"Draft"
Annual Work Programme 2013

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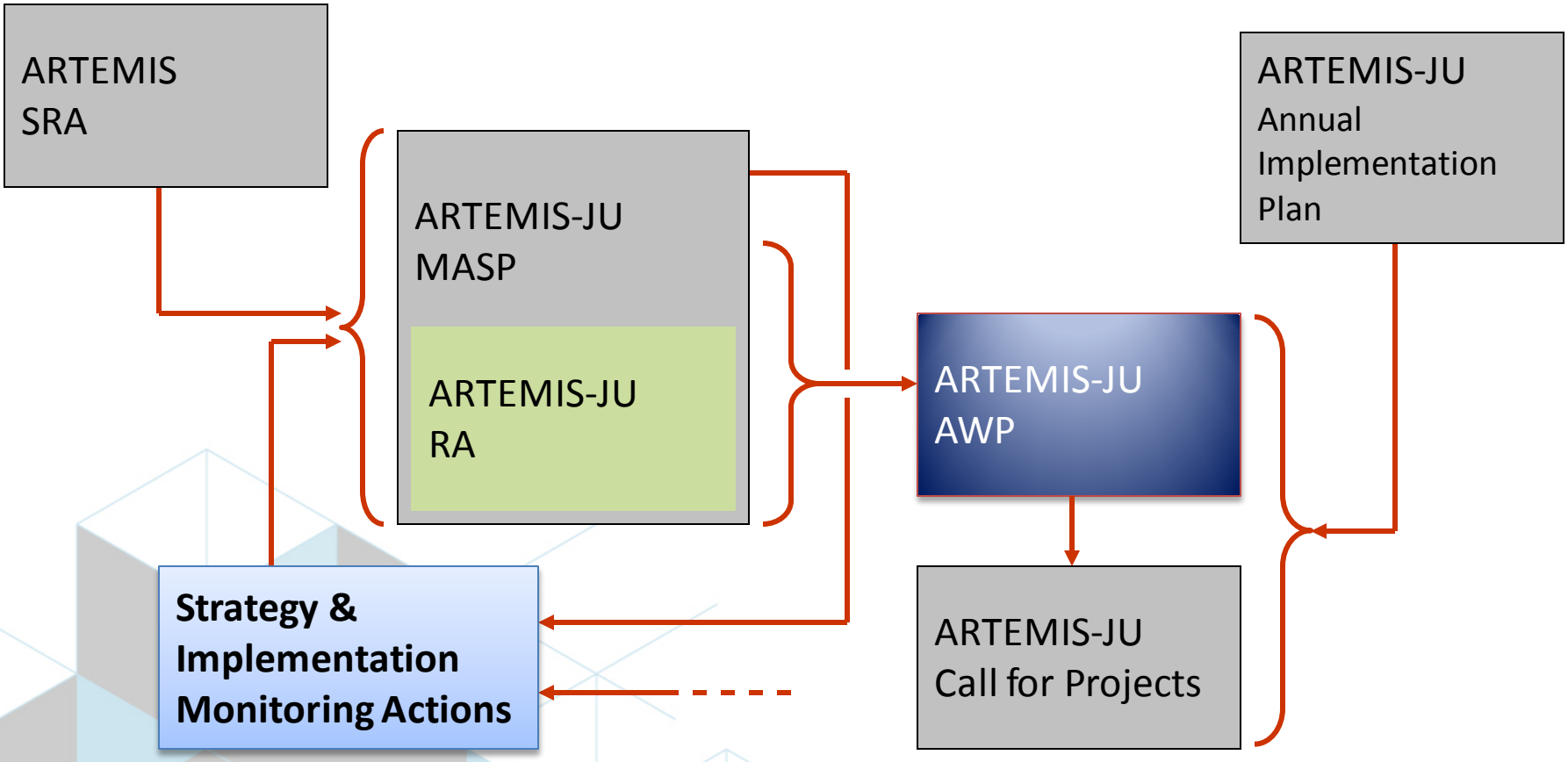
Advanced Research & Technology for Embedded Intelligence and Systems

