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## ARTEMIS magazine - June 2013

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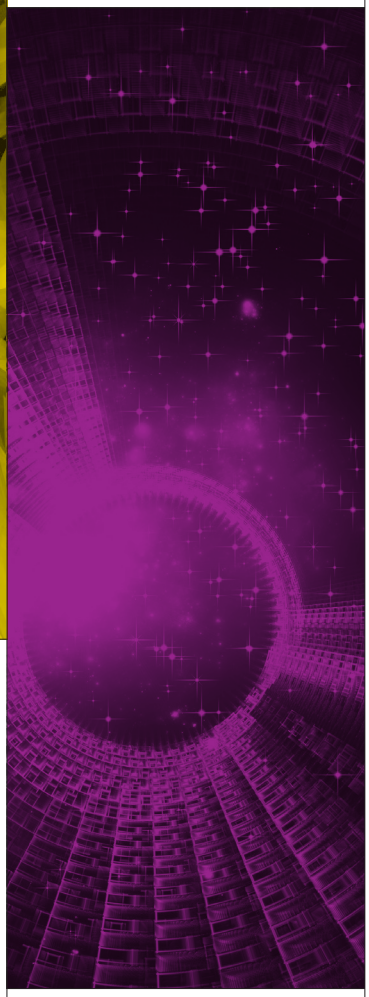


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## FOREWORD

**Jan Lohstroh**
*Secretary General*
ARTEMIS Industry Association

Dear ARTEMIS Friends,

Firstly, I'd like to thank Eric Schutz for his stimulating and dedicated leadership in ARTEMIS as Executive Director of the ARTEMIS Joint Undertaking. We now know that, due to rules of the European Commission, Eric is being forced to retire from his position in July of this year, when reaching the age of 65. It is unfortunate that this rule of the European Commission is being so strictly applied, when European citizens are increasingly supposed to work until 67. Still, we hope that Eric will be allowed to continue supporting ARTEMIS in an advisory role in one way or another.

We are happy that the General Assembly of ARTEMIS-IA has elected Heinrich Daembkes as ARTEMIS-IA Steering Board member and that subsequently the ARTEMIS-IA Steering Board has elected him as President, being the successor of Klaus Grimm. Heinrich, who started in the second week of this year, has already shown a lot of energy and leadership in getting involved in the many meetings related to the set-up of the new Joint Undertaking.

The subtitle of this issue of the ARTEMIS Magazine is "Working for the future", as we are in the middle of many activities in preparation of the new Joint Undertaking on Electronic Components and Systems, in which ARTEMIS-IA, AENEAS and EPoSS are to be the private members.

Of course we can only build a successful follow-up Joint Undertaking when the current one is a success and it is with pride that we presented the ARTEMIS Book of Successes (of those projects that have been finished) at our Spring Event earlier this year. In this issue of the Magazine we have articles on the ARTEMIS Book of Successes and on this year's Spring Event. We also present an introductory article on CRYSTAL, one of the first ARTEMIS Innovation Pilot Projects that is now in its start-up phase.

Looking to the future cooperation with AENEAS and EPoSS in one Joint Undertaking, my colleagues from AENEAS and EPoSS and myself have been interviewed together by Chris Horgan, while Eric Schutz has written an article with the title "Time for Change".

An interesting contribution comes from Manfred Broy, one of the leading scientists in Germany on Embedded and Cyber- Physical Systems, with the title "Cyber-Physical Systems: Concepts, Challenges, Foundations". This article is followed by statements of Heinrich Daembkes: "The vision & mission of the new president of the ARTEMIS Industry Association", and an overview by myself on "Work in Progress, Building on the new Joint Undertaking".

Finally you can read more on ARTEMIS JU news and this time's "Baton Blue" is by Josef Affenzeller.

I wish you an enjoyable read.

Jan Lohstroh

## FOREWORD

**Eric Shutz**
*Executive Director*
ARTEMIS Joint Undertaking

Dear Friends,

2013: the year of the last ARTEMIS Call. It's now time to look back! What did we achieve up to now? What can we be proud of?

Well, when we look back we can see that the ARTEMIS Programme has been a long road to successes, a long road paved with success stories! Yes, it was a long road. It took four years, from 2004 until end of 2007 to prepare the ARTEMIS Joint Undertaking, and now, at the beginning of 2013, we have six years of fantastic collaboration behind us: a unique collaboration between all stakeholders of the Embedded Systems world, from the main European Large Enterprises, the most dynamic and promising SMEs, the most famous European Universities and Research Institutes, to most of the Countries in the European Union, and the European Commission.

