DRAFT

ARTEMIS JU
Additional Annual Work Programme
2012

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Change history

Not applicable.

1 Introduction and disclaimer

This present document is part of the ARTEMIS[1] Annual Work Programme (AWP) for 2012 – it sets out the research priorities for projects to be supported through the Call 2012 (the fifth call) for Proposals of the ARTEMIS Joint Undertaking (JU) in the so called ARTEMIS Innovation Pilot Projects concept as detailed hereafter.

[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 and 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. It promotes 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 defining 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) 2012 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 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 AWP2012.

The "ARTEMIS Innovation Pilot Programmes" are therefore set-up to respond to the following targets stated in the MASP 2012:

- 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, 'ARTEMIS Innovation Pilot Programmes' are addressing the areas of:

- Critical Systems Engineering Factories.
- Innovative Integrated Care Cycles.
- Seamless Communication & interoperability- smart environment (the neural system of society).
- Production and Energy System Automation.
- Computing platforms for embedded systems.
- "Intelligent-Built" environment and urban infrastructure for sustainable and "friendly" cities.

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 this year specifically the creation of 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 2012 Call for ARTEMIS Innovation Pilot Project

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 2012 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.

3.1.1 AIPP1: Critical Systems Engineering Factories

Objectives and Approach

On the topic of Critical Systems Engineering, a first generation of ARTEMIS projects, and a number of other European or national projects have obtained meaningful research results: Building blocks of the factories for critical systems engineering are available, major steps in the technical integration of these building blocks in consistent platforms have been made, and industrial feedback is being collected through meaningful use cases.

Lessons learned from these projects are stressing the need for sustained collaborations schemes, beyond the timescale of individual projects, while speeding-up technology maturation cycles.

The overall objective of this AIPP is therefore to enable new, sustainable paths to speed-up the maturation of technical and methodological building blocks of the factories for critical systems engineering, in different application domains, thereby strengthening the market perspectives for European systems engineering solutions.

Expected Projects should:

- Address R&D innovation and challenges detailed below.
- Enable sustainable long term transverse actions of clear common interest, such as elaboration of open standards, continuous assessment of emerging technologies, and feeding the academic community with well formulated industrial requirements.
- Speed up the integration of innovative SMEs in the ecosystem of technology providers.
- Support the transition from a set of consistent and recognized technical building blocks to the elaboration of domain specific critical system engineering factories.
- Improve the cross-domain fertilisation on technologies and standards.

R&D innovation and Challenges

ARTEMIS projects (such as CESAR, iFEST, MBAT) and other projects (such as ITEA projects OPEES, VERDE) are sharing the concept of a Reference Technology Platform (RTP) as a consistent set of building blocks, integration principles, interoperability standards.

The transition from the RTP achievements to effective critical systems engineering factories calls for R&D innovations in the area of methods and techniques, according to short term and medium term business impact priorities, including:

- Variability management and support to product line development (towards effective tool chains).
- Model based systems engineering techniques in the context of certification processes (towards reducing drastically the quantity of documentation that this processes are demanding; usage of models as certification evidences will be considered).
- Techniques for the integration of COTS building blocks in certified architectures.
- Multi-viewpoint and multi-criteria engineering. This shall support effective integration of dedicated analysis tools in the engineering framework, and is a key enabler to efficient interactions between different engineering disciplines (co-engineering).

In addition, new techniques or extensions need to be introduced, according to medium term and long term business impact priorities. This includes:

- Aided design space exploration and multi-level architecture trade-offs.
- Holistic (Multi-physics and control) modelling and simulation.
- Further investigations to better introduce safety and security criteria in the multi-criteria architecture exploration, including new safety and security analysis techniques in the proposed tool chains.
- Extension of the concept of “Safety Case” to a more general “Assurance Case” concept.
- Techniques for heterogeneous time constraints applications and architectures.
- Techniques for highly scalable, customisable and composable systems.

- Techniques for the design, implementation and integration of emergent behaviours as new services.
- Engineering of human-machine interactions for critical or complex systems.

Expected Results

Projects shall target the following results:

- Provide evidences of impact of R&D innovations listed above in terms of efficiency of engineering processes.
- Strengthen perspectives for European technology providers, in particular SME, to bring these R&D innovations to the market.
- Establish a perennial exchange platform for sustained long-term collaboration in the R&D to improve critical systems engineering.

