



The ARTEMIS JU  
Annual Work Programme  
2009

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# 1 Introduction

Embedded Systems are everywhere, built into cars, roads, bridges and tunnels, into medical instruments and surgical robots, into homes, offices and factories, into aeroplanes and airports, into mobile phones and communication and virtual reality glasses, and even into our clothes. They are interconnected into networks of many devices - the car to the fixed road infrastructure, the smart card to the banking systems. Embedded Systems technologies are deployed in all relevant market sectors for Europe. Consequently Embedded Systems have a major impact on the way these sectors work and collaborate, how they will develop, how they are perceived by both professionals and the public, and how successful their products will be on the world market.

ARTEMIS (ETP) -“Advanced Research and Technology for Embedded Intelligence and Systems”- is the European Technology Platform for Embedded Computing Systems.

This ARTEMIS Annual Work Programme for 2009 is the Annual Work Programme for the ARTEMIS Joint Undertaking (JU) for its second Call for Proposals.

This Work Programme has been derived from extensive consultation with the research and application community, first to establish the ARTEMIS Strategic Research Agenda (SRA), then the Joint Undertaking Multi-Annual Strategic Plan including the Research Agenda (RA).

## 2 Context

The structure of the ARTEMIS Joint Undertaking (JU) is laid down in the Council Regulation no 74/2008 which states that the Joint Undertaking will develop its own ARTEMIS Research Agenda (RA). The Research Agenda closely follows the recommendations of the ARTEMIS Strategic Research Agenda (SRA) of the ARTEMIS Technology Platform and addresses the design, development and deployment of ubiquitous, interoperable and cost-effective, powerful, safe and secure electronic and software systems.

However, the ARTEMIS RA is a subset of the ARTEMIS SRA since on the one hand European and national programmes other than the ARTEMIS Joint Undertaking also contribute to the goals of the ARTEMIS SRA, and on the other hand the contribution of the ARTEMIS JU must be tailored to the boundary conditions within which the ARTEMIS JU can operate.

In particular, the ARTEMIS RA focuses on downstream-oriented research that can deliver prototype or demonstrator solutions with high cross-domain applicability to address specific and important societal needs. It may also be enriched on specific topics that are not described in detail in the ARTEMIS SRA.

ARTEMIS also maintains a Multi-Annual Strategic Plan (MASP), which defines the strategy that the JU, will follow to ensure that the RA can be executed in the most favourable conditions, how this can be supported, how it will be financed, and how it will be managed.

Each year, the specific objectives for R&D to be achieved through Calls for Proposals will be detailed in an Annual Work Programme. There will be one Call for Proposals to address those requirements during each year.

This present document is the Annual Work Programme for 2009. It defines the content and scope of the Call for Proposals focusing on downstream-oriented research to be launched in 2009.

The text of the Call for Proposals will further detail the available budget and the eligibility criteria, taking into account the requirements of both the European Commission and Member States.

### 2.1 *Technical context*

The ARTEMIS JU strategy is conceived to overcome fragmentation in the Embedded Systems markets so as to increase the efficiency of technological development and, at the same time, facilitate the establishment of a competitive market in the supply of Embedded Systems technologies.

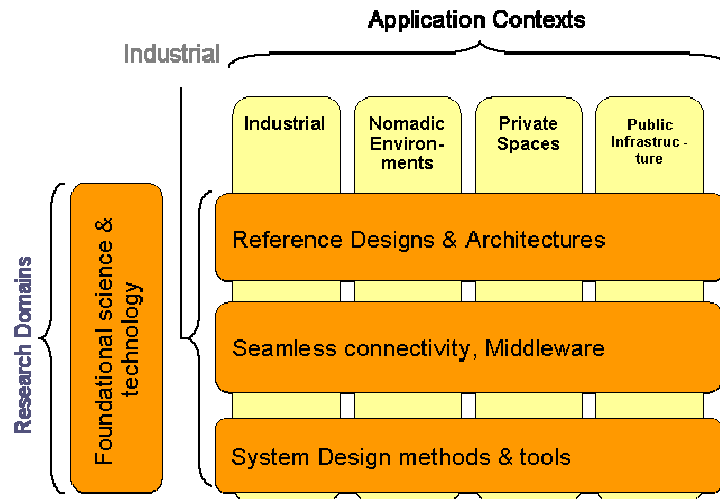
Specific technological barriers to progress have been identified that have common characteristics across the different application contexts (See summary in Section 3.1). These fall into three main Research Domains:

- “Reference Designs and Architectures”
- “Seamless Connectivity and Middleware”
- “Design Methods and Tools”

While the ARTEMIS JU will seek maximum commonality across application sectors, it is recognised that different application domains impose differing demands on the technology to be developed. The ARTEMIS SRA therefore identified a number of representative 'Application Contexts' in which sets of applications can share common domain expertise, design characteristics and requirements so that they can, in turn, share methods, tools, technologies and skills. These are:

- “Industrial systems”
- “Nomadic Environments”
- “Private Spaces”
- “Public Infrastructure”

The ARTEMIS strategy therefore takes a two-dimensional matrix approach: on one side the four clusters of Application Contexts, and on the other the three Research Domains.



The three Research Domains form the core of the research strategy of the Joint Undertaking.

In addition to the cross-domain strategy, the outcome of the research within the Work Programme is expected to fulfil concrete targets for the ARTEMIS JU that are set out in the MASP (see *References* in section 7).

## 2.2 Structural context

The industrial partners within ARTEMIS stress the importance of application-oriented research that supports the development of sophisticated prototypes of embedded systems so as to provide proofs of concepts for novel embedded systems applications in specific domains (the “Application Contexts” of the ARTEMIS RA). These implementation developments are needed to empirically validate design requirements and allow for real-time performance evaluation of novel designs and architectures.

In order to focus the research towards concrete instantiations of these Application Contexts that are relevant from a business standpoint and that address perceived societal needs, the ARTEMIS-JU Research Agenda (RA) defines eight “ARTEMIS Sub-Programmes”:

- ASP1. Methods and processes for safety-relevant embedded systems
- ASP2. Person-centric health management
- ASP3. Smart environments and scalable digital services
- ASP4. Efficient manufacturing and logistics
- ASP5. Computing environments for embedded systems
- ASP6. Security, privacy and dependability
- ASP7. Embedded technology for sustainable urban life
- ASP8. Human-centric design of embedded systems

These eight sub-programmes are detailed in the Research Agenda. They address research into both technologies and applications. This is necessary to ensure that cross-domain re-usability of technological developments is attained.