ARTEMIS Process for deriving the AWP



Update of AWP for 2013 Call
…*The guiding principles*

- 2013 is the last call within ARTEMIS JU actual setting
- Pursue fulfilling ARTEMIS high level targets and strategy:
  - **cross domain industrial priorities serving application domains and societal challenges**
- Implement the Research Agenda topics /challenges to insure good coverage through the AWPs and projects
- Maximize the use of the available budget from PAB
  - **attract additional budget for both ASPs and AIPPs**
- Sustain the Research Agenda implementation
  - Building on the growing ARTEMIS Projects portfolio : significant results and clustering around societal challenges
- Complementarity of the top-down approach (defined in the Research Agenda) with the bottom-up needs expressed by the CoIEs

The proposed AWP 2013 is composed of two parts

- ASP Part : similar structure and approach as the previous AWPs
- AIPP Part : to build and deliver “Innovation Pilots Projects”

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Update of AWP ASP for 2013 Call

Changes from AWP 2012 to AWP 2013:

All text marked in yellow has been changed from the last AWP :

- Page 9: reference to Vision 2030 (the MASP2013 goes deeper into this subject)
- Page 11: list of ASP's open for call2013
- Page 13: web-link added to tool platform definition (labeling criteria)
- Page 14: web-link added to repository (requires login)
- Page 17: Foundational research topics are toned down.
- Page 19/20: text of ASP1 substantially modified
- Page 22/23: text of ASP2 slightly modified
- Page 25/26: some modifications to text of ASP 4
- Page 27/28: text of ASP5 substantially modified
- Page 31: ASP7 is closed
- Page 32/33: some modifications to text of ASP8
- Page 36: explicit reference to patent activity added
- Page 37: explicit reference to the CoIE added
- Page 37: Cooperation with other projects (ARTEMIS, FP, ITEA)

AWP 2013 "ASP Part"
….*Proposal for* coverage and content

- Not "All" the ASPs are open
  - *3.2.7 ASP7: Embedded technology for sustainable urban life: not open*
- 3.2 ARTEMIS Sub-Programmes
  - 3.2.1 ASP1: Methods and processes for safety-relevant embedded systems
  - 3.2.2 ASP2: Embedded Systems for Healthcare systems
  - 3.2.3 ASP3: Embedded systems in Smart environments
  - 3.2.4 ASP4: Manufacturing and production automation
  - 3.2.5 ASP5: Computing platforms for embedded systems
  - 3.2.6 ASP6: ES for Security and Critical Infrastructures Protection
  - 3.2.8 ASP8: Human-centred design of embedded systems

AWP 2013 "ASP Part"
….*Proposal for* coverage and content

New topics are introduced

- 3.2 1 Model driven system development – innovative evolution of tools – loosely coupled or hierarchical control systems – requirement management , formalisation
- 3.2.2 A completely new ASP for care at home, early diagnosis and prevention, image guided intervention, clinical support systems. ES to contribute in performance, reliability, interoperability, dynamically reconfigurable networks, ..
- 3.2.3 Development of tools for multi-device and shared resource applications- smart cities
- 3.2.4 Advanced production automation (renewed content)
- 3.2.5 complex homogeneous or heterogeneous multi-core – power dissipation – energy efficiency–new programming model & new types of API- virtualization for multiple criticality.
- 3.2.6 Completely renewed content

AWP 2013 "ASP Part"

….ASP 1: Methods and processes for safety-relevant embedded systems

- A model-driven process for the compositional development of safety and security for critical global multi-systems/system/distributed system/ system of systems including multi-physics systems for rapid qualification or certification and rapid re-qualification or re-certification after change (considering safety standards, such a DO 178 B, DO 254, IEC 61508, and ISO 26262..)
- Manage variability and ensure support to product lines development.
- Develop system engineering ontology capabilities in order to support a system engineering approach and conduct multi-views concurrent engineering activities
- Security and safety analysis methods for autonomic security management of embedded systems fostering connection to the Internet
- Processes, methods, techniques and tools to support SoS design (trade-offs between autonomy, evolvability, resilience vs. predictability, dependability), and certification.
- A European Reference Technology Platform, embodying meta-models, methods, and tools for safety-critical hard-real-time and/or mixed criticality system development.
- A European Tool Platform dedicated to reference system architectures (as developed in ASP5, targeting one or more application domains).
- Strengthening the European ecosystem of tool vendors: including requirements management, design support, formal analysis, design space exploration and virtual prototyping, early validation, product line support, incremental certification.

