
# ARTEMIS JU
# Annual Work Programme 2013 –

# PART AIPP

.

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# Change history

| **Changes from AWP2012 to AWP2013:** |
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| • Section 1: Disclaimer modified<br>• Section 3.1 : AIPP1 as well as AIPP 4 and AIPP6 are closed in this call<br>• Section 3.1: Remark on AIPP selection added<br>• Section 4.2: add a mention on measurable KPI.<br>• Section 4.9 : Remark on the Project's duration<br>• Section 5: Section 5.2 time-line is updated |

# 1 Introduction and disclaimer

**This present document is part of the ARTEMIS[1] Annual Work Programme (AWP) for 2013 – it sets out the research priorities for projects to be supported through the Call 2013 (the sixth call) for Proposals of the ARTEMIS Joint Undertaking (JU) in the so called ARTEMIS Innovation Pilot Projects concept as detailed hereafter.**

Although this Call 2013 is the sixth and last call of ARTEMIS JU in its present setting, the content of the call is anticipating a follow-up JTI that is expected to take over the ARTEMIS JU mission to pursue the European stakeholder's ambitions in the fulfilling ARTEMIS objectives in Embedded Systems research.

In addition, a third call by the very end of 2013 is not excluded, if following conditions are met: 1) availability of funding and 2) H2020 based funding tools are judged to have too low maturity to launch calls early 2014.

[1] ARTEMIS -*"**A**dvanced **R**esearch and **T**echnology for **Em**bedded **I**ntelligence and **S**ystems"*- is the European Technology Platform for Embedded Computing Systems.

# 2 Context

## *2.1 Societal and Economic Context*

The objective of the ARTEMIS Joint Undertaking (ARTEMIS-JU) is to increase the efficiency of technological development and, at the same time, enhance European competitiveness of the market in the supply of Embedded Systems technologies with the ambition to strengthen the European position in Embedded Intelligence and Systems to achieve of world-class leadership in this area.

ARTEMIS aims to fulfil its high level targets by maximizing the use of the available budget; i.e. to achieve a world class position in Embedded Systems and to implement the SRA research topics and challenges and also to insure a good coverage of these through the implementation of its Annual Work Programmes, and projects.

Within the context of the preparation of the coming Framework Programme FP8 - now called Horizon 2020- a High Level Group HLG on Key Enabling Technologies (KETs) was set up to develop possible policy measures to promote the industrial take-up of KETs by EU industries. This High Level Group (HLG) presented its final report to the EC on 28th June 2011 (*) where it proposes 11 policy recommendations for the development and deployment of KETs in Europe.

- Micro-Nano electronics
- Advanced Materials
- Nanotechnology
- Biotechnology
- Photonics
- Advanced Manufacturing

These Key Enabling Technologies are playing an important role in the R&D and innovation. They promote enhancing technology research to facilitate the delivery of product demonstrators as well as the implementation of pilot lines to stimulate large-scale production in Europe. Such large scale production is now considered crucial for ensuring the competitiveness of European industries and as main driving force behind the development of future goods and services. Mastering these technologies and production means is at the forefront for managing the shift to a low carbon, knowledge-based economy.

A similar report released by the USA "President's Council of Advisors on Science and Technology (PCAST)" advocates the setting of an innovation policy based on launching an Advanced Manufacturing Initiative, the report confirms that "*Once manufacturing is outsourced, process-engineering expertise can't be maintained, since it depends on daily interactions with manufacturing. Without process-engineering capabilities, companies find it increasingly difficult to conduct advanced research on next-generation process technologies".*[2]

Although Embedded Systems are not mentioned as such in the KET initiative, Embedded Systems are key enabler for efficient use and exploitation of these KETs in the ICT environment and for generating intelligent applications, as Embedded Systems pervade in all artefacts of life providing intelligence and capabilities to cleverly connect to the abundance of systems in their environment, either physically or at cyber-space level, and in real time.

Therefore by adapting the concept of "pilot lines" to Embedded Systems, the ***ARTEMIS Innovation Pilot Project*** approach will pave the way to the coming FP8 /Horizon 2020. Triggering this concept in a number of meaningful areas for Europe industries based on selected /focused domains aims to contribute in achieving ARTEMIS high level targets.