One of the major characteristics of the new research approach promoted by the ARTEMIS JU is the promotion of cross-fertilization and reuse of technology results in different application domains. The structure in the 8 subprogrammes is coherent with such a view. To obtain valuable results, the implementation will be managed by tightly coordinating and synchronizing the research performed in the sub-programmes, with the longer-term goal of stimulating long-lasting and self-sustaining “eco-systems” of actors, as described in the ARTEMIS-JU MASP. The tight coordination referred to will be assured by encouraging projects to be highly visible (within the constraints of the IPR contractual agreements). In addition, the contribution of projects to the attainment of the ARTEMIS high-level objectives will be monitored, initially by requesting projects to propose self-assessment criteria and baselines, and later via specific actions which will identify Success Criteria and Metrics at the JU level, whose lead- and lag-indicators will offer a powerful tool for steering the content of future calls.

### **2.3 ARTEMIS-JU and other R&D initiatives**

The ARTEMIS MASP and RA, and the consequent Annual Work Plan, is designed to be complementary to other existing and new initiatives.

In contrast and complementary to the more upstream research generally undertaken in the context of the EC's Framework Programme 7, ARTEMIS focuses on downstream research and technology development with a strong market drive. The ASPs provide focus of technology development to market areas that are strategic for European competitiveness, yet are broad enough to allow sufficient agility, at the programme level, to address the rapid evolutions that characterise these applications and markets.

The level of focus provided by the ARTEMIS-JU ASPs distinguishes it from the EUREKA clusters ITEA2 on Software-Intensive Systems (SIS) and CATRENE, as well as from National and Regional programmes. While also market oriented, Eureka programmes are typically much broader in scope, allowing for a different degree of market orientation, while National and regional programmes focus on local priorities.

### 3 Content and Objectives of 2009 Call

The results arising from projects following the 2009 Call will be expected to demonstrate their contribution to the ARTEMIS-JU high-level objectives set out below:

ARTEMIS has an over-arching objective to close the design productivity gap between potential and capability, as a necessary pre-requisite to advancing Europe's competitive position on the world market.

- reduce the cost of the system design from 2005 levels by 15% by 2013.
- achieve 15% reduction in development cycles - especially in sectors requiring qualification or certification - by 2013,
- manage a complexity increase of 25% with 10% effort reduction by 2013,
- reduce the effort and time required for re-validation and recertification after change by 15% by 2013.

achieve cross-sectoral reusability of Embedded Systems devices developed using the ARTEMIS JU results (for example, interoperable hardware and software components for automotive, aerospace and manufacturing ...).

#### 3.1 Industrial Priorities

The ARTEMIS JTI on Embedded Computing Systems should address the design, development and deployment of ubiquitous, interoperable and cost-effective, powerful, safe and secure electronics and software systems. It should deliver on 3 industrial priorities:

##### 3.1.1 Reference designs and architectures

Reference designs and architectures that offer common architectural approaches for given ranges of applications. It includes topics such as:

- composability: the ability to derive instantiations of architecture from a generic platform that support the constructive composition of large systems out of components and sub-systems without uncontrolled emergent behaviour or side effects.
- architectural dependability, to ensure secure, reliable and timely system services despite accidental failure of system components and/or the activity of malicious intruders.
- design for safety by means of architectures instantiated from a generic platform that enable the implementation of safety critical systems and the concurrent construction of dependability models. In addition to the required dependability and functionality of the provided services, emphasis is put on architectural support for certification, and the establishment of a safety case.

##### 3.1.2 Seamless connectivity and middleware

Middleware that allows seamless connectivity and interoperability. It includes topics such as:

- cross domain connectivity and communication capabilities, necessary to realise the seamless interoperability between the 'Ambient Intelligent Environments' envisaged for the European citizen (at home, travelling, at work, in public spaces,...)
- resource management to insure seamless connectivity between ES in a physical and logical environment more and more subject to changes, and to dynamically adapt to such changes. Resource management should ensure high utilization of the system resources such as CPU, memory, network, and energy, and guarantee operation within resource reserves or budgets.

##### 3.1.3 Design methods and tools

Integrated system design methods and tools for rapid development and prototyping. It includes topics such as:

- establishment of an integrated chain of European-sourced tools, based on ARTEMIS JU results, to support a complete process flow of development of Embedded Systems from user requirements, through system design, to system-on-chip production.
- system-level model-based tools and design processes that contribute, in an integrated fashion, to elevating the abstraction level for architecture exploration and product design.

- test, validation and verification tools to support compositional design that can be integrated into the complete process flow to support concurrent verification and validation at the product level as an integral part of the design process.

### **3.2 ARTEMIS Sub-programmes**

The specific sub-programme priorities for 2009 are indicated below. These are set in the context of the sub-programme definitions contained in the ARTEMIS Multi-Annual Strategic Plan and the ARTEMIS-JU Research Agenda.

A research project should specifically address the Main Goals and Approach, the Applications Relevance, and the Cross-domains aspects of the sub-programmes, as described below.

In addition, all projects are required to satisfy general requirements, not specific to any of the sub-programmes. These general requirements are set out in Section 4.

#### **3.2.1 ASP1. Methods and processes for safety-relevant embedded systems**

##### **Main Goals and Approach**

The overall aim of this sub-programme is to enhance the quality of services and products in strategic European industrial sectors and to decrease fatalities and injuries by building cost-efficient processes and methods supporting the development and operation of safety enabling embedded systems.

The aim is to achieve technological breakthroughs in four research areas:

- Requirement Management
- Architecture Modelling and Exploration
- Analysis Methods
- Component Based Design

These breakthroughs will contribute to progress in several transverse processes, e.g. Design for Safety, Design for Maintainability, Design for Reuse, Considerations for Certification aspects...

##### **Application relevance & impact**

Embedded systems with high safety requirements contribute more and more in the total costs and value creation in a large variety of equipment serving application areas such as:

- Transportation applications (automotive, aerospace, rail)
- Industrial applications (process control)
- Public infrastructures (electricity, gas, water) and utilities
- Medical applications (surgical equipment, diagnostic equipment, imaging equipment, sensors devices, ..)
- Energy generation applications

The competitiveness of European Industry in these areas will rely on the fulfilment of top level objectives to maintain the leading edge position, to reduce the time to market despite the increase of systems and software (size and complexity), to increase the quality and reliability of products and services with novel functionalities to the user, and improve cross-domain fertilisation.