The perennial exchange platform scope should go beyond the scope of individual projects, aiming at becoming a natural de facto common place. In the area of critical systems engineering, it shall:

- allow stakeholders, collaborating in large scale or small projects, to evaluate, integrate, standardize, and disseminate the results of collaborative research,
- actively support the industrialization and exploitation of a consistent set of services and products

Expected Market impact and Innovation

The general market impact for this AIPP, consistent with ARTEMIS priorities, is the efficiency of product development for complex safety relevant embedded systems, through improved engineering practices, new and mature tools, and flexible environments to deploy extended enterprise approaches.

A specific market impact is, simultaneously to:

- Strengthen and extend European engineering support solutions (to validly compete against an established US competition).
- Reduce the time to market of innovative engineering tools solutions (to fight an emerging competition from low-cost countries).

To contribute to this expected business impact, innovation impact should target:

- Acceleration of the technology acquisition cycle, through faster demonstration of feasibility in a representative environment.
- Acceleration of the tool development cycles for tool vendors.
- Federation of a community of practice with mutualisation of objectives, means and resources and dissemination of best practices.
- Better articulation between tool providers (including commercial and open source), services providers, and tool users.
- Facilitation of the emergence of standards

The major expected impact of the pilot project is a disruption in the way European marketable tool chains are elaborated:

- not only leveraging medium term and long term cross-domain synergies to increase technical maturity and market readiness of common building blocks, thereby strengthening the most innovative European engineering tools providers
- but also exploiting strong existing intra-domain synergies in organized supply chains, consolidating sustainable market perspectives for individual tool providers and sustainable business pull for future innovations.

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 Euro 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).

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

Objectives and Approach

Contribution to strategic targets

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

SEAM program 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 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

SEAM program 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 SEAM 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 with SEAM add-ons will provide the following services for building application for systems of systems:

- Programming interfaces: An API for various application development environments will be provided to align the use of the SEAM solutions for different target systems.
- Resource management: A common way of detecting and reserving communication and other resources in the interoperation setup.
- Mixed criticality: 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

Objectives and Approach

Global society objectives

Europe's manufacturing, energy, process and logistics industry is a very important segment and by employment making it by far the largest sector. Productivity improvements in this sector will therefore have major impact to the European economy, both to the production outcome and to the competitiveness of European industry compared to other market leaders. The industries are constantly facing new and increasing challenges such as managing in an efficient manner the energy consumption, harder environmental regulations, better raw material yields, more efficient plants from both energy consumption and production outcomes viewpoints, more competitive products and solutions, higher product quality and better production processes just to name a few.

The very high level of challenge is facing our society considering the cycle of production and consumption of resources like energy and integrating in an end to end process the manufacturing management and the energy management. From a centralised solution and a set of non-connected silos, we have now to chain the integrated scope.
This future of XXX infrastructure will require the global integrity of large numbers of interacting, independent and autonomous systems from different organisations. This will pose new challenges for the integration of these intelligent sub-systems so they can be used collectively. Embedded Systems will have to be "network enabled", and incorporate capabilities of self-management, self-supervision and the means for self-organisation as well as failure auto-recover mechanisms.

Many sectors like water and waste water treatment, mining, minerals, gas and oil and also construction are indeed energy intensive and have a high effect on Europe's CO2 emission. Technology and Production Process Management and Control Improvements for energy efficiency and logistics will therefore make a significant contribution to a sustainable society and reduction of the greenhouse effect. Raw material like oil and gas, forestry and mineral and its refining plants cannot be off-shored but down the product building value chain European jobs are threatened.
Other challenges are the reduction of heavy manual work, improved working conditions, and people and plant safety. Therefore, enabling the efficient integration of production and energy systems will be part of a developing eco-society paradigm.

These challenges require:

- new and improved processes,
- smarter and more flexible and sometimes fast reconfigurable production systems,
- supply and efficient management of utilities and energy,
- better use of new emerging paradigms and associated technologies, like Service-Oriented Architectures, Complex Systems-of-Systems Engineering resulting in Smart (efficient) Manufacturing Solutions,

resulting in ***Smart, Efficient Production Solutions***.