This enabling key role of Embedded Systems is getting deeper and deeper involved in the European society as indicated by the 2011 ISTAG Report[3], this key role envisioned for ICT underlines the importance of Embedded Systems as enabling key technology in the move from localised, sector-specific improvements - in homes, offices, vehicles, factories, traffic management, healthcare, and so on .., to

[2] Contrary to the KET, the US report identifies the "information technologies" of strategic importance.
[3] "*Orientations for EU ICT R&D & Innovation beyond 2013*", July 2011.

smart cities, smart regions and even smart societies. And, apart from their contribution to energy management and especially to reduced consumption in other domains, new techniques to reduce the energy consumption of Embedded Systems themselves become increasingly important.

The 2011 ISTAG report also advises in its Recommendation 9;

> "*Future funding of cross-border, co-funded initiatives and partnerships should focus on areas and activities where EU-wide action, services and systems-of-systems are needed. This notably includes development and support to common platforms and reference architectures as binding sets of structures, processes, interfaces, and data exchange standards and documentation standards*".

## *2.2 Strategic context*

The ARTEMIS strategy, as defined in the Strategic Research Agenda (SRA) 2011, is 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.

The original ARTEMIS industrial priorities aim to achieve multi-domain compatibility, interoperability, and even commonality was already moving in this direction. In the 2011 update to the ARTEMIS Strategic Research Agenda, this strategy is now taken further with scenarios that have been developed to break down the complexity of these challenges to manageable and comprehensible pieces and mapping them to application contexts and technological domains.

The ARTEMIS-JU strategy as defined in the Multi-Annual Strategic Plan (MASP) 2013 is to: *"**Build self-sustaining innovation ecosystems for European leadership in Embedded Systems**"*, by stimulating the emergence of innovation ecosystems within the field of embedded systems in a number of business sectors, facilitating their integration into larger ecosystems, mainly through support of R&D projects and relevant supportive actions.

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 implementation will therefore be managed by building on the results of the research performed in the consequent portfolio of ARTEMIS-JU projects, as they are 'clustering' around axis in line with the societal challenges and producing significant results, so to achieve **longer-term goal of stimulating long-lasting and self-sustaining "eco-systems" of actors, as described in the ARTEMIS-JU MASP**.

In addition to making a contribution to the cross-domain aims of the 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, section 7*) and in section 4.2 of this AWP2013.

The "ARTEMIS Innovation Pilot Programmes" are therefore set-up to respond to the following targets stated in the MASP 2013:

- Seamless technology, interoperability within and between ambient environment to achieve cross-domain connectivity and communication capabilities to realise the seamless interoperability between the 'Ambient Intelligent Environments'.
- Successful Tool strategy to establish integrated chains and interoperable of Tool Platforms, based on ARTEMIS-JU results, to support development of Embedded Systems from user requirements, through system design, to system-on-chip production.
- Cross- sectorial technology development, multiple use and reuse: to cross-sectorial usability of Embedded System technology and devices such as interoperable components (hardware and software) in, for example, the automotive, aerospace and manufacturing sectors, which will be developed using the ARTEMIS-JU results.
- Addressing main societal concerns: to address issues of significant societal impact, offering solutions to the main concerns encountered by people in their everyday life. Topics such as efficient energy use, safety and privacy, meaningful employment, health-care cost and urbanisation (its benefits and disadvantages) will help assure high market acceptance of the ARTEMIS-JU work

Therefore, in order to focus the R&D&I towards concrete instantiations of the above mentioned targets, and taking into account the results of ARTEMIS JU Call 2012 'ARTEMIS Innovation Pilot Programmes' are addressing the areas of:

- Innovative Integrated Care Cycles.
- Seamless Communication & interoperability- smart environment (the neural system of society).
- Computing platforms for embedded systems.

## *2.3 Innovation environment context*

### 2.3.1 ARTEMIS Innovation

ARTEMIS is an Innovation program around Embedded Systems. The term "innovation" is broadly used. In the ARTEMIS program "innovation" is mainly connected to technologies and ranges from fundamental and industrial research and experimental development of new products, processes and services, also process and organization innovation of services is within the scope of the ARTEMIS program.

Within the ARTEMIS SRA and MASP/RA the ARTEMIS priorities are defined in technological terms. The ARTEMIS-JU strategy described in the MASP formulates the Innovation environment that is necessary to support the R&D projects.