Projects should contribute to one or more of the following:

- A European Standard Reference Technology Platform, embodying meta-models, methods, and tools for safety-critical hard-real-time system development supported by European tool vendors.
- A model-driven process for the compositional development of safety and security critical systems. This should enable model-based compositional development and qualification, supporting reasoning about non-functional properties (including but not limited to safety) and is should provide a basis for rapid qualification or certification of compositionally designed systems and especially rapid re-qualification or re-certification after change.
- An analysis methodology to establish an industrially applicable methodology for exploration of design spaces and multi-criteria constraint satisfaction and design and development decision-making, with particular regard to safety properties.
- The design and prototype implementation of a cross-domain embedded systems architecture that addresses the requirements and constraints of the ARTEMIS SRA for composability, Networking and Security, Robustness, Diagnosis and Maintenance, Integrated Resource Management, Evolvability and Self-Organization.

The ARTEMIS-JU 2009 MASP defines a strategy aiming to form an agreed set of specifications dedicated to well-defined applications and aspects of the complete design tool chain, referred to as a Tool Platform. It is expected that each Tool Platform will attract specialised developers and users thereby forming an eco-system of technical expertise. Due to the strong implication of this ASP on Design Systems and Tools, projects referring to it are strongly encouraged to propose specific actions to establish a Tool Platform.

### **Cross-domain aspects**

The development of safety critical systems will mainly rely on:

- Development of cross-domain S/W tools with multi-objective consideration (cost, time, energy, memory, safety, design distribution, standards compliance)
- Design space exploration and architecture assessment
- Component based design for better composability
- Safety assessment metrics and tools
- (Co-)Modelling, (co-) simulation (HW/SW), (validated) code generation
- Automatic testing, formal techniques
- Interoperability analysis and verification
- Ad-hoc communication protocols, devices and HW/SW infrastructure for multi-system architectures

Systems of systems specific requirements, if needed, (e.g. self-assembly in manufacture, and intermodality, formation flying or driving in transport) should be addressed in conjunction with the relevant application-oriented sub-programmes.

Synergy will be sought with SP6 in view of the similar objectives.

Synergy will be sought with SP8 since usability is a main concern for early and smooth adoption in projects.

### 3.2.2 ASP2. Person-centric health management

#### Main Goals and Approach

This sub-programme will establish an overall system approach for person centric health management based on an integrated system concept of seamless integration of interoperable components (devices as well as services). This will offer personalized prevention and treatment strategies by taking advantage of the opportunities offered by new technology, such as:

- gathering data by a large variety of sensors and controlling treatment by various actuators in relevant situations: at home, on the move, at work, in health centres, clinics and hospitals;
- analysis of the gathered data, from historical as well as parallel care cycles, and present the relevant information in adequate way to persons related to their task and situation;
- ubiquitous access to a citizens health data, by all partners in an inter-disciplinary care team under the conditions of proper privacy enforcements;
- adequate communication between partners in inter-disciplinary care teams using collaboration technology, including secure messaging, instant messaging, audio and video communication and even remote sharing of applications at any place and time on the device of choice.

An essential part in this eHealth approach relates to embedded systems technology: communicating sensors and actuators, improvements in genetic, molecular and imaging equipment for diagnostics, advanced treatment technology in surgery, chemical and radiation therapy and guidance based on tele-monitoring in post event care; facilities for diagnostic and epidemiological analysis, remote management of implanted drug delivery, tele-surgery.

#### Application relevance & impact

The aim of this sub-programme is move away from 'health care' to health management' - i.e. from "how to treat patients" to "how to keep people healthy". In this way Europe may optimise the use of its expenditure on healthcare, which is at present steadily rising from a recent figure of about 8% of GDP - or about 600 billion Euro p.a.

Projects should contribute to one or more of the following:

- A reference architecture to support integrated care cycles
- Interoperability guidelines and selected standards
- Portable and stationary, compliant to interoperability standards, sensors and actuators
- Standards to build applications that cover the full path from sensor and actuators up to the backend infrastructure to make the information available to other health services
- Implementations that can be validated
- Possible controllable licensing model for medical data
- Stable, robust and extendable standard format for medical data (the data should and have to be readable more or less indefinitely, or at least over a human life time)
- Reduction of effort and time required for certification/qualification upon changes and during system development, implementation and evolution

#### Cross-domain aspects

Solutions for the health management must operate in contexts varying from near body close loop systems, home centric systems and fully end-to-end solutions involving back-end services and several alternatives to implement the required connectivity. This programme must therefore share research and results with other sub-programmes operating in private spaces, nomadic environments and transportation to enable this connectivity.

Interface to public infrastructures will be important since in many countries regional or national Health Information Exchange infrastructures are or will be implemented and even European ideas in the context of eHealth are on the agenda (eHealth card and Patient Summary Records).

With respect to the development of devices and systems collaboration with the sub-programme "Methods and Processes for Safety-enabling Embedded Systems" will be organized.

An important issue is the interaction with people, the citizen/patient as well as professionals using the system in the context and situation of their task, this relates to the sub-programme concerned with "advanced cognitive modelling and HMI design".

The dynamics of several services involved from device level up to data management, processing and interacting with persons could benefit from the work of the sub programme "Smart Environments Eco-Systems and Scalable Digital Services incl. Mobile Media". In the context of the Person Centric Health Management sub-programme account must be taken of specific healthcare requirements like the development of medical profiles for connectivity on top of Bluetooth, USB and Zigbee, ...

Security and privacy is another topic that relates to the sub-programme "Security, Privacy and Dependability in Embedded Systems". Within PCHM the base technologies developed by the other sub-programmes will be used to implement the specific needs of this sub-programme, like bi-directional authentication between sensor and actuator devices with other parts of an end-to-end system as well as identification of these devices e.g. to check their certification as medical device.

Since senior citizens are an important target group and likely also need more support in managing their health this sub-programme has also relations to Ambient Assisted living.

### 3.2.3 ASP3. Smart environments and scalable digital services

#### **Main Goals and Approach**

The overall goal of SP3 is to provide methods, tools, technology and models with which developers will be able to build “smart environments”, i.e. ecosystems of smart and heterogeneous devices interacting with each other and with the environment, and cooperating together to provide a foundation for rapid local applications and service innovations.

This will be achieved by building an interoperable infrastructure for service innovation and identifying vertical service cases with relevant business models. The requirements of all stakeholders must be accommodated - SMEs, corporations, research institutes and public authorities willing to enter the innovative market of smart environment applications.