AWP 2013 "ASP Part "

….ASP 2:Embedded Systems for Healthcare and Wellbeing

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

- Product innovation and technological breakthroughs in a number of research aeras.
- Provide integrated healthcare solutions for hospitals, clinics and health centres.
- Improve system qualities such as performance, reliability, interoperability,..
- Develop and deploy advances in ES - also in the area of telemedicine, including , tele-monitoring, and tele-surgery, lighting and displays for immersive environment.
- A reference architecture and design to support these system qualities demanding decisions on multi-objective trade-offs, involving real time behaviour, power consumption, cost, accuracy and speed with advanced modelling support and simulation techniques
- distribution and interoperable, dynamically configurable networks obeying latency, bandwidth security and privacy and allowing massive reliable medical (image) data processing, and distributed control systems;
- automatic optimisation of resource usage at system level
- provision of sensors and actuators, that are compliant to interoperability standards;
- safe and secure ambient identification and authentication - multi system integrated workflows; a stable, robust and extendable standard format for medical
- Link to ASP 8: Human Centred design.

AWP 2013 "ASP Part "

….ASP 3: Embedded systems in Smart environments

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

- a common, multi-domain architecture
- standards for interoperability in smart environments
- Interaction model between horizontal and vertical activities, to assure proper tackling of the interoperability and cross-domain issues
- infrastructure requirements to support new interaction and interface concepts (e.g. goal-based user-environment interaction, and automatic triggering of services with non-explicit requests)
- Environment representation language to support interoperability and reasoning
- Development tools for multi-device and shared resource applications
- Semantic platform specification

AWP 2013 "ASP Part "

….ASP 4:Embedded Systems for manufacturing and process automation

The objectives:

- Improvement in instant access of virtual dynamic factory, real time sensing and networking; support maintenance decision making, orchestration of flexible production and distributed manufacturing– automation system security and safety.
- automation model life cycle management IP everywhere, middleware nowhere on-line real time quality assurance of measurement data
- robustness of sensor and actuator technology, e.g calibration, energy harvesting, disposability
- automation system human user interface context awareness and information timing
- automated device configuration

Projects should contribute to one or more of the following (new requirements):

- Architectures for exchanging large data streams between a limited number of nodes in a networked environment.
- new interfaces to allow manufacture of the network components to design products that can be integrated seamlessly with the components of other suppliers
- Novel services propositions

AWP 2013 "ASP Part"
….ASP 5:Computing platforms for embedded systems

Projects should contribute to one or more of the following objectives (extract):

- sharing and scalability of computing resources and data in complex distributed and heterogeneous approaches supporting real time awareness, safety, privacy protection, cyber-physical (sensor data) and Systems of Systems. Real-Time focus, including cloud and High Performance Computing in the loop.
- establishment of a common multi-domain methodology (in relation with ASP1) architecture, APIs, and design tool platform for advanced homogeneous or heterogeneous multi-core and many-core – distributed or not – compute elements (ECU) ensuring security and safety.
- definition of performance & resource management models, meta-data and system layers in order to achieve global performance (including energy efficiency), resource optimization and management, quality of service (or graceful degradation), redistribution of functions in case of overload or failure, statically or dynamically during operation.
- development of design tools and associated runtime, including hypervisors to enable composability;
- Design methods, techniques and tools that reduce the energy consumption of systems and systems of systems.
- enhancing virtualization techniques (supporting tools, software, OS, hardware) to support multiple OSes on the same hardware, allowing multiple criticality (including real-time criticality) on the same hardware and providing multiple safety levels.

AWP 2013 "ASP Part"

….ASP 6:Embedded Systems for Security and Critical Infrastructures Protection

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

- definition and implementation of a common conceptual framework and design flow from requirement to physical hardware or executable software to address the requirements for security, privacy and dependability in combination with other non-functional requirements like safety.
- trusted service platforms supporting the governance of the Internet of Things and enabling seamless and secure interactions and cooperation of ESs over heterogeneous communication infrastructures;
- trusted platforms for secure embedded systems connecting hardware security and software security measures and enable separation of different applications to reduce system complexity and enable coexistence of security critical and standard applications;
- flexible communication protocols that enable trade-off between performance (latency, jitter, throughput, etc.) and security parameters (determinism, reliability, security, etc.);
- principles and methodology for specifying and implementing a dynamic security policy for federations of large networked embedded systems, dynamically composed by unmanaged devices, and incorporating spontaneously co-operating objects and ad hoc networks