**The ARTEMIS Innovation Pilot Projects are expected to foster and sustain the ARTEMIS innovation environment** through:

- Creating new business innovating eco-systems,
- Efficiently using of Public, Private Partnership in the Embedded Systems arena to overcome the resource deficit for R&D and to foster innovation & collaboration in Europe,
- Aligning implementation of R&D&I (Research and Development and Innovation) priorities for Embedded Systems in Europe to turn European "diversity" into a strength,
- Achieving a "European Dimension" by combining the R&D efforts across Europe for future proven application domains and technologies, while pulling resources in key areas, and involving relevant players having the ability to insure successful valorisation and take-up of the results.
- Establishing and sustaining a holistic approach to R&D&I, by undertaking projects of critical mass, reconciling the market silos/ business efficient approach with the cross-domain synergies.
- Risk sharing by allowing projects that otherwise would not be undertaken,
- Building upon results from existing and previous projects for providing market driven solutions based on prototypes and demonstrations,
- Pooling industrial resources and "sharing" (e.g. standards and methods) to foster interoperability and synergies between various environments, in order to keep leadership position in traditional markets, and gain worldwide positions and more market in new areas.
- Setting and sharing of R&D&I infrastructures.

### 2.3.2 ARTEMIS Innovation Pilot and real-Life experiments

ARTEMIS will support specifically this year the creation of real-life experiments Living labs as part of or besides the typical R&D projects. The ARTEMIS Innovation Pilot Project concept also embraces real-life experiments by the systematic user co-creation approach integrating research and innovation processes.

These are integrated through the exploration, experimentation and evaluation of innovative ideas, scenarios concepts and related technological artefacts in real-life use cases.

Such real-life experiments enable concurrent consideration of both the global performance of a product or service and its potential adoption by end users, as this process concurrently involves the following multidisciplinary activities: co-creation, exploration, experimentation and evaluation.

### 2.3.3 SME Integration

**Support integration of the SME environment in ecosystems**
This involves facilitating such services as identification of high-potential SMEs, promoting business development beyond the projects, enabling that the point of view of SMEs is brought to the different events such as summer camps, conferences, working groups, etc.

**Facilitate the participation of SMEs in projects.**
A basic requirement in assuring heightened SME enrolment is the creation of an environment that will allow high-potential SMEs to be identified and communicated with, that encourages their participation in technically relevant collaborative R&D projects, and carries this through with support in valorising these developments as market-viable innovations.

### 2.3.4 Collaborative Innovation

The key actions to push open innovation within ARTEMIS Innovation Pilot Projects will be to:

- use Centres of Innovation Excellence to collect, attract and retain skills and resources, which will form critical mass for sustainable innovation;
- support actions towards SMEs and for SME networking;
- develop open- or community-source organizations for embedded software technologies, where appropriate;
- facilitate access to funding instruments to support development and commercialization of new innovations (Interface with European Investment Bank and with other financial institutions providing guarantees to SMEs, EC instruments, Venture Capital firms);
- support standardization activities, combating today's fragmentation;
- encourage sharing of and contributing to tool platforms.

### 2.3.5 Standards

All projects to be supported by the ARTEMIS-JU will be required to agree a strategy for standardisation, if applicable, particularly in the context of the ARTEMIS Innovation Pilots Programmes. This will include a rationale for that strategy that takes into account the ARTEMIS Standardisation SRA (available from the ARTEMIS-IA web-site, see section 7). Projects will be expected to communicate with relevant ARTEMIS standardisation initiatives[4] concerning their standardisation needs and opportunities, including those that may emerge during project execution.

[4] Such as the FP7 Supporting Action 'PROSE' (*"Promoting Standardisation for Embedded Systems"*)

# 3 Content and Objectives of the 2013 Call for ARTEMIS Innovation Pilot Programmes

Each proposal should address the full aspects of the AIPP as described below a technological focus on at least one AIP Programme (see Section 3.1). The application-driven development of new technologies and solutions can direct the project results more towards real user needs and businesses and for innovation. Proposals will benefit from having a central role for such business needs and early feedback during the projects in order to achieve market-relevant results. Proposals should identify which of the ARTEMIS Innovation Pilot Programmes they address.
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## *3.1 ARTEMIS Innovation Pilot Programmes*

The ARTEMIS Innovation Pilot Programme priorities for 2013 are indicated below. These are set in the context described in the ARTEMIS Multi-Annual Strategic Plan and the ARTEMIS-JU Research Agenda.

In addition to the specific requirements described in the sub-section for the ARTEMIS Innovation Pilot Programmes, all ARTEMIS Innovation Pilot Projects are required to satisfy general requirements (not specific to any of the ARTEMIS Innovation Pilot programmes). These general requirements are set out in Section 4.

To ensure that the optimal number of AIPP's will be covered by the ARTEMIS JU programme, the following AIPP's are proposed for the Call 2013

### 3.1.1 AIPP1: Critical Systems Engineering Factories

**Not open for this call**

### 3.1.2 AIPP2: Innovative Integrated Care Cycles

**Objectives and Approach**

Europe has an ageing population, growth in chronic diseases, more demanding citizens, and increasing expenditure on healthcare - presently rising from a recent figure of about 8% of GDP - or about 600 billion Euros p.a.

