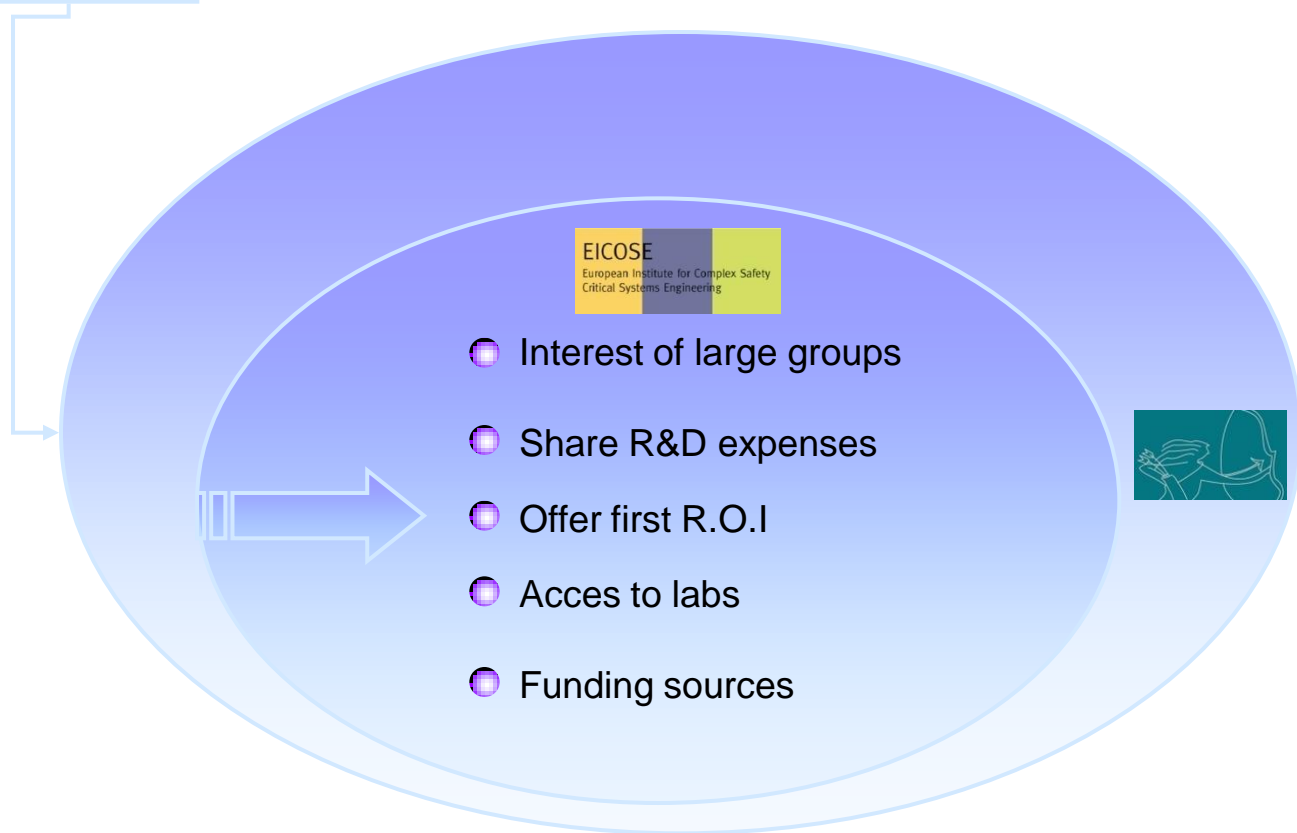
- SP1 will contribute to enhance the quality of final transportation services and products and to decreasing fatalities and injuries in transportation systems by
 - building cost efficient processes and methods supporting safety enabling embedded systems
 - SP1 will require technological breakthroughs 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

SP 5 „Computing Environments for Embedded Systems“

- The main goal 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
-

EICOSE – Added Value

Artemis road-map



EICOSE

Any question?

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