Research Agenda and sub-programmes on which the first Call of the ARTEMIS-JU will be based
2004 – High-level group publishes “Building ARTEMIS”
   • Describes the importance of Embedded Systems expertise to European industrial competitiveness

2006 – ARTEMIS ETP publishes detailed Strategic Research Agenda
   • Describes technical challenges and novel approaches for R&D
     • Involvement of SMEs
     • Centres of Excellence
     • Financing schemes

January 2007 – ARTEMISIA Association established
   • Takes over custodianship of the ARTEMIS ETP and it SRA
   • Will represent the R&D actors in the future Joint Undertaking

2007/2008 – ARTEMISIA expert groups derive a Research Agenda proposal for the ARTEMIS Joint Undertaking
   • Technical Research roadmap for the JU, taking most significant elements of the ARTEMIS SRA
   • Reference document for the Plans and Calls of the JU
ARTEMIS envisages cross-application solutions

- Common objectives:
  - Sustainability
  - Design Efficiency
  - Ease of Use
  - High added value
  - Time to market
  - Modularity
  - Safety / Security
  - Robustness
  - Competitiveness
  - Innovation
  - Cost reduction
  - Interoperability

- Application Contexts:
  - Industrial
    - Industrial Environments
    - Nomadic Environments
    - Private Spaces
    - Public Infrastructure

- Research Domains:
  - Foundational science & technology
  - Reference Designs & Architectures
  - Seamless connectivity, Middleware
  - System Design methods & tools

- Multidomain, re-usable innovations and research results
The JU Research Agenda proposal considers the expectations of the JU and resulting projects:

- **“Think BIG”**
  - = projects with *appropriate critical mass* and significant societal impact

- **“Socio-Economic Benefits”**
  - = improved industrial efficiency “… to *strengthen European competitiveness* and allow the emergence of new markets and societal applications.”
    - i.e. a focus on key technical issues, solving high-visibility issues with commercially valorisable results

- **“Multi-national”**
  - = considers national/regional strategic priorities

- **“Think Different”**
  - = significant and complementary *added-value* over existing programmes
Society’s needs

APPLICATION DEMONSTRATORS

ARTEMIS JU RA

Sub-Programme B

Meet-In-The-Middle implementation

Business Perspectives

Societal Topic B

Sub-Programme A

Societal Topic A

Industrial View

ARTEMIS ETP VISION

Top-Down

ARTEMISIA SRA

Foundational Science

Research Domains

Innovation Environment

APPLICATION

Bottom-Up

Scientific / Technological view

ARTEMIS – Research for the Public Good
Societal concerns and Business Perspectives

ARTEMIS – Research for the Public Good
Societal concerns and Business Perspectives

ARTEMISIA Working Group SRA

ARTEMISIA ASSOCIATION - 5
ARTEMIS SRA: inputs into the JU-RA

“ARTEMIS SRA”
2006

Reference Designs & Architectures
Seamless Connectivity & Middleware
System Design Methods & Tools
Innovation Environment

Proposal to JU
Research Agenda (RA)

Enrichments
JU Project results should satisfy this “golden zone”

May be a subset of activities within a JU project
ARTEMISIA expert groups identify 8 sub-programmes

- Address well-known societal concerns
  - Environment, safety, healthcare, secure employment, ...
- ... In a viable business context
  - Relevant for new businesses and growth markets

Each sub-programme is elaborated to embrace the ARTEMIS SRA approach
ARTEMIS-JU Research: relationship to the ARTEMIS SRA

ARTEMIS-JU programme addresses the Research Domains and Application Contexts identified in the ARTEMIS SRA

- **Sub-programme A**
- **Sub-programme B**
- **Sub-programme X**
### ARTEMIS-JU Research: Main relationships to the ARTEMIS SRA

<table>
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<td>Person-centric Health Management</td>
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<td>Human-centric Design of Embedded Systems</td>
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ARTEMIS SRA, Sub-programmes and the JU Documents
Methods and Processes for Safety-relevant Embedded Systems

- Embedded Systems for **enhanced safety and efficiency**
  - Special relevance for the Transport & Manufacturing sectors
    - Automotive, Aerospace, Plant, …
  - Cost-effective design and integration of new systems used in safety-critical situations

Person-centric Health Management

- Improved **prevention**, care, cure and well-being through Embedded Systems
  - Rising cost of health-care demands new paradigms supported by ICTs
  - Approach: start by keeping people healthy!
ARTEMIS JU Sub-Programmes – II

- **Smart Environments and Scalable Digital Services**
  - New (service / software) architectures for enhanced user experience of (mobile) media and applications
    - Enable the creation of *new services* that bring the “Ambient Intelligence” experience to the mobile user

- **Efficient Manufacturing and Logistics**
  - Embedded Systems supporting *sustainable, competitive, flexible manufacturing*, delivery and support of products over their *complete life-cycle*
Computing Environments for Embedded Systems
- New architectures and design paradigms for embedded systems
- Transversal technology, with positive impact on all ES application domains
  - Processing throughput, low power, …

Security, Privacy and Dependability
- Protect the individual, the supplier and the (data) infrastructure from abuse
  - Increase trust and confidence in the use of technology-based services
- Protect the public at large (infrastructure protection)
- Transversal technology, with positive impact on all ES application domains
Embedded Technology for Sustainable Urban Life
- Sustainable delivery of energy and other utilities
- Improved energy use through cost-effective and intelligent embedded systems