The PWC Health Research Institute emphasizes the importance for accelerating innovation and the need for public-private partnerships in its HealthCast 2010 report: “Healthcare will soon become more patient-friendly and tailored”…”the greatest progress is being made where governments are accelerating innovation and seeking public-private partnerships around outcomes-based care.”

As an example, a concrete integrated Care Cycle is described in this section to illustrate an idea of and ARTREMIS contribution to the Innovation Pilot in the area of Healthcare. This example covers the Care Cycle for Cardiovascular Diseases.

Heart disease touches millions of people every day and Cardiovascular Diseases (CVDs) are the global number one killer. The World Health Organization (WHO) states that:

- 20 million people will die from CVDs, mainly heart disease and stroke, by 2015.
- 80% of premature cardiac disease deaths are avoidable through healthy lifestyle choices.
- 80% of CVD deaths take place in low and middle income countries.

The Cardiac Care Cycle (CCC), an Innovation example, shows a complete cycle for a person going through from a healthy person, to a person with health symptoms, diagnoses, intervention and eventually recovering. This example aims to present potential solutions covering the entire cycle of cardiac disease care –from prevention via diagnosis and treatment, to disease management and on-going surveillance– to improve outcomes, optimize costs and deliver meaningful innovations.


Projects under this Innovation Pilot Programme overall ambition is to move from episodic, occasional care using isolated equipment, to integrated care pathways, team coordination and connected workflow solutions throughout the complete cardiac care cycle.

To this aim the Healthcare Centre of Innovation Excellence (under construction) brings together key European players with complementary competences in all stages of the cardiology care cycle.

An Innovation Pilot Project in this area is expected to address the following four main R&D areas, following the described care cycle.

**Screening and early detection**
Aim: Enabling early non-invasive screening and risk stratification of asymptomatic patients
Clinical Challenge: Effective and early detection of symptoms of the diseases (for example cardio vascular) to enable treatment in early stages.
Artemis Challenge: Providing novel methods, tools, equipment and network services.

**Discovery to treatment**
Aim: Reducing time to treatment for acute patients and providing crucial decision support to diagnose each unique condition.
Clinical Challenge: Quick diagnosis from emergency medical services for timely intervention of acute patients.
Artemis Challenge: Providing open data management, enabling focus more on patient care and less on transmitting data during treatment and transport.

**Minimally invasive interventions**
Aim: Innovating minimally invasive procedures for an ever-expanding range of disease ( e.g. cardiac) conditions.
Clinical Challenge: Provide treatment with less patient discomfort, shorter hospital stays, faster recovery times and lower treatment cost.
Artemis Challenge: Providing real time imaging tools and equipment to support image guided intervention and treatment.

**Chronic disease management**
Aim: Enabling the management of chronic conditions in care settings outside the hospital.
Clinical Challenge: Avoid re-hospitalization of patients by predicting adverse events before they occur and managing compliance with clinicians' recommendations at home.
Artemis Challenge: Collecting patient data from different sources providing multi-parameter algorithms to enable home monitoring of patients after an intervention.

Expected Projects should include:

- Providing novel methods, tools, applications:
  - Risk group screening
  - Advanced notification systems
  - Clinical decision support
- Patient centric data management and communication technologies throughout the care cycle:
  - Open data management
  - Data compatible equipment
  - Workflow and Network services
- Imaging technologies for early diagnoses, image guided intervention and treatment:
  - Advanced imaging and detection technologies
  - Real time data processing of large data sets
  - Interoperability and security
  - Integrated decision support
- Components for patient monitoring and screening
  - Sensor data fusion
  - Solutions for remote decision support
  - Secure network and communication protocols

**R&D innovation and Challenges**

Embedded Systems Challenges to be addressed:
- Sensor Networks:
  - Sensor (body) area networks
  - Sensor Fusion
  - Low Power management
- Integration and interoperability:
  - Between and within use cases
  - On device level, system level and data level
- Algorithmic level:
  - Both statistical data mining

    - Image quality, image enhancements, feature extraction
    - Image processing, image registration, 3D visualization
    - (Real time) Multi model (source) imaging
- Embedded Data management:
    - Ontology: patient health Records
    - Reasoning engine
    - Data Fusion: multi source patient data and medical data
- Middleware
    - Semantic Interoperability middleware among heterogeneous smart devices
- Embedded control of systems & devices
    - E.g. catheters, pace makers, diagnostic equipment.
- Workflow management and support

**Expected Market impact and Innovation**

The results of this Innovation Pilot project will embrace an integrated environment showing the innovations achieved in the project. Integrating these Embedded System solutions will support patients and care givers throughout the whole cardiac care cycle, independent of time and location (home, ambulance, hospital and rehabilitation centre).

