



ARTEMIS: Intelligence on the Spot

Advanced **R**esearch & **T**echnology for **EM**bedded Intelligence and **S**ystems

Digital convergence by emancipation of data, building embedded intelligence to every place, and the internet revolution, are the opportunities of our time. These will change the way we live as citizens of the new knowledge based society and do business in the new digital economy.

Networked Embedded Systems are THE NEURAL SYSTEM OF SOCIETY. Embedded Systems pervade all artefacts of life, from children's toys and mobile phones to space probes and from transportation vehicles to healthcare systems. In fact, Embedded Systems will be part of all future products and services, providing intelligence on the spot and capabilities to clever connect to the abundance of systems in their environment, either physical or at cyber-space level, in real time.

These connections can be direct or via a network, such as the Internet. In this sense, Embedded Systems form the edges of the 'Internet of Things' bridging the gap between cyber space and the physical world of real 'things', and are crucial in enabling the 'Internet of Things' to deliver on its promises. In fact, Embedded Systems are the technologies that make the future Internet work, full stop.

By nature, internet communication cannot be expected to provide the same quality as dedicated Embedded Systems networks. Therefore Embedded Systems must be made more autonomous and robust to compensate for the reduced real-time and reliability guarantees, operating dependably even in the presence of network degradation or temporary failure. The safe and secure operation of such increasing complexity will impose huge challenges on design, operation and interoperability of Embedded Systems, be it in software, electronics, sensors, actuators or a combination of those.

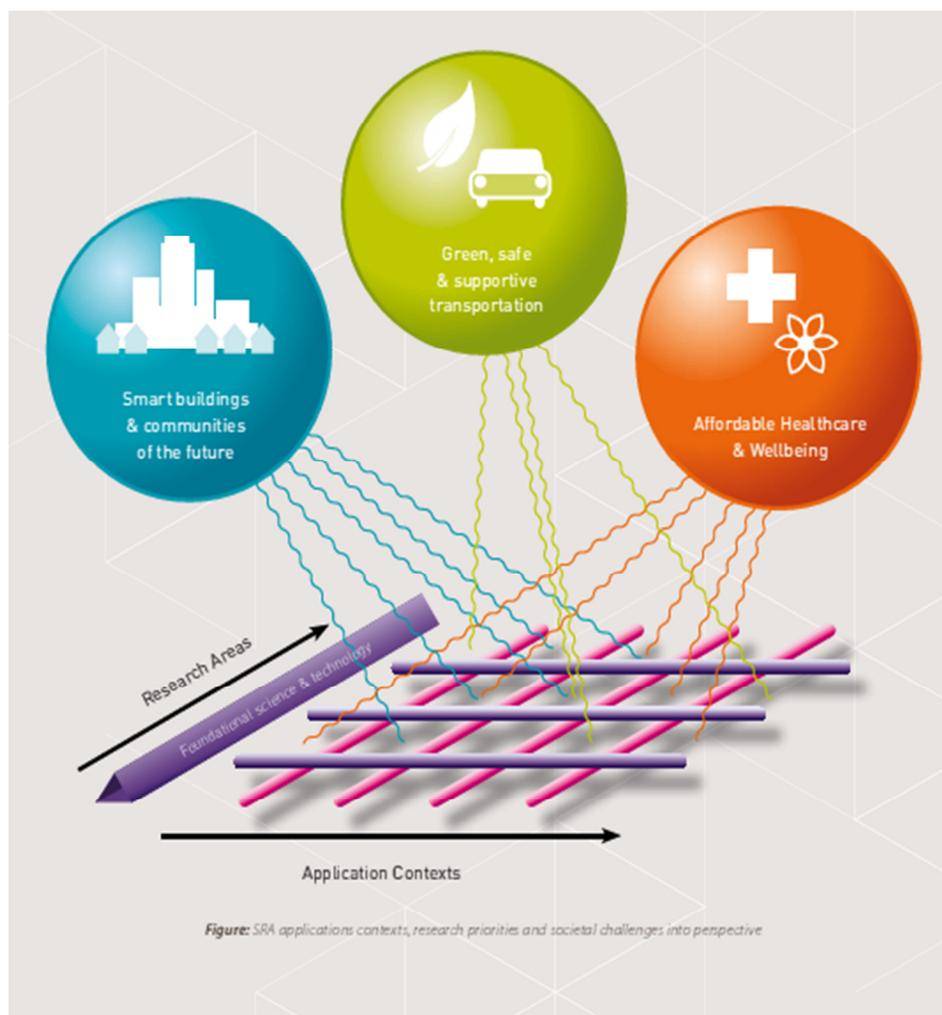
Embedded Systems, also referred to as Cyber-Physical Systems, become part of bigger systems in a world of 'systems of systems'. This imposes even larger challenges on the functionality of Embedded Systems.