AWP 2013 "ASP Part"

….ASP 7: Embedded Systems supporting sustainable urban life

- **NOT open**

AWP 2013 "ASP Part"

….ASP 8: Human-centred design of embedded systems

Projects should contribute to one or more of the following specific objectives (new –extract):

- Object recognition, scene analysis and classification, image stabilisation, ego motion compensation (as in compensation for movement of camera),
- image processing using high performance processors which could combine many core processors and FPGAS for high definition/high frame rate image processing
- cognitive assistant (e.g detecting movement and identifying objects behind/out of field of view and alerting human) that could be combined with wearable cameras, while insuring image privacy aspects especially for high definition images
- Develop and assess through real-life experiments new methods and tools for the design of innovative interfaces between complex embedded control systems and human operators responsible for their operation.
- cross-domain reusable technology to synthesize "intelligent" multi-modal HMI; using architectural design patterns for efficient HMI development.
- cross-domain technologies to analyse the effectiveness and economy of interaction with "intelligent" multi modal HMI designs by predicting human behaviour;
- agile model-based HMI prototyping taking into account multi-modal interfaces and the need for allocation of capabilities between "presentation layer" and "data management layer";
- towards naturalistic and empathic (the machine feels what the operator needs) interaction with complex machines taking into account operators' emotional states
- technologies for un-intrusive measurement of operators' cognitive and emotional states for real-time adaptation of the human-machine interaction including the level of automation

AWP 2013 "ASP Part"
….*Proposal for* coverage and content

- Chapter 4 **Requirements**
  - 4.1 General
  - 4.2 Contribution to the ARTEMIS targets
  - 4.3 Expected impact : knowledge sharing
  - 4.4 Technology vis-à-vis Application
  - 4.5 Co-operation
  - 4.6 Evolution of markets and market environment
  - 4.7 Standards & Regulations
  - 4.8 Innovation environment
  - 4.9 Contribution to the tool platform
  - 4.10 **Contribution to the repository**
  - 4.11 Project duration: not longer than 3 years (end 2017)

AWP 2013 "ASP Part"
….*Proposal for* coverage and content

- *Section 6 : Eligibility and Evaluation criteria*
- Five criteria - Each criterion scored out of 10.
  - 1. Relevance and contributions to the objectives of the Call.
  - 2. R&D innovation and technical excellence.
  - 3. Science and Technology (S&T) approach and work plan.
  - 4. Market innovation and market impact.
  - 5. Quality of consortium and management.

Weighting
20 points

- 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 sum of the five individual scores, is 40.

Update of AWP AIPP for 2013 Call
……*Main changes*

Changes from AWP2012 to AWP2013:

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

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Update of AWP AIPP for 2013 Call

- exclude topics covered by 2012 projects to stimulate focus.
  - *AIPP1, 4 and 6 are closed*
- Foster the concept of test beds or living labs to facilitate involvement of customers/ end user in the R&D
  - *Concept of test beds and living labs are in: page 7*
- KPI: added in the general requirements 4.2 : page 19

AWP 2013 "AIPP Part" Skeleton Structure

- Specific requirements for "Innovation Pilot Projects"
  - Industrial Priority to be addressed : are described in parg."Objectives"
  - R&D and Innovation challenges
  - Overall strategy of the work plan-[logical phases of the implementation including prototyping, validation, certification ..)
  - Expected Outcome : Market innovation and market impact
  - *Resources needed (size xxx M€/…specific investments…) and duration*
- General Requirements
- Eligibility and Evaluation Criteria

AWP 2013 "AIPP Part "

Societal and Economic Context

- **Fulfil ARTEMIS high level targets: achieve a world class position in Embedded Systems thus implementing the SRA research topics and challenges**
- **Maximize the use of the available budget**
- **Foster the concept of "KET pilot lines"; adapted to Embedded Systems paving the way to the coming FP8 /Horizon 2020.**
- **ARTEMIS Innovation Pilot Project Based on selected and focused domains**
  - Innovative Integrated Care Cycles.
  - Seamless Communication & interoperability- smart environment (the neural system of society).
  - Computing platforms for embedded systems.
- **Sustain the road-map approach**
  - The "ARTEMIS Innovation Pilot Programmes" are set-up to fulfil the MASP 2013
  - Build on ARTEMIS Projects **portfolio** and their **results**