More specifically, Projects should develop their expected impact:

- In enabling early detection and screening,
- In reducing the time to treatment/ of treatment
- Proposing innovative methods and procedures – from minimally invasive to non-invasive.
- In improving the patient management and overall cycle
- On business side: reducing the cost of the in hospital/outside the hospital for the hospital
- On the Patient side: development of more patient friendly healthcare cycle and reducing the overall cost.

The example used in the previous paragraph covers the Care Cycle for Cardiovascular Diseases, as this provides a very effective illustration of the technology coverage and the societal impact seeked by this AIPP. However, proposals may address health care cycles tackling other type of diseases and / or any health care aspects where the proposed R&D Innovation in the AIPP will generate similarly large impact on population.

### 3.1.3 AIPP3: Seamless communication and interoperability - Smart environments: the Neural System for society

**Objectives and Approach**

ARTEMIS SRA 2011 describes networked embedded systems as neural system of society. Such neural system is naturally a key enabler for all kind of applications and systems needed to solve the societal challenges of modern society. A key challenge in building this nerve system is enable the connectivity between systems and possibility to access and understand correctly the information provided. Current systems are typically bounded by technological and economical borders preventing this.
Objectives

This AIPP targets to provide a solution set for interoperating systems which include technologies to connect to any system, means to access any kind of information in embedded systems, and tools for handling mixed requirements. The objective is to construct the real end-user systems instead of laboratory set-ups and to test the systems having real end-users in living labs. This will require real life experimentation (living lab installations) in few selected locations recruiting large number Industry partners bringing the solutions and ARTEMIS technologies in to test/use.

**R&D innovation and Challenges**

This AIPP's activities should include cross-domain interoperability solutions that are based on earlier research projects, e.g. ARTEMIS interoperability solutions. Cross-domain issues should address topics like Digital City, Smart Buildings, and Urban Living. In practice, this means Living Lab buildings, public areas, and temporary installations.

The increased utilities should significantly improve the competitiveness of the European Embedded System industry.

**Expected Market impact and Innovation**

The ultimate outcome of an AIPP should be certified add-ons to operating systems that will enable:

- Adaptation in various embedded systems middleware,
- A communications infrastructure, that has utilities for Syntactic and semantic integration
- Different security levels,
- Support self-configuration, self-organisation, self-healing and self-protection of the embedded system participating the operation,
- Resource management schemes that can adapted to different constraint of system configurations
- Interoperability of system functions that are designed by Artemis projects,
- Tool environment.

Operating systems within this AIPP add-ons will provide the following services for building application for a system of systems:

- Programming interfaces: An API for various application development environments will be provided to align the use of the AIPP solutions for different target systems.
- Resource management: A common way of detecting and reserving communication and other resources in the interoperation setup.
- A method and tool support for capturing, annotating and analysing critical requirements of the different interoperating systems.

The out coming results are expected to be applicable on various domains.

### 3.1.4 AIPP4: Production and Energy Systems Automation

**Not open for this call**

### 3.1.5 AIPP5: Computing platforms for embedded systems

**Objectives and Approach**

With the expansion of the Internet-of-Things the prominent position of the field of embedded systems is further strengthened, since the Things at the edge of the Internet are embedded systems.

It is a high-level goal of ARTEMIS to make European industry a world-leader in this all-important field of embedded systems. This goal requires that the European industry has access to powerful hardware, supported by user-friendly tools at highly-competitive costs.

Considering recent technology trends in the domain of hardware and systems, the enormous economies of scale of the semiconductor industry and the software industry have further proliferated. For example, a GPS receiver that cost 10 000 € fifteen years ago can today, due to the development of a highly integrated mass produced GPS chips, be provided for less than 5 €. By developing a generic cross-domain architecture that can be implemented on a single heterogeneous MPSoC (multiprocessor-system-on chip) and tailored to the needs of a given application domain by software, similar cost reductions can be accrued for many embedded applications. The non-recurring cost for the development of such an architecture chip can easily surpass 100 Mio €.

In a number of FP7 (e.g., GENESYS) and ARTEMIS projects (e.g., INDEXYS, ACROSS) the rigorous groundwork for such a cross-domain architecture chip has been laid.