Human-centric Design of Embedded Systems
- New ways to interact with technology
  - ... Or better, for the technology to interact with the user!
- Easier-to-use, friendly electronics for home, work and play
  - Reduces the “digital gap”
- Improved user monitoring and control of industrial and transport systems
  - Eliminate user error, for safer plant, safer car/train/’plane, ...
ARTEMIS SRA relevance: Methods and Processes for Safety-relevant Embedded Systems

- **Reference Design & Architectures**
  - impacting and adapting corresponding standards like AUTOSAR
  - definition of design patterns supporting use of COTS, fault isolation, DASL/ASIL level reduction, similarity arguments in composable and evolvable ways

- **Seamless Connectivity & Middleware**
  - supporting reconfigurable, diagnosable systems with multiple levels of safety, including support for fault containment and deterministic behaviour

- **Design Methods & Tools**
  - large-scale requirement management
  - methods enabling diagnosability
  - component based design, including typical architecture trade-offs, product line requirements and model based designs in the large systems
  - Enabling standardized tool interoperability
  - Providing composable, product-line oriented V&V technologies, including local verification techniques, simulation and model-based V&V

- **Innovation**
  - based around EICOSE Centre of Excellence
ARTEMIS SRA relevance: Person-centric Health Management

- **RD&A**
  - Application context specific reference architecture.
  - Dependability (robustness, security, trust, privacy)
  - Interoperability (standardization)
  - Collaboration of heterogeneous sub-systems

- **SC&M**
  - Bridging and hybrid networking
  - Dynamics in sensor and actuator connectivity (WSN)
  - Dynamic service composition

- **DM&T**
  - Person centric engineering,
  - Validation procedures for trials in virtual labs and larger environments

- **Innovation management**
  - Arrangements for “Living Labs”
  - Arrangements for field trials
ARTEMIS SRA relevance: Smart Environments and Scalable Digital Services

Sub-programme Mapping to SRA

SP3 Focus
- Connectivity, Interoperability, Ad-hoc networking, Usability
- Tools & tool chains for Productivity in design and apps deployment
- Smart space as platform, Scalability and dynamicity

Approach:
- Horizontal ecosystem

SRA Application Contexts
- Nomadic
- Private

SRA Research priorities
- System organization and programming:
  - Device & service discovery
  - Interaction management
  - Ontologies
  - Resource Management
  - Heterogeneity Management
- Design, Implementation & Verification Tools
- Composability:
  - Distributed architectures
  - Ad-hoc architectures
  - Dynamically Reconfigurable systems
ARTEMIS SRA relevance: Efficient Manufacturing and Logistics

- **RD&A**
  - Composability, Predictable Communication,
  - Unreliable Components (constraint),
  - Design for Verification, Diagnostic Service,

- **SC&M**
  - Manufacturing and distributed systems are central to the SC&M “Plant” cluster
  - RFID and sensor-networks important for logistics

- **DM&T**
  - Calls on SP1 for high safety relevance
    - safety certification after IEC 61508

- **Innovation**
  - Foresees participation in CoE’s to benefit from technologies developed for high-volume, hi-rel markets
ARTEMIS SRA relevance: Computing Environments for Embedded Systems

- **RD&A**
  - Composability, through the proposition of adequate support and programming abstractions
  - Architecture dependability and robustness
  - Reference architectures for parallel systems
  - Multi-aspects trade-off in designs, *including performance and energy aspects*
  - Resource management and virtualization
  - Diagnosis and Maintenance
  - Evolvability

- **SC&M**
  - Programming
  - Resource Management
  - Robustness & Diagnosis
  - Provably correct systems
  - Organization & Deployment

- **DM&T**
  - System Architecture, Co-Design, Distribution
  - System Integration & Testing
  - Model-Based Design Flow Optimisation
  - Model-Based Validation & Verification Flow Optimisation
  - Global HW+SW Solution Verification & Optimisation
**Reference Designs & Architectures (RD&A)**
- Develop security-enabled ES platform and define standards
- Reconfigurable, upgradeable embedded devices in terms of security functions
- Develop metrics for validation of secure embedded systems
- Develop enabling technologies for smart, integrated groups of sensors and actuators aimed at the surveillance and safety in public buildings and areas

**System Design Methodologies & Tools (DM&T)**
- Lower specific relevance

**Seamless Connectivity & Middleware (SC&M)**
- Will contribute in reducing the effort and time required for certification/qualification upon changes and during system evolution.
- Applicable in all Application Clusters

**Innovation**
- Strengthening the European SME sector by creating new market opportunities, improving inter-operability easing access for SMEs to the market of secure ES, and spin-offing for new technologies.
INNOVATION
- Promotes of ‘Open Source Eco-Systems’
- Open systems for connecting digital white goods to a standard home network
- Standard communication technologies and devices for creating a proper bridge between “smart grids” and “smart electric appliances”
ARTEMIS SRA relevance:
Human-centric Design of Embedded Systems

- **RD&A**
  - Important Challenge in ARTEMIS SRA - “introduce new ways of interfacing” and “more intuitive ways for humans to interact with technical systems”

- **SC&M**
  - (low relevance)

- **DM&T**
  - Modelling of user interaction (cognitive)
  - Integration into design flows
Sub-Programme contributors

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All 95!
END