AWP 2013 "AIPP Part"
Sustaining the ARTEMIS Innovation Environment

ARTEMIS Innovation Pilot Projects are expected

- Creating new business innovating eco-systems,
- Efficiently using Public, Private Partnership in the Embedded Systems arena to overcome the resource deficit for R&D and foster innovation & collaboration in Europe,
- Aligning implementation of R&D&I priorities in Europe to turn European "diversity" into a strength,
- Achieving a "European Dimension" by combining the R&D efforts across Europe 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, setting and sharing of R&D&I infrastructures.
- providing market driven solutions based on prototypes and demonstrations,
- Pooling industrial resources to foster synergies between various environments, to keep leadership position in traditional markets, and gain worldwide positions and more market in new areas.

AWP 2013 "AIPP Part"

- *AIPP 1: Critical Systems Engineering Factories : not open*
- AIPP 2:Innovative Integrated Care Cycles.
- AIPP 3: Seamless Communication & interoperability- smart environment (the neural system of society).
- *AIPP 4: Production and Energy System Automation: not open*
- AIPP 5: Computing platforms for embedded systems.
- *AIPP 6: "Intelligent-Built" environment and urban infrastructure for sustainable and "friendly" cities: not open*

AWP 2013 "AIPP Part"

…AIPP1 : Critical Systems Engineering Factories

Not open

AWP 2013 "AIPP Part "

…AIPP2 : Innovative Integrated Care Cycles

Diagnosis → **Treatment** → Management → Surveillance

… to care pathways, team coordination,

and connected workflow solutions.

AWP 2013 "AIPP Part"

…AIPP2 : Innovative Integrated Care Cycles

Innovation Areas covered by a Care Cycle e.g. Cardiac

Screening and early detection

Enabling early noninvasive screening and risk stratification of asymptomatic patients.

Discovery to treatment

Reducing time to treatment for acute patients. Providing crucial decision support to diagnose each unique condition.

Minimally invasive interventions

Innovating minimally invasive procedures for an ever-expanding range of cardiac conditions.

Chronic disease management

Enabling the management of chronic conditions in care settings outside the hospital.

AWP 2013 "AIPP Part"

…AIPP 2 : Innovative Integrated Care Cycles

- Sensor Networks:
  - Sensor (body) area networks
  - Sensor Fusion
  - 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, past surgeries DB, Reasoning engine, real-time image info guiding the surgery + augmenting reality systems.
  - Patient data and Medical data fusion
- Middleware
  - Semantic Interoperability middleware among heterogeneous smart devices
- Embedded systems & devices
  - Catheters, pace makers, diagnostic equipment
- Workflow management and support

AWP 2013 "AIPP Part"

…AIPP 3 :Seamless communication and interoperability - Smart environments: the Neural System for society

This program targets is 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.

AWP 2013 "AIPP Part"

...*AIPP 4 :* Production and Energy Systems Automation

Not open

AWP 2013 "AIPP Part"

…AIPP 5 :Computing platforms for embedded systems

The objective of AIPP 5 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 utility in the aerospace, automotive, medical, and industrial domain and thus strengthen the competitiveness of the European Embedded System industry.

Open challenges are in:

- Security in MPSoCs : secure operation , secure maintenance, security building blocks, IP protection
- Active diagnosis in MPSoCs : certifiable methods for active diagnosis, in safety critical applications, non-intrusive observation between IP cores, detection/analysis of errors.
- Integrated resource management: algorithms, with holistic view of different resources- and continuity of services during reconfiguration
- Internet Integration of MPSoCs : Hierarchical naming /mapping enabling smart objects identification
- Tool environment: Model driven component based development – non-functional properties-platform independent

AWP 2013 "AIPP Part"

…AIPP 6 : "Intelligent-Built" environment and urban infrastructure for sustainable and "friendly" cities