Based on this solid groundwork, it is the ultimate objective of AIPP5 is to provide to the European Embedded System Industry a heterogeneous MPSoC (multiprocessor-system-on chip) that realizes a cross-domain execution platform characterized by:

- Utmost Flexibility
- Dynamic Adaptability in Open Systems
- Guarantee Safety and Security on Demand
- Extraordinary Dependability at
- Affordable Cost

This execution platform will be used to build embedded systems of superb utility in the aerospace, automotive, medical, and industrial domain and thus strengthen the competitiveness of the European Embedded System industry.

**R&D innovation and Challenges**

ARTEMIS promotes the concept of reference designs and architectures that provide solutions to key challenges such as composability, networking, security, robustness, diagnosis, maintenance, integrated resource management, evolvability, self-organization and dynamically adjustments in changing systems.

A first generation of ARTEMIS projects has defined a generic blueprint of a reference architecture along with FPGA-based prototypes, which can serve as a starting point for solving the above challenges.

Examples of remaining open challenges are:

- Security in MPSoCs:
  - Methods for secure operation, secure maintenance and secure diagnosis
  - Security building blocks including IP protection, secure download, Digital Rights Management
  - Gateways for the secure interconnection of MPSoCs and the connection to the Internet
- Active diagnosis in MPSoCs:
  - Use of diagnostic information to achieve fault-tolerance by directly intervening in the system behaviour by means of reconfiguration (e.g., migration of services to spare cores, graceful degradation),
  - Certifiable methods for active diagnosis in safety-critical applications,
  - Non-intrusive observation of interactions between IP cores,

    - Detection and analysis of errors and anomalies in an MPSoC.

- Integrated resource management:
    - Resource management algorithms with a holistic view of different resources (e.g., power, execution time, bandwidth, memory) that dynamically allocate resources to IP cores such that the deadlines of all time-critical services are met and the given budgets for resource-usage are observed,
    - Continuity of services during reconfiguration,
    - Support for heterogeneous time constraint systems where the resource allocation to safety-critical tasks can be static and deterministic.

- Internet Integration of MPSoCs
    - Hierarchical naming architecture with a mapping to the chip-level in order to be able to identify smart objects,
    - Gateway components that enable MPSoCs to become autonomic components in the Internet-of-Things with support for network service discovery, system configuration, optimization, system adaptation and evolution.

- Tool environment
    - Model-driven component-based development methodology for MPSoCs,
    - Support for the translation of platform-independent models into different implementation technologies in order to handle technology obsolescence,
    - Methods and tools for the evaluation of non-functional properties (e.g., energy, reliability).

Projects in this area are expected to construct on the results of INDEXYS and ACROSS and industrial FPGA implementation to be provided for use in different domains. Industrial strengths tools should be tailored to this infrastructure within an associated tool projects.

Projects should also envisage a take-up of the FPGA by a mass-market application, so that the MPSoC to be developed should be used in many different domains. The economies of scale to be realized by such a chip should be demonstrated and are expected to bring substantial economic benefits to a diversity of embedded applications.

**Expected Market impact and Innovation**

Innovation Pilot Projects in this area are expected to make important contributions towards the achievements of the goals set out in the Strategic Research Agenda of ARTEMIS.

The provision of a generic cross-domain state-of-the art MPSoC that can be tailored by middleware to the needs of a particular application domain will substantially reduce the non-recurring development costs and the time to market of new embedded system applications and significantly cut the recurring cost of the respective products.

It is expected to have a substantial reduction in the recurring cost of products based on this solution and also it is expected to open large markets, e.g., in the medical domain, wind power plants, smart grids, e-vehicles etc. to the European embedded system industry.

They are also expected to enable the development of low cost solutions for high volume market development through enhanced modularity, reuse, scalability, and portability. This very considerable reduction in the recurring cost of such an Innovation Pilot Project-based product is expected to open large new markets, e.g. in the medical domain, to the European embedded system industry.

Projects are expected to propose an architecture to allow the investigation of the architectural design by the certification authorities as foreseen in the subject development standards of the individual industrial domains (aerospace, automotive, railway, wind-power, smart grid, medical, etc. ...).

Another expectation and need in many industrial domains is the protection against threats from the internet in case of integration of such embedded systems in the internet of things or potentially into any

kind of cloud computing system or other type of systems (such as off-shore wind park; the threat of “internal assault” by service or maintenance people, etc. … ).
The out coming results are expected to be applicable on various domains.