Application scenarios for smart environments that have been identified already include:

- Smart locations (smart city, smart home, smart public space, ...)
- Smart physical objects (objects equipped with identification mechanisms such as RFID tags, smart multi-media content storage, smart communications objects such as wireless grids and co-operative networks)
- Smart virtual spaces (Mixed mode Physical and 3D-Virtual spaces, community spaces)
- Private mobile social networks ('PMSNs')

The vertical and horizontal approaches are strictly related. Systems for vertical scenarios must be designed taking into account interoperability and extensibility: common service platforms must be able to cope with the needs of the most relevant applications. In order to narrow down the possible choices, a dual approach will be taken:

1. identify a common architecture and build a horizontal interoperable infrastructure for service innovation
2. identify a set of domain specific services, “vertical cases”, with relevant business models

#### **Application relevance & impact**

The potential for reaching across application domains is expected to provide growth opportunities beyond what is possible with domain specific solutions, since the same smart environment can be used for multiple purposes by multiple classes of users. This should enable novel possibilities for service aggregation and service composition.

In the medium to long term, the deployment of smart environments should lead to more local, personal control, less reliance on manufacturers and corporate service providers, less stress, less overhead and increased comfort and safety in everyday life.

Projects should contribute to one or more of the following:

- Interaction model between horizontal and vertical activities, to assure proper tackling of the interoperability and cross-domain issues
- Understanding infrastructure requirements to support new interaction and interface concepts (e.g. goal based user-environment interaction, automatic triggering of services with non-explicit requests)
- Environment representation language to support interoperability and reasoning
- Validation of SP3 vision on one vertical case that can be generalized
- Semantic platform specification

The ARTEMIS-JU 2009 MASP defines a strategy aiming to form an agreed set of specifications dedicated to well-defined applications and aspects of the complete design tool chain, referred to as a Tool Platform. It is expected that each Tool Platform will attract specialised developers and users thereby forming an eco-system of technical expertise. Due to the strong implication of this ASP on Design Systems and Tools, projects referring to it are strongly encouraged to propose specific actions to establish a Tool Platform.

**Cross-domain aspects**

One of the central notions of the smart environment applications is their ability to benefit from information in different domains.

Projects will demonstrate that smart environments connectivity and interaction technologies may provide strategic input to enhance the potential of all ARTEMIS application-oriented Sub-programmes, particularly “Methods and Processes for Safety Enabling Embedded Systems” (focused on transportation systems), “Person Centric Health Management”, “Embedded Technology for Sustainable Urban Life” and “Human Centered Design of Embedded Systems”. The latter is especially important as a “space” which will most likely cover several different entities and in which there is a need for interaction with the aggregate system.

In return, the common architecture (embracing seamless connectivity and middleware) supporting the expected horizontal and interoperable infrastructure will certainly have the potential to highly benefit from the incorporation and exploitation of input from all of the transversal Sub-programmes, namely “Computing Environments for Embedded Systems”, “Information Security, Privacy and Dependability”.

### **3.2.4 ASP4. Efficient manufacturing and logistics**

#### **Main Goals and Approach**

The main ambitions of this sub-programme are to improve time-to-market, productivity, and efficiency in manufacturing and logistics, recognising that the boundaries between manufacturing and logistics will become blurred as manufacturing operations are carried out closer to the customer and in-transit manufacture blurs the boundaries between production and distribution.

The approach is therefore the establishment of an embedded systems' architecture, together with supporting methodologies and tools that enables holistic lifecycle management for manufacturing, distribution, recycling and disposal of goods.

The architecture should enable the interoperation and reconfiguration of embedded devices and systems in both products and processing equipment so as to build complete plant solutions that enable owners and operators to save energy and achieve greater transparency of operation, greater predictability, reduced safety risks, enhanced security, and cost efficiency.

The architecture should be supported by all the necessary systems and tools to support development and implementation of systems conforming with the architecture.

#### **Application relevance & impact**

The industry employs around 35 million people in Europe making it by far the largest sector. Productivity improvements in this sector will have major impact for European economy and competitiveness. Manufacturing efficiency will improve quality and shorten time-to-market while cutting social, economic and environmental costs.

Increased usage of technology, and particularly automation can also improve safety and working conditions, reducing the need for tedious or heavy manual work, in turn opening the prospect for distance maintenance, monitoring, control and industrial services in which SMEs may participate more easily.

Projects should contribute to one or more of the following:

- development of a complete plant solution concept in which production machines and equipment are connected via an optimized platform of heterogeneous wireless and cabled networks.
- real-time asset monitoring for large-scale distributed production processes, linked to automatic scheduling of maintenance activities and automatic reaction to malfunctions.
- continuous tracking of material flow from raw material to final deployed products based on RFIDs and sensors network technologies.
- new multi-disciplinary coordination and control principles for large-scale, wireless sensor and actuator networks, including combined Control, Computing and Communication (C3) strategies.
- new tools for managing uncertainty and risk in distributed and networked systems;
- new tools for visualization of plant operations

#### **Cross-domain aspects**

Low-power solutions and future wireless sensor networks, as required by instruments, for example, have much in common with nomadic applications (ASP3).

Safety technology used to prevent industrial accidents has much in common with safety technology in transportation domains such as rail, automotive and aviation. (ASP1)

Manufacturing has less advanced solutions for cyber security than available for other IT dependent industries such as Web commerce and financial applications etc. and it would be highly advantageous to utilize the cyber security technology from such sectors, though with adjustment of focus to availability of the production system (e.g. uninterrupted energy supply)

### **3.2.5 ASP5. Computing environments for embedded systems**

#### **Main Goals and Approach**

A main goal of this sub-programme is to enable transition from separate sectoral, vertically structured markets to a horizontally structured market.

A second goal is to enable massive real-time data-processing in multiple domains (image processing, signal processing, computational fluid flow, ...).

A third goal is to enable composition of platform independent software over highly concurrent, fault-tolerant systems with a variety of communication schemes, types of core, etc. Run-time adaptability is required so as to optimise performance and resource usage - particularly extremely low power consumption.

#### **Application relevance & impact**

The transition from a vertically structured to a horizontally structured market will allow easier IP reuse across applications and domains, create new market opportunities, and stimulate the emergence of new innovation ecosystems, in particular supporting SMEs. In particular, the modularity, reuse, scalability, and portability that are anticipated as part of this transition will enable the development of low cost solutions for high volume market development.

Some specific application domain clusters in which fundamental requirements for computing environments are similar are particularly important. The Transportation and Manufacturing cluster, and the Nomadic and consumer electronics cluster are considered as priority targets for this sub-programme.