One of the key technologies addressing many of these challenges is collaborative automation, as it has been shown by the first set of industrial pilot applications addressed in European projects like ITEA SIRENA, ITEA SODA, FP6 SOCRADES and other currently running initiatives such as FP7 IMC-AESOP and FP7 FENIX.

Europe as the world leading automation region has the potential to take necessary steps to further develop European manufacturing, process and logistics industry sector that is "best in class". To do so, muti-disciplinary approaches will need to be applied and key challenges need to be addressed at concept and technology level.

Embedded system industry objectives

The ambition is to address the societal challenges related manufacturing, process and energy industries while maximizing efficiency and flexibility. This will not only augment industrial production manufacturing employment in Europe but also assure jobs in the design, manufacturing, integration and servicing of the manufacturing equipment itself. Embedded Systems will provide Automation technology, which precisely control process parameters, including the active reduction of pollutants and an efficient management of energy consumption, to reduce the total cost and environmental impact. Further competitive advantages will be achieved by controllability, flexibility and condition monitoring made possible through Networked Embedded Service-oriented Automation Systems, thus enabling a holistic system of systems integration of industry to society needs and comfort, and further providing a frame work for new services and business models.
Service-oriented Embedded System solutions will support production management and operation, covering functions and components across the different levels of an ISA´95 compliant Production Enterprise Architecture, from the sensor/actuator, throughout SCADA, MES to the upper ERP and with open service integration to society energy infrastructure adhering to standards like ISO 61850 for Substation Automation.

Projects are expected to address these objectives by providing support for:

- Flexibility, from real-time product grade changes and process tuning to raw material quality changes.
- Improvement in end-product quality will be achieved through active control of the manufacturing process and its energy management, moving from “off-line” to “in-process” quality and energy control through advanced automation.
- Improved man-machine interaction through advanced Embedded Systems and “human-in- the-loop” control systems will improve quality, flexibility and productivity by assuring zero operator errors, as well as reduce accidents.
- Agile adaptation to market demands, particularly for individual customization. Achieved through reduced commissioning and production ramp-up times, allowing fast changes in product type or grade to be made.
- Development of new business models facilitating the local and global interaction between actors.

Process and manufacturing Industry objectives

Reduction of overall energy consumption, more efficient and flexible usage of energy, meeting harder environmental regulations, increasing raw material yields, plant and process efficiency, competitive high quality products and are only possible if efficiency and production bottlenecks can be identified, production variances reduced and site performance planned and overviewed.

Objectives towards smarter manufacturing and autonomous energy aware production are:

- Plants and facilities with higher competitiveness.
- New products and services for efficient production planning, logistics and transportation and better Product lifecycle management including end-user usage.
- Mass customization while maintaining adaptiveness and quality.
- Systems that can easily be built from complex subsystems, fully distributed systems with high computing resources when needed, big data management for information and decision support and systems that are becoming maintenance free, integrated with better and more useful standards.
- Using best available and forthcoming technologies and innovations with real time performance and electronics that are greener, robust and fault tolerant with increased software tool availability requiring much smaller development efforts for all phases e.g. modelling, engineering, deployment, maintenance, management etc.
- More productive tools that support total on-line engineering and upgrades together with global distribution and application stores.
- Tight integration between enterprise production systems and energy and logistics systems for high-definition visibility, real-time key performance indicator monitoring, enforcement of enterprise and societal goals from factory to society.

R&D innovation and Challenges

A number of European R&D projects made through ARTEMIS, ITEA, Framework program, PPPs have investigated specific embedded system technology aspects to address above objectives.

Specific technology developments and demonstration thereof has proven feasibilities and given an outlook to the available potential.

Customer requirements have been defined through work in numerous European Technology Platforms (ETPs) e.g. ManuFuture, European Commission specific tenders, and other initiatives like Smart Mine In the Future (SMIFU).

Seeing the correlations of results from these customer and supplier driven activities, opens a strong possibility for rapid market acceptance. To leap frog the transition of the embedded system technologies to a strong market acceptance it is therefore critical to address the integration and interoperability of technologies and requirements to a technology platform capable of spanning across application domains and spawning from shop floor to business level.

The foreseen solution platform should be a strong technology stepping stone for the integration of production to other parts of the society such as energy production, distribution and management, logistics and transportation.
Such integration should enable the future optimization between different demands, needs and supply either through a market-driven approach or a regulation approach. Either of which can be supported, and to a desired degree automated, by technology based on the automation technology platform.