### 3.1.6 AIPP6: “Intelligent-Built” environment and urban infrastructure for sustainable and “friendly” cities

**Not open in this call**

# 4 Requirements

The proposal should satisfy the following requirements:

## *4.1 General*

Each proposal should address at least one ARTEMIS Innovation Pilot Programme (see Section 3.1)

Large, strategic initiatives are encouraged to ensure maximum effective use of the available budgets, and respond to the ARTEMIS Innovation Pilot Projects concept.

## *4.2 Contribution to the ARTEMIS Strategic targets*

ARTEMIS has an over-arching objective to close the design productivity gap between potential and capability. The results arising from Projects responding to this call will be expected to:

- reduce the cost of the system design from 2012 levels by 15% (8 year timescale);
- achieve 15% reduction in development cycles - especially in sectors requiring qualification or certification – from 2012 levels (8 year timescale);
- manage a complexity increase of 25% with 10% effort reduction, compared with 2012 (8 year timescale);
- reduce the effort and time required for re-validation and recertification of systems after making changes by 15%, compared with 2012 levels (8 year timescale);
- achieve cross-sectorial reusability of Embedded Systems devices and architecture platforms (for example, interoperable components (hardware and software) for automotive, railways, aerospace and manufacturing) that will be developed using the ARTEMIS JU results.

All projects are requested to formulate, their intended contribution to achievement of these targets in their project proposal. Proposals should describe how projects would measure their contribution and how they would establish a baseline and thereafter monitor their progress from the baseline, by proposing adequate and measurable Key Performance Indicators (KPI).

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 focus on 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.

## *4.3 Expected impact*

All projects to be supported will be expected to identify, at the proposal stage, the impact that they aim to achieve with regard to the expected impact of the Innovation Pilot Programmes that they address. Proposals should describe how projects would measure their impact and how they would establish a baseline and thereafter monitor their progress from the baseline.

## *4.4 Technology vis-à-vis Innovation Pilot Programmes*

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. Nevertheless, all projects in all AIPP must make explicit contributions to the technological ambitions of ARTEMIS for Embedded Systems development. **Clear expression of the technical approach to the research objectives will be essential**.

## *4.5 Co-operation*

All projects to be supported are expected to take initiatives to share requirements and emerging results with other relevant JU projects, as well as with during project execution, so as to achieve the coherent, synergistic progress sought by the ARTEMIS JU.

## *4.6 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.

In addition, the emerging use of the internet for Embedded System provides new market opportunities, therefore projects proposed should take account of this, if applicable, and of the ability of the Embedded Systems to exploit the capacity to interconnect not only for communication but also to gain access to the knowledge of Internet based information systems.

## *4.7 Standards & Regulations*

ARTEMIS has a Strategic Agenda for Standardisation. 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.

## *4.8 Innovation environment*

The ARTEMIS Strategic Research Agenda sets out the ambition to *"establish a new holistic approach to research, technology development, innovation and skill creation"* by improving the linkages between the three parts of the 'knowledge triangle' - education, research and innovation.

With regard to Education and Training, the ARTEMIS Strategic Research Agenda sets out the aim to *"overcome the gap between the theory of academic education and the practice in industrial application"*. Proposals should describe their specific intended contribution to this aim.

ARTEMIS has a specific 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 proposals should clearly indicate concrete and quantifiable measures to assist participating SMEs in their dissemination of project results and subsequent valorisation of the results in near-future business plans. Moreover, project consortia must be balanced, considering explicitly the involvement of SMEs and favouring clustering of SMEs in innovation eco-systems.

ARTEMIS also supports the consistent grouping, on a voluntary basis and at European scale, of industry and research in Centres of Innovation Excellence to foster the Innovation Environment. It is recommended that projects show awareness of existing eco-systems, with a view to more concrete collaboration in the future.

Proposal should, if applicable, also describe the possible interaction with existing national or European level experimentation platforms, or proposes setting such as real-life experimentation environment, in order to foster co-creation, exploration, experimentation, approach as well as integrating research and innovation processes.

## *4.9 Project duration*

In view of the downstream research focus of the ARTEMIS Joint Undertaking and the concept of Innovation Pilot described in this document, a maximum of 3 years projects are expected. Each project must provide adequate phasing justification for their length, relative to the application demonstrators and expected impact that they describe.

# 5 Implementation of the Call 2013

## *5.1 Call 6: JU-ARTEMIS-2013*

- Date of publication: **26th February 2013**
- Closure date: **6th June 2013**, at 17.00 h Brussels local time.
- Indicative budget: 73 M€[5]
- Evaluation procedure: Single stage (Full Project Proposal only)
- Indicative evaluation and contractual timetable: It is expected that the contract negotiations for the selected proposals will start as of September 2013.
- Project Cooperation agreements: Participants in all actions resulting from this call are required to conclude a project cooperation agreement.
- The grant which will be offered by the JU will be specified in the Grant Agreement applicable to ARTEMIS.