Projects should contribute to one or more of the following:

- establishment of a common multi-domain architecture, APIs, and design tool platform for advanced multi-core hardware and middleware solutions
- establishment of heterogeneous multi-domain architectures and integrable and interoperable tool suites to support massive real-time data-processing
- definition of a new programming model & new types of API to support platform-independent composition
- definition of performance & resource management models, meta-data and system layers in order to achieve global performance and resource optimization and management.
- development of design tools and associated runtime support to enable composability, predictability, parallelisation, aggregation and management of systems according to a service-driven or data-centric approach, performance and energy modelling and analysis, verification, scalability ... while preserving system-level predictability and appropriate levels of safety.

Project results must be demonstrated with application use cases derived from one or several application domains, such as advanced road vehicle management; data intensive multi-sensor applications (vision, radar, lidar, ...); adaptive nomadic context-sensitive multimedia service provision; adaptable/evolvable autonomous systems; robotic control systems.

The ARTEMIS-JU 2009 MASP defines a strategy aiming to form an agreed set of specifications dedicated to well-defined applications and aspects of the complete design tool chain, referred to as a Tool Platform. It is expected that each Tool Platform will attract specialised developers and users thereby forming an eco-system of technical expertise. Due to the strong implication of this ASP on Design Systems and Tools, projects referring to it are strongly encouraged to propose specific actions to establish a Tool Platform.

#### **Cross-domain aspects**

This need for multi-domain and cross-domain application is central to this sub-programme.

Nevertheless, there is most probably no "one-fits-all" global solution for all types of systems and applications. Effective solutions to the often conflicting demands on applications - and on the computing

platform - will require domain-specific trade-off analysis. At the same time, some strong cross-domain studies and exchanges should be undertaken so as to achieve conceptual and technological sharing between domain specific solutions.

### **3.2.6 ASP6. Security, privacy and dependability in Embedded Systems for applications, networks and services**

#### **Main Goals and Approach**

The main goal of this sub-programme is to ensure that security, privacy and dependability (SPD) can be ensured in the context of integrated and interoperating heterogeneous services, applications, systems and devices. Systems and services must be robust in the sense that an acceptable level of service is available despite the occurrence of transient and permanent perturbations such as hardware faults, design faults, imprecise specifications, and accidental operational faults.

The approach is to establish a common conceptual framework - and thereafter conformant methods and tools for design and implementation - to assure security, privacy and dependability in three classes of systems. These three classes are differentiated on the basis of the difference between 'managed systems' where the security attributes are centrally defined by the provider managing the system and 'unmanaged systems' built on the top of a set of independent and dynamic managed systems, where the security attributes cannot be defined by a single provider. The three classes are:

- interconnected embedded systems employing heterogeneous devices and standard communication technologies working in managed and trusted environments.
- interconnected embedded systems, employing heterogeneous devices and advanced communication technologies (including securing on demand 'instant' networks) working in unmanaged and non-trusted environments. This will require definition of security schemes spanning different dynamic domains, assurance of end-to-end security, and adaptive, context and information dependent security.
- interconnected embedded systems in a framework characterized by an efficient combination of managed and unmanaged systems, where each embedded system builds its own trust and security model, whichever communication technologies or media channels will be adopted. This will also include adaptive trust based on the provenance of the information used by each embedded system.

#### **Application relevance & impact**

Enhanced security, privacy and dependability will increase people's confidence in applications, systems, devices and infrastructures that were considered vulnerable or untrustworthy in the past. Knowledge, for example, that their cell phone is more difficult to be tampered with or that secure network access is fully guaranteed during an interaction with a system or application, will reduce their fear or reluctance in using them. The feeling and knowledge of complete protection from crime and violent "supporter riots" will, for example, make public events more enjoyable and will augment the willingness of people to socialize while decreasing risks for public disorder. This will enable industrial actors and service providers to offer new features or services with minimal additional cost to the customer.

Projects should contribute to one or more of the following:

- definition of a common conceptual framework to address the requirements for security, privacy and dependability in one or more of the three classes of systems identified above, with a particular focus on compositional design and development. Research should take into account the interplay between system properties such as safety, reliability, availability, maintainability, security, and survivability, and should work with certification and qualification authorities to establish new approaches to certification and qualification required to accommodate the new technology.
- instantiation of this framework with architectures, components, methods, interfaces and communications, tools and tool chains, to enable the design, development, analysis, validation, and deployment, as well as certification (or qualification).
- test beds and field trial set-ups, including prototypes, in order to prove the advanced security, privacy and dependability concepts.

#### **Cross-domain aspects**

The results of research on ES security and privacy in this sub-program will be applicable beyond the traditional fields of pervasive computing applications and services and public infrastructure protections in, for instance:

- Wide deployment of m-commerce transactions and other financial services as well as trusted multimedia distribution on mobile – Internet based networks.
- Remote (i.e. Internet-based) control of home, office and industrial processes.
- Decentralized and interconnected utilities productions, storage and transmission systems.

At the same time this sub-program will monitor security, privacy and dependability conditions and requirements and use technological results obtained by other Sub-programs (for instance those concerned with “nomadic environment”, “safety” and “energy management”) that will present security and privacy features for ES boards and appliances, ES networks, ES firmware/middleware or will influence the implementation technologies for security provision.

In particular, this sub-programme will specifically focus on the interplay of security and safety in fault-tolerant (redundant and/or diverse) configurations. This has up to now not been resolved only in special domains or applications, and is not well-addressed in standards for either safety or security.

### **3.2.7 ASP7. Embedded technology for sustainable urban life**

#### **Main Goals and Approach**

The main goal of this sub-programme is to enable sustainable urban life through rationalisation in the use of resources while increasing comfort and security in urban environments by means of embedded intelligence and integration technology. It is expected that the results will also bring urban benefits to non-urban areas, thereby countering the tendency towards over-urbanisation.

The approach is to achieve greater efficiency in use of resources, more flexibility in the provision of resources and better situation awareness for the citizen and for service and infrastructure owners. This should be achieved through the deployment and inter-operation of embedded systems throughout the environment.

Therefore, the main outcome of application should be improved energy efficiency in residential and non-residential buildings as a first priority, while efficiency in the management of other resources in more extensive urban and sub-urban areas are to be addressed in subsequent years.

#### **Application relevance & impact**

Three main market sectors are especially relevant: public infrastructures and utilities; residential and non-residential buildings; and domestic electronics and appliances.

Public infrastructures and utilities span all kinds of urban buildings and infrastructures from power generation and distribution, to water supply and waste management, public health, education and leisure, security services, transport systems in urban areas, etc. The already huge market may grow even further, since the sub-programme will stimulate the creation of new business models - from conceptualisation to maintenance and operation of urban systems.