Internet connected intelligent embedded systems will provide the core of solutions for the big societal challenges like affordable healthcare and wellbeing, green and safe transportation, reduced consumption of power and materials, reduction of food waste, smart buildings and communities of the future, and an imminent lack of natural resources. Such solutions to our pressing societal challenges will spur on European competitiveness.

Europe can address these challenges by using its sophisticated Embedded Systems Research and Development resources in industry and research institutes if coordinated well and if funded adequately. In a global world EMBEDDED SYSTEMS are a crucial KEY ENABLING TECHNOLOGY for Europe's industrial and societal future, and one that must not be underestimated or overlooked.

ARTEMIS, through its Industry Association (an active 200+ member community), takes the lead to set the Embedded Systems scene with its pan-European Strategic Research Agenda 2011 and by its Joint Undertaking with R&D projects that are co-funded by private project consortia, the ARTEMIS Member States and the European Commission. The ARTEMIS industrial priorities are basis for new value chains and aim at big-impact and quick-to-market business ecosystems providing efficient, inclusive, and trustworthy solutions for the industrial competitiveness and the societal grand challenges of Europe.

The ARTEMIS SRA 2011 points to a series of technical issues that should be resolved within the next decade. First, those issues related to foundational science and technology; second, those related to the application contexts; and third, those encompassing societal challenges (see ARTEMIS SRA 2011: <http://www.artemis-ia.eu/publications>).



ARTEMIS highlights two parallel sets of industrial driven research objectives to help resolve the above:

- Technical solutions that form the basis of developing the pre-competitive industrial goals, by attacking the complexity of new systems through improved designs and implementation processes and tools
- Research into technology that will offer completely new solutions to the technical barriers that hinder progress towards the application context's goals

ARTEMIS aims to establish a new, holistic approach to Research, Technology Development, Innovation and skill creation in Embedded Systems, by means of innovation ecosystems. This will increase the efficiency of technological development and, at the same time, enhance the competitiveness of the market in the supply of Embedded Systems technology.

Apart from the funded projects that are carried out under the umbrella of the ARTEMIS Joint Undertaking and that are R&D oriented, the ARTEMIS Industry Association is active in the field of Design Environments, Standardisation, Results Repository and Innovation with a number of very active working groups formed by voluntary members of industry and research institutions. Furthermore, the ARTEMIS Industry Association issues a label for recognised established Centres of Innovation Excellence on Embedded Systems (CoIE) as well as for Tool Platforms to boost the chances of good ideas and sound concepts becoming successful products and services in the market. Also, education and training on Embedded Systems is an integral feature of the ARTEMIS approach because it is people who, at the end of the day, have to take an interest to improve the effectiveness and reliability of the highly complex system of Embedded Systems and their interconnectivity.

Europe, with its world class automotive, aerospace, communication, and medical equipment industries, still has an excellent position in Embedded Systems, which play a key role in enhancing the capabilities, availability and usefulness of these products. Only through adequate coordination and collaboration and with the help of public funding can this position be maintained to help solve the enormous societal challenges and, at the same time, spur European competitiveness in many areas. ARTEMIS is a key player in achieving this essential element for Europe to maintain its competitiveness in 2020.

A successor programme, following the final call of the current ARTEMIS Joint Undertaking programme in 2013, is essential if Europe is to achieve the level of competitiveness needed to keep it ahead in the global race for ICT based solutions to societal challenges as targeted by the European Digital Agenda.

The vision of ARTEMIS is that indeed mankind will benefit from a major evolution in our society whereby our world is widely supported by intelligent Embedded Systems. Life in our society, along with security and safety, will increasingly depend on Embedded Systems technology as the NEURAL SYSTEM OF SOCIETY. The inherent invisibility of these technologies must not hide the need for the resources that are essential for this technology that is a KEY ENABLER in its own right.

For more information see: www.artemis.eu for ARTEMIS general, www.artemis-ia.eu for ARTEMIS Industry Association; www.artemis-ju.eu for ARTEMIS Joint Undertaking and <http://www.artemis-ia.eu/publications> for ARTEMIS SRA and other publications.