Projects in this area should address the integration and interoperability of embedded system technologies enabling a common automation technology platform that could empower the rapid advancement of European manufacturing, process and automation industry.

Expected Market impact and Innovation

Long term the AIPP impact is expected to improved productions efficiency, improved product quality and improved OEE at manufacturing and process facility while achieving an energy and logistic integration to surrounding society, encouraging and motivating increased investments in the necessary automation technology.
On shorter term this will impact the whole value chain of the automation industry from component and device supplier over system suppliers to system integrators.
The AIPP is expected to address and impact most of this value chain including the plant operating end users.
A key aspect of the “cloud based” technology platform is to facilitate the introduction of new automation technology. Further increased usage of automation - verging on autonomy - will enable “High resolution management“. Thus the envisioned technology platform is expected to have impact on energy consumption reduction and improvement of raw material utilization while supporting improved safety and working conditions.

The new industrial service-based architectures, sensors and communications also open the prospect for remote maintenance, monitoring, diagnosis, and control in which SMEs may participate more easily, and projects are expected to facilitate the “opening up“ of the market for such services.

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 AIPP 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
- 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 and self-organization.

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

Objectives and Approach

Both ICT and information are the heart of the "smartness" in the cities:

- Environmental, economic, demographic and socio-cultural factors are pushing us to design and implement intelligent and friendly cities:
- Energy efficiency. For example using zero energy balance elevation systems or consumption aware household equipment.
- Eco-sufficiency. Improving human behaviour in the use of resources assisted by Ambient Intelligence techniques. Optimizing management and maintenance of resource distribution and management systems themselves.
- Comfort, safety and security, through improvements in environmental quality, increased automation, and advances in smart service distribution through the urban areas.
- New business models for companies offering integrated services.

With the overall purpose to overcome the innovation gap between the technology development and their deployment on real scenarios by applying a user-driven approach and by bringing together and promoting interaction between all relevant players in the value chain for smart city.

The main objective of this programme is therefore to bring results that will contribute to sustainable urban life in the Smart City by improving smart systems and intelligent functionality to efficiently manage aspects such as the energy of jointly managed groups of buildings (residential and non-residential), optimizing the usage of the energy consumption, production and storage subsystems of each building, urban lighting, logistics, traffic management, electric mobility, etc. in intelligent buildings, intelligent communities and smart cities.

The projects should focus on piloting existing reference designs and architectures, by deploying for example a reference platform that will integrate intelligent embedded systems at various levels (building units, whole buildings, clusters of buildings districts and smart cities). This reference platform should then be evaluated and validated through large-scale demonstration activities in several pilot site typologies across Europe.

Projects addressing this area should contribute to one or more of the following specific objectives:

- definition and initial instantiation of architectures and communication platforms to enable the flexible and evolvable interoperation of systems, including sensors, actuators, information systems, and control systems across multiple domains - e.g. transport, urban lighting and energy management - and multiple vendors and service providers;
- reference designs for 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;
- 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;
- Visualization of Sustainable Urban Life, and integration of such visualization with the underlying models and applications.

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

R&D Innovation challenges

Projects in this programme are expected to support the transformation of our European cities by:

- Enabling environmentally sophisticated and intelligent buildings.
- Extend the concept of energy profile 2.0 from home and buildings to the city. This must include the need to adapt buildings and cities to future requirements such as smart grids, cogeneration, electrical energy storage, electric and plugged vehicles…
- Supporting secure smart communications between heterogeneous sources by promoting interoperability (standards) and integration among them.
- Promoting real-time information awareness and self-adaptability as a key enabler for smartness: there is a need to monitor, integrate, exploit and share efficiently and intelligently information from the built environment in real-time. That information will be provided by the different devices deployed in different parts of the city and provided via Internet (Internet of Things concept).
- Enabling interoperation between different geographical located cities in order to save costs, share information and provide common urban user-driven services.
- Avoiding effort fragmentation by providing a common and open platform for smart city management based on other ARTEMIS projects' outcomes by refining, extending and integrating them.
- Supporting decision support on city complexity management.
- Promoting collaboration between the urban players/stakeholders in order to stimulate sustainable behaviours.
- Achieving trustworthiness (dependability) in operating large scale ICT-based systems through appropriate support for installation, for quality of service, for personalisation, for secure and privacy preserving data management, and for maintenance.