Appliances are no longer independent entities, but part of a larger system connected through a residential gateway, with intelligent smart capabilities. Energy efficiency is a driver for purchase and renovation of domestic brown and white goods.

Projects should contribute to one or more of the following:

- definition and initial instantiation of architectures and communication platforms to enable the flexible and evolvable interoperation of systems, including sensors, actuators, information systems, control systems and commercial systems across multiple domains and multiple vendors and service providers.
- development of reference designs to achieve energy efficient HW/SW architectures (e.g. reference mobile handset, reference tiny communicating device)
- definition of a standard HW and SW modelling framework and of development tools based on common industry driven meta-models, for high-level analysis and validation of resource usage, emphasizing composability and reuse
- design and realization of design-time energy exploration and optimization tools and methods
- development of models to enable energy efficient topology management in distributed systems, with emphasis on dynamic reconfiguration capabilities of resource management devices as key non-functional capability to cope with the legacy challenge

Projects may be focused by addressing a variety of application challenges associated with eco-efficiency, eco-sufficiency, eco-sustainability and/or improved comfort and security.

#### **Cross-domain aspects**

Safety aspects of transport systems, addressed in SP1, will complement work in this sub-programme on the use of embedded systems for transport system optimisation in urban areas.

Comfort and security services aimed at eco-efficiency and eco-sufficiency addressed in this sub-programme constitute one specific aspect of the Smart Environments and Scalable Digital Services domain (SP3).

In addition, there are cross-domain problems that are addressed in technology-oriented domains and applicable in developments and systems for sustainable urban life. This is the case particularly for computing environments and energy management in embedded systems, security, privacy and dependability, and user interfaces.

This sub-programme will also draw on developments from these other areas, focusing on development and/or adaptation of specific aspects of the technology, such as surveillance systems, access control, and accessibility.

### 3.2.8 ASP8. Human-centric design of embedded systems

#### Main Goals and Approach

This sub-programme aims to automate tasks which are today fully under human control (e.g., driver assistance in the automotive domain) and to extend automation in tasks which are today highly assisted (e.g., pilot assistance systems in the avionics domain). The HMI determines how these systems are perceived by the users. It is the mediator between new functionalities or services and the user, mediating human intervention (like configuration, adjusting or overriding) and machine intervention (like preventing hazardous manoeuvres).

The approach is to establish a methodology for design and development of human-in-the-loop adaptive control systems suitable for application in multiple safety critical domains and sectors, taking into account not just explicit interactions between human and machine, but also the cognitive state of the human.

#### Application relevance & impact

Human centred design (HCD) is a key enabler for embedded systems advancement and deployment in *all* ARTEMIS application contexts, and especially in safety critical domains. In *Industrial Systems* HCD enables Advanced Driver Assistance Systems for road and rail vehicles and Advanced Multidimensional Cockpit Displays and Flight Management Systems in the aircraft. In *Nomadic Environments* HCD is at the heart of the seamless integration of information management in personal information spaces. In *Private Spaces* HCD informs the design of products with innovative user interfaces, for instance to ease access for aging or disabled persons. In *Public Infrastructure* applications, HCD is critical to the design and operation of safe and efficient power plants, communication systems, emergency infrastructures, and health monitoring, care and treatment systems.

Projects should contribute to one or more of the following:

- understanding and modelling of human performance in the context of ever-increasing and ever-changing automation,
- the extension of model-based design approaches to the design and analysis of human machine interaction.
- the development of cross-domain reusable technology to synthesize “intelligent” multi-modal HMI.
- the development of cross-domain technologies to analyse the effectiveness and economy of interaction with “intelligent” multi modal HMI designs by predicting human behaviour.
- agile model-based HMI prototyping taking into account multi-modal interfaces and the need for allocation of capabilities between “presentation layer” and “data management layer”,
- methodologies for building cognitive user models taking into account perceptual, cognitive and psychomotor capabilities as well as emotional state and attitude,
- technologies for intelligent multi-modal interactive systems especially addressing the user’s inter-working with adaptive context-aware systems.

#### Cross-domain aspects

In all domains addressed by ARTEMIS, interfaces of automated systems are used to interact with the environment, but also to interact with the user (e.g. to give him advice, to prevent hazardous manoeuvres) and furthermore to allow the user to influence the automated system itself (e.g. to configure its rules and behaviour). In all ARTEMIS domains systems are becoming more and more autonomous. In spite of differences in time-to-market, time-on-market, and certification requirements of automation and assistive technology in the different domains, cross-domain reuse of design methodologies, devices, processing hardware, and software components is achievable.

The sub-programme envisions cross-domain sharing of concepts, methods and tools in synthesis as well as analysis of HMI and cross-domain clusters can be defined based on the interaction patterns between human and machine:

1. one human, one complex system (avionics, complex infrastructure monitoring, nomadic with "all in one" device, automotive, ..)

2. one human, many "not so complex systems" (home, automotive, ..)
3. several humans, one complex system (surgical team around a patient, satellite launch infrastructure, ...)
4. several humans, several complex systems (e.g. air traffic management, catastrophic situations management, systems of systems with human at different levels of responsibility, ...)

## 4 Requirements

The proposal should satisfy the following requirements.

### 4.1 General

Each proposal should address at least one ARTEMIS Sub-Programme (see Section 3.2) and address within that at least one of the Industrial Priorities (see Section 3.1).

Each proposal should include demonstration of core technological developments in order to achieve the empirical validation expected.

Large, strategic initiatives are encouraged, complemented with smaller more focussed research proposals, to ensure maximum effective use of the available budgets.

Proposals addressing any of the 8 ASPs are invited. However, based on the results of Call 2008, projects addressing ASPs 2, 4 and 6 are especially welcome.

### 4.2 Contribution to the ARTEMIS targets

All projects to be supported will be expected to identify, at proposal stage, their intended contribution to achievement of the high-level ARTEMIS targets quoted in Section 3. Proposals should describe how projects would measure their contribution and how they would establish a baseline and thereafter monitor their progress compared with that baseline.

### 4.3 Technology vis-à-vis Application

All projects are expected to have a strong application focus in order to present a realistic context for industrially relevant, short to medium term research and technology development, and to enable its validation. However, all projects in all sub-programmes must make explicit contributions to the technological ambitions of ARTEMIS for Embedded Systems development (see Section 3.1). Clear expression of the technical approach to the research objectives will be essential.

### 4.4 Co-operation

Project proposals are naturally expected to demonstrate the added value of cooperation between partners in achieving the projected results (final results or intermediate enablers).