Not open

AWP 2013 "ASP Part "
….Proposal for

- ***Section 6 : Eligibility and Evaluation criteria***
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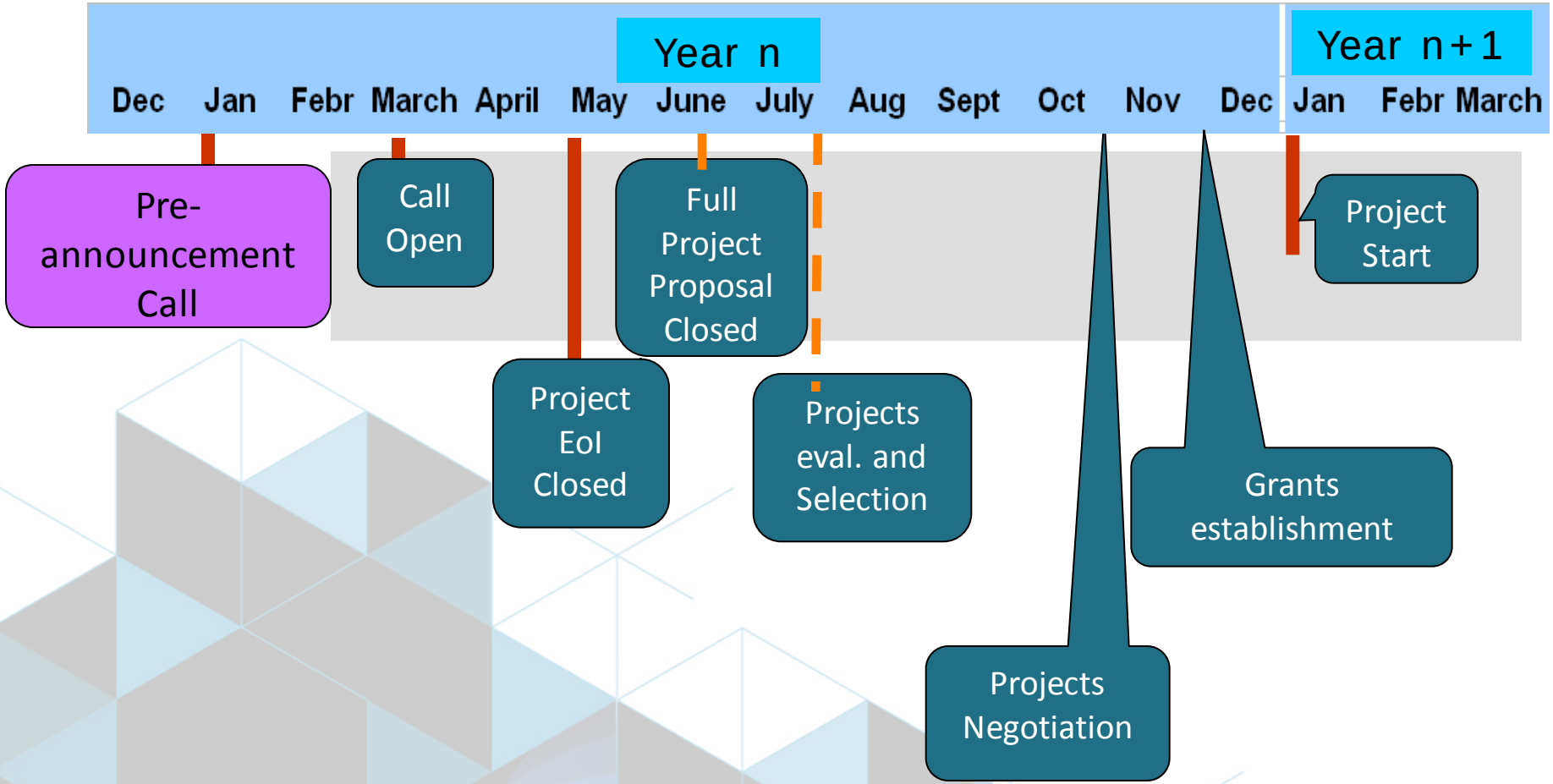
AWP 2013 "AIPP Part"
….Proposal for

- ***Section 6 : Eligibility and Evaluation criteria***
- Five criteria - Each criterion scored out of 10.
  - 1. Relevance and contributions to the objectives of the Call.
  - 2. R&D &I and technical excellence.(state of practise; previous projects, pilot description)
  - 3. Technological solution for Innovation and work plan.(demonstration ; co-creation)
  - 4. Market innovation and market impact.(innovation process; end-users; eco-systems;)
  - 5. Quality of consortium and management. (eco-system; critical mass; tangible and intangible resources)
- The overall threshold, applying to the sum of the five individual scores, is 40.

Tentative Schedule

- submission process
- Provisional dates :EoI end April/ FPP mid June 2013



Thank you for your attention!

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