For doing so, Projects are expected to use as basis the results and work done on other projects such as:

- eDIANA (ARTEMIS project, call 1) for Reference Architecture; SOFIA (ARTEMIS project, call 1) Interoperability Platform (SOFIA IOP; BeyWatch (FP7 project), for an innovative, energy-aware, flexible and user-centric solution; Internet of Energy (ARTEMIS project, call 3); InRoadS (CIP-PSP) for web based management of urban lighting and its interfacing with other urban functions

Expected impact

Projects in this area are expected to contribute positively to:

- Integrate innovation capabilities across city areas, such as buildings, information sharing or communication, to create and promote new market and urban business models.
- Enable cities as active innovators by playing as urban living labs ready to pilot new ICT-based applications and services.
- Promote interaction and ubiquity capabilities on energy efficient buildings.
- Enable intelligent information sharing and communication systems to support resilient cities able to adapt to environmental and urban changes.
- Aspects of the Smart city to be addressed and improved:
    - Smart People & quality Life
    - Urban areas & Critical infrastructures smart management
    - City Governance & Smart Economy
    - Smart Destination
    - Green and Smart Environmental aspects
    - Energy efficiency
    - Smart mobility in the city (Logistics, public transport, green cars, ...)
    - Safety, privacy and security
    - Empowering for independent living.

Potential Pilot smart cities are to be envisaged to demonstrate the above.
Projects are expected to lead to offers of high-level internet-based services based on open reference implementations that enable the connection of diverse devices with each other, with home networks, and with smart grids. Public authorities should be involved where necessary to harmonize innovation and regulation.

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 2011 levels by 15%;
- achieve 15% reduction in development cycles - especially in sectors requiring qualification or certification – from 2011 levels;
- manage a complexity increase of 25% with 10% effort reduction, compared with 2011;
- reduce the effort and time required for re-validation and recertification of systems after making changes by 15%, compared with 2011 levels;
- 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. 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 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, 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.

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, 2-4 years projects with duration longer than must provide adequate phasing justification for their length, relative to the application demonstrators and expected impact that they describe.

5 Implementation of Call in 2012 (to be updated by PAB)

5.1 Call 4 : JU-ARTEMIS-2011

- Date of publication: 28 February 2011
- Closure date: 01 September 2011, at 17.00 h Brussels local time.

  (NB. A two-step process is foreseen, where project proposer may submit a Project Outline by 31 March 2011, and receive feedback by May 2011).
- Indicative budget: M€[5]
- Evaluation procedure: two stages
- Indicative evaluation and contractual timetable: It is expected that the contract negotiations for the selected proposals will start as of end October 2011.
- 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 2011

	Budget of Call 2011 (estimated) (€)
Total JU Contribution	
Total contributions from ARTEMIS Member States [6]	
Total budget of Call	

[5] Including the JU funding estimated as 55% of the amount committed by ARTEMIS member States to the budget of this 2011 Call.

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

6 Eligibility and Evaluation Criteria for Proposals

Eligibility checks

T
he 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
- It is complete (i.e. both the requested administrative forms and the proposal description are
- present).
- It is submitted in English[7].
- 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[8].
- 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.

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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

8 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 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 4.
- 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 ARTEMISPAB-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&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. 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 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. 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 3.2.1 to 3.2.8.
- 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[9].
- 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 ...).

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	http://www.artemisia-association.org/downloads//SRA_MARS_2006.pdf
Reference Design & Architecture SRA	http://www.artemisia-association.org/downloads/RAPPORT_RDA.pdf

[9] 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.**

Seamless Connectivity and Middleware SRA	http://www.artemisia-association.org/downloads/RAPPORT_SCM.pdf
System Design Methods and Tools SRA	http://www.artemisia-association.org/downloads/RAPPORT_DMT.pdf
ARTEMIS-JU MASP (including the ARTEMIS-JU Research Agenda)	http://www.artemis-ju.eu/attachments/183/ARTEMIS-GB-2010-D.19_MASP.pdf
STANDARDISATION SA	http://www.artemisia-association.org/downloads/standardisation.pdf