In addition, all projects to be supported will be encouraged to publicise their activities (e.g. via web-sites) and actively exchange public information with other projects and initiatives (while respecting the IPR agreements within the project), including summary presentations at ARTEMIS and other events. This is to help achieve the coherent progress and the seeding of ecosystems sought by the ARTEMIS JU.

### 4.5 Evolution of markets and market environment

All projects to be supported will be expected to maintain a 'market watch' to ensure the continuing relevance of their work to the evolving market, and to contribute to programme-level monitoring of the market for the purpose of evolving the Research Agenda and the Multi-Annual Strategic Plan.

### 4.6 Standards & Regulations

ARTEMIS has a Strategic Agenda for Standardisation (see *References* section 7.). Its principle mission is to support the ARTEMIS ambitions for cross-domain synergies, composability, reusability, reliability, interoperability, verification and certification. This entails overcoming the present domain-orientation of many standards and standardisation groups. Projects will be expected to contribute to this aim, engaging where appropriate with the relevant standardisation, regulation and certification bodies.

Specifically, proposals must make explicit their intended contribution to:

- standard development and harmonisation, as the basis of any integration and inter-operation;
- open source reference implementations of standards, in order to facilitate their take-up in the market.

#### **4.7 Innovation environment**

ARTEMIS supports and encourages the consistent grouping, on a permanent basis and at European scale, of industry and research in *Innovation Eco-systems* to foster the *Innovation Environment*. It is requested that projects show awareness of existing eco-systems, with a view to future more concrete collaboration. Examples of such contribution to the Innovation Environment may include:

- The organisation of specific meetings or workshops in collaboration with, or in order to form, such eco-systems, projects or clusters.
- The participation of the project in European initiatives towards establishing standards or working-methods (via meetings, presentation of public information, etc...).

At the programme level, ARTEMIS-JU foresees specific activities that will, amongst other actions, catalogue existing and relevant innovation and clustering initiatives as a guide to future proposals.

#### **4.8 SME Involvement**

To fulfil the ARTEMIS SRA target for having *50% more European SMEs within the aegis of ARTEMIS JU engaged in the Embedded Systems supply chain, from concept through design and manufacture, delivery and support, than there were in 2005*, project consortia must be balanced, considering explicitly the involvement of SMEs and favouring clustering of SMEs in innovation eco-systems.

The participation of SMEs is therefore considered of high importance in all ASPs. Project proposals should clearly indicate concrete and quantifiable measures to assist participating SMEs in their dissemination of public project results and subsequent valorisation of the results in near-future business plans.

ARTEMIS recognises and welcomes the participation of all classes of SMEs relevant to Embedded Systems, being providers of basic embedded technology, intermediate players who adapt generic or cross domain technology to a particular market (transportation, health, energy, security...) and also service providers.

#### **4.9 Project size and duration**

In order to achieve the lasting impact envisioned by the ARTEMIS JU and to make the best use of available budgets, it is anticipated that each ARTEMIS Sub-programme will generate a small number of quite large project proposals, complemented by a number of smaller footprint initiatives.

In view of the downstream research focus of the ARTEMIS Joint Undertaking and the targets described in this document, projects with duration longer than 3 years must provide adequate justification for their duration, relative to the application demonstrators and expected impact they describe.

## 5 Implementation of ARTEMIS Call 2009

### 5.1 ARTEMIS Call 2009 implementation:

- Call title: ARTEMIS Call 2009
- Identifier: ARTEMIS-2009-1
- Indicative date of publication: February 26<sup>th</sup> 2009.
- Evaluation procedure: A two-stage procedure will be followed: proposers must submit a Project Outline (PO), followed by the submission of Full Project Proposals (FPP).
  - Deadline for submission of Project Outlines: 15<sup>th</sup> April 2009 at 17:00:00 (Brussels local time)
  - Deadline for submission of Full Project Proposals: 3<sup>rd</sup> September 2009 at 17:00:00 (Brussels local time)
- The submission of an eligible Project Outline **is mandatory** for the submission of a Full Project Proposal.
- The general eligibility criteria as well as evaluation criteria and sub-criteria are set out in chapter 6 of this work programme.
- Indicative timetable:
  - The ARTEMIS Joint Undertaking will provide the proposers with a technical assessment of Project Outlines by 15<sup>th</sup> May 2009.
  - It is expected that the selection of Full Project Proposals for funding will take place in October 2009.
  - It is expected that the negotiations for the selected proposals will start in late October 2009.
- Project agreements: Participants in any project resulting from this call are required to conclude a project agreement.
- Financial contribution of the ARTEMIS Joint Undertaking to participants in projects: Following the evaluation, selection and award procedures of the ARTEMIS Joint Undertaking, the Joint Undertaking will conclude grant agreements with participants. The financial contribution of the Joint Undertaking will be 16.7% of eligible costs incurred by participants to implement the projects.

### 5.2 ARTEMIS Call 2009 budget

	Indicative Budget of Call 2009 (€)
ARTEMIS Joint Undertaking <sup>1</sup>	37.086.500
ARTEMIS Member States	67.430.000
<b>Total indicative budget of Call</b>	<b>104.516.500</b>

<sup>1</sup> estimated as 55% of the amount committed by ARTEMIS Member States to the budget of this Call.

## 6 Eligibility and Evaluation Criteria for Proposals

### *Eligibility checks*

The following eligibility criteria will be checked by the ARTEMIS Joint Undertaking:

1. Eligibility Criteria for proposals (Project Outlines and Full Project Proposals)
2. Eligibility Criteria for funding of individual participants (ARTEMIS JU funding and national funding from ARTEMIS Member States)

### **6.1 Eligibility Criteria for Proposals**

#### **6.1.1 Project Outlines (PO)**

A PO will only be considered eligible if it meets all of the following conditions:

- It is submitted using the ARTEMIS Proposal Service (APS)
- It is received by the ARTEMIS JU before the deadline given in the call text for POs.
- It involves at least 3 non-affiliated legal entities established in at least 3 ARTEMIS Member States<sup>2</sup>
- It is complete (i.e. both the requested administrative forms and the proposal description are present).
- It is submitted in English<sup>3</sup>.
- The content of the PO relates to the topic(s) described in this work programme.

#### **6.1.2 Full Project Proposals (FPP)**

A FPP will only be considered eligible if it meets all of the following conditions:

- The corresponding PO has been considered eligible by the ARTEMIS JU
- It is submitted using the ARTEMIS Proposal Service (APS)
- It is received by the ARTEMIS JU before the deadline given in the call text for FPPs.
- It involves at least 3 non-affiliated legal entities established in at least 3 ARTEMIS Member States.
- It is complete (i.e. both the requested administrative forms and the proposal description are present).
- It is submitted in English<sup>4</sup>.
- The content of the FPP relates to the topic(s) described in this work programme.