## *5.2 Call implementation in 2013*

| | **Budget of Call 2013 (estimated) (€)** |
|---|---|
| Total JU Contribution | 25.652.000 * |
| Total contributions from ARTEMIS Member States [6] | 46.640.000 |
| **Total budget of Call** | **72.292.000** |

* The JU contribution may be increased to 37.000.000 € in case of confirmation of possible upsides in some Member States.

[5] Including the JU funding estimated as 55% of the amount committed by ARTEMIS member States to the budget of this Call.

[6] At least 1,8 times the Community's financial contribution

# 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
2. Eligibility Criteria for funding of individual participants (ARTEMIS JU funding and national funding from ARTEMIS Member States)

## *6.1 Eligibility Criteria for Proposals*

A FPP 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 FPPs.
- It involves at least 3 non-affiliated legal entities established in at least 3 ARTEMIS Member States.
- It is complete (i.e. both Part A with the requested administrative forms and part B with the description of the proposed research are present).
- It is submitted in English[7].
- The content of the FPP relates to the topic(s) described in this work programme.

## *6.2 Eligibility criteria for funding*

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 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*

The evaluation criteria against which proposals will be judged are set out in the document ARTEMIS-PAB-2012-D.18: "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&I and technical excellence.
3. Technological solution 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 from 1 to 10. Criterion 1 will have a weight of 0.5, criteria 2 and 3 will have a weight of 1, criterion 4 will have a weight of 2, and criterion 5 will have a weight of 1.5. The threshold for all the individual criteria will be 6. The overall threshold, applying to the weighted sum of the five individual scores, will be 40.

[7] 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

### 6.3.1 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 the Innovation Pilot Programmes for those topics as set out in Sections 3.1.1 to 3.1.6 and in Section 4.
   - Relevance and contribution to the ARTEMIS strategic targets listed in section 4.2.

2. R&D&I and technical excellence:
   - Soundness of the R&D&I concept
   - Clarity and quality of the objectives and expected results
   - Progress beyond the state of practice and the use of state-of-the-art in innovating.
   - Leveraging on existing / previous projects, with emphasis on ARTEMIS projects.
   - innovation pilot description,

*3*. Technological solution for innovation and work plan
   - Quality and effectiveness of the methodology
   - Quality of the work plan.
   - Quality and effectiveness of the demonstration and related infrastructure
   - Co-Creation and Collaboration

4. Market innovation and market impact
   - Contribution, at the European and/or international level, to the expected impacts of the work programme, and specifically to the expected impacts of the Innovation Pilot programmes) that the proposed project intends to address as set out in Sections 3.1.1 to 3.1.6 and in Section 4.
   - Speeding-up and quality the innovation process.
   - Degree of application innovation in the context of the Innovation Pilot 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.
   - Introduction and enablement of new, more competitive practices and methodologies
   - Appropriateness of measures for the dissemination of project results.
   - Contribution to standards.
   - End-users direct involvement from requirement through validation phase
   - Management of intellectual property.
   - Societal impact.
   - Industrial benefits.
   - Achieving the strategic objectives for creation of/ contribution to innovation eco-systems.

5. Quality of consortium and management[8].
   - 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.
   - Effectiveness of the eco-system: large scale and critical mass, and further plan for attracting other partners and reinforcing the eco-system.
   - Appropriateness of the level, allocation and justification of the resources to be committed either tangible or intangible (budget, staff, equipment, infrastructure ...).

[8] This evaluation criterion corresponds to the **selection criteria** in the meaning of the general financial regulation (article 115) [OJ L248, 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 (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 2011 | http://www.artemis-ia.eu/sra |
| Reference Design & Architecture SRA | http://www.artemis-ia.eu/publication/download/publication/633 |
| Seamless Connectivity and Middleware SRA | http://www.artemis-ia.eu/publication/download/publication/634 |
| System Design Methods and Tools SRA | http://www.artemis-ia.eu/publication/download/publication/632 |
| ARTEMIS-JU MASP and Research Agenda (RA) | http://www.artemis-ju.eu/publication/download/publication/270<br>http://www.artemis-ju.eu/publication/download/publication/271 |
| STANDARDISATION SA | http://www.artemis-ia.eu/publication/download/publication/744 |
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