### **6.2 Eligibility Criteria for funding**

1. The ARTEMIS JU will carry out the verification of participants against the pre-defined Joint Undertaking eligibility criteria for funding as set out in the financial regulation or published in the Call, on the basis of verifications carried out by the Commission. These verifications will be performed as much as possible before proposers submit a Full Project Proposal.
2. The ARTEMIS JU will carry out the verification of participants from ARTEMIS member States and their contribution to the project proposals, on the basis of verifications carried out by the respective

<sup>2</sup> Currently: (Austria, Belgium, Cyprus, Czech Republic, Denmark, Spain, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Hungary, Latvia, the Netherlands, Norway, Portugal, Romania, Slovenia, Sweden and the United Kingdom)

<sup>3</sup> Except for the additional information and forms that may be requested by ARTEMIS Member States for the verification of eligibility of national funding that can be in their respective national languages

<sup>4</sup> Except for the additional information and forms that may be requested by ARTEMIS Member States for the verification of eligibility of national funding that can be in their respective national languages

national authorities, against the pre-defined national eligibility criteria for funding as published in the Call. The verifications by national authorities will be done as much as possible before proposers submit a Full Project Proposal.

The full details on the eligibility criteria for funding will be published in the Call.

## **6.3 Evaluation criteria**

### **6.3.1 Project Outline**

The Project Outline will be assessed by the ARTEMIS JU, on the basis of the following criteria:

- Relevance will be considered in relation to the topic(s) of the work programme open in a given call and to the objectives of a call.
- Relevance and contribution to the overall ARTEMIS targets listed in section 3.
- Soundness of the concept
- Clarity and quality of the objectives and expected results
- Contribution, at the European and/or international level, to the expected impacts listed in the work programme under the relevant sub-programme
- Degree of application innovation in the context of the sub-programmes addressed
- Expected market impact of the results for the industrial partners
- Quality of the consortium as a whole including complementarities, balance and involvement of SMEs

### **6.3.2 Full Project Proposal**

The evaluation criteria against which proposals will be judged are set out in the document ARTEMIS-PAB-4-08: "ARTEMIS Joint Undertaking selection and evaluation procedures related to Calls for proposals".

The 5 evaluation criteria are:

1. Relevance and contributions to the objectives of the Call.
2. R&D innovation and technical excellence.
3. S&T approach and work plan.
4. Market innovation and market impact.
5. Quality of consortium and management.

Evaluation scores will be awarded for each of the five criteria, and not for the sub-criteria. Each criterion will be scored out of 10. Criteria 1, 2, 3, and 5 will have a weight of 1 and criterion 4 will have a weight of 2. The threshold for the individual criteria (1), (2), (3), (4) will be 6. There is no threshold for the individual criterion (5). The overall threshold, applying to the weighted sum of the five individual scores, will be 40.

Some further explanation on the evaluation criteria:

1. Relevance and contributions to the objectives of the Call.
  - Relevance will be considered in relation to the topic(s) of the work programme open in a given call and to the objectives of a call.
  - Relevance and contribution to the overall ARTEMIS targets listed in section 3.
2. R&D innovation and technical excellence.
  - Soundness of the concept
  - Clarity and quality of the objectives and expected results
  - Progress beyond the state-of-the-art.

3. S&T approach and work plan
  - Quality and effectiveness of the S&T methodology
  - Quality of the work plan.
4. Market innovation and market impact
  - Contribution, at the European and/or international level, to the expected impacts listed in the work programme under the relevant sub-programme
  - Degree of application innovation in the context of the sub-programmes addressed
  - Market impact and quality of the exploitation plans of the industrial partners; quality of the market analysis section including competitor descriptions and market opportunities.
  - Appropriateness of measures for the dissemination of project results.
  - Contribution to standards.
  - Management of intellectual property.
5. Quality of consortium and management<sup>5</sup>.
  - Appropriateness of the management structure and procedures
  - Quality and relevant experience of the individual participants
  - Quality of the consortium as a whole including complementarities, balance and involvement of SMEs
  - Appropriateness of the level, allocation and justification of the resources to be committed (budget, staff, equipment)

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<sup>5</sup> This evaluation criterion corresponds to the **selection criteria** in the meaning of the general financial regulation (article 115) [OJ L 248, 16.09.2002, p. 1] and its implementing rules (article 176 and 177) [ OJ L 357, 31.12.2002, p.1] and of the financial rules of the Joint Undertaking (article 101). It will also be the basis for assessing the 'operational capacity' of participants. The other four evaluation criteria (1-4) correspond to the **award criteria**.

## 7 How to submit a proposal

Proposals (Project Outlines and Full Project Proposals) should be submitted in accordance with the terms set out in the call for proposals. In order to submit a proposal, applicants should consult the following documents:

- The text of the call for proposals, as announced in the Official Journal of the European Union and published on the webpage of the ARTEMIS Joint Undertaking
- This work programme
- The guide for Applicants

There are also a number of other useful texts which applicants could refer to:

Document	Document / Web site
ARTEMIS SRA Introduction	<a href="http://www.artemis-sra.eu/downloads/SRA_MARS_2006.pdf">http://www.artemis-sra.eu/downloads/SRA_MARS_2006.pdf</a>
Reference Design & Architecture SRA	<a href="http://www.artemis-sra.eu/downloads/RAPPORT_RDA.pdf">http://www.artemis-sra.eu/downloads/RAPPORT_RDA.pdf</a>
Seamless Connectivity and Middleware SRA	<a href="http://www.artemis-sra.eu/downloads/RAPPORT_SCM.pdf">http://www.artemis-sra.eu/downloads/RAPPORT_SCM.pdf</a>
System Design Methods and Tools SRA	<a href="http://www.artemis-sra.eu/downloads/RAPPORT_DMT.pdf">http://www.artemis-sra.eu/downloads/RAPPORT_DMT.pdf</a>
ARTEMIS-JU MASP (including the ARTEMIS-JU Research Agenda)	<a href="https://www.artemis-association.org/publications/MASP.pdf">https://www.artemis-association.org/publications/MASP.pdf</a>
STANDARDISATION SA	<a href="https://www.artemis-association.org/publications/STANDARDS-SRA.pdf">https://www.artemis-association.org/publications/STANDARDS-SRA.pdf</a>