After 5 yearly calls, and more than 50 projects - some of them already finished, some others just about to start - we can be proud of the results already achieved. In the 'ARTEMIS Book of Successes', released at the recent Spring Event in Brussels, you can read and understand more about why we can be so proud of these ARTEMIS achievements. The projects in today's portfolio are the foundations of the global ARTEMIS construction. They will give you an idea about what this global construction will look like in five years from now on.

I'm absolutely convinced that, when observers and analysts will look at the ARTEMIS programme at the end of this decade, they'll conclude that ARTEMIS has been a unique programme

> ARTEMIS is the largest R&D effort ever for Embedded Systems for Safety Critical Systems
> ARTEMIS has been the largest programme ever, focused on Multi-core Technology
> ARTEMIS has created the AIPPs, the largest pilot projects on Embedded Systems, with the largest number of participants, addressing key societal challenges

So, I wish that you'll enjoy the reading of this Magazine and that you'll read the ARTEMIS Book of Successes, the first chapter of the Embedded Systems Saga, in the 21st century.

Eric Schutz

# THE ARTEMIS BOOK OF SUCCESSES

## LEADERSHIP IN EMBEDDED SYSTEMS

Written by Chris Horgan

In his preface to the ARTEMIS Book of Successes, the ARTEMIS JU's Executive Director, Eric Schutz, referred to the 'long road paved with success stories … six years of fantastic collaboration between all stakeholders of the Embedded Systems world, from the main European Large Enterprises, the most dynamic and promising SMEs, the most famous European Universities and Research Institutes, to most of the countries in the European Union, and the European Commission.' This record of achievements reveals the remarkable merits of the unique programme that ARTEMIS has been since its inception in 2007:

> the largest R&D effort ever for Embedded Systems for Safety-Critical Systems.
> R&D activities focused on projects addressing the main societal challenges of the beginning of this 21st century, from the health issues of our ageing society to electro-mobility in our evolving cities, energy management in our homes and offices, and so many other challenges impacting our daily life, and the future life of our children.
> the creation of new Centres of Innovation Excellence, changing the way European stakeholders collaborate.

Echoing the remarks of Eric Schutz, Heinrich Daembkes, the new President of the ARTEMIS IA, revealed the pride and privilege he felt in 'experiencing at close quarters many of the successes that have been achieved by what has become a real European community for Embedded Systems.'

The success of the JU approach is evident in how private and public sectors have been brought together in such a large-scale way. With the presence of an industry association and the community around it, the effect is much broader. In addition, the ARTEMIS model has member state participation on the funding side. This has a key impact on two areas: the project footprint is significant, with an average country participation rate of seven for a single project, and SME participation is huge – half of the participants in ARTEMIS projects are SMEs, which are benefiting considerably from their participation, with a positive knock-on effect in terms of employment and business prospects in and for Europe. This is attributable to the tripartite approach of the joint undertaking and the presence of an industry association. The legacy which comes from this can be found in the community that has been created and the CoIEs that will continue into the future.

The Book of Successes bears testament to what has been achieved. Achievements that are the result of the combined effort defined by all the stakeholders whereby the best available resources specifically on embedded systems have been brought together to achieve the focus that makes a difference and puts ARTEMIS in the driving seat for the European Embedded Systems community.

## AN OVERVIEW

The Book of Successes is an unabashed volume of successes, 130 pages long. All we can do here is to provide a kind of 'tourist leaflet' of interesting facts and features. Nothing, of course, beats reading the real thing!

The book provides both a background to and rationale for the projects and their achievements, looking back through the "Building ARTEMIS" document when a high-level group of industry leaders identified the path towards establishing a Joint Technology Initiative through to the unequivocal successes – Innovations (with a capital 'I'), collaborations, reference technology platforms like CESAR, CoIEs (Centres of Innovation Excellence) and the new downstream AIPPs (ARTEMIS Innovation Pilot Projects).

Furthermore, there is a focus on the criteria for success in the shape of the working group (WG) 'Metrics for ARTEMIS Success Criteria' created to define and monitor the achievements of the ARTEMIS JU Programme. The early successes of Embedded Systems Technology R&D for European Industry are revealed in the first ARTEMIS WG Metrics Report. A second round of questions In 2012 broadened the scope with the aim of measuring the success of the ARTEMIS programme and defining the steps to further improve and prioritise the programme. This second report reveals that collaboration within ARTEMIS remains very successful and has grown significantly compared to 2010, with the creation of new partnerships almost doubling and SME involvement considerably expanded.

## HIGHLIGHTS

Chapter 3 of the book examines the interactions between projects by putting projects into clusters based on their general application field. These clusters are:

> Safety and Reliability (HI-REL): CESAR, CHARTER, CHESS, SYSMODEL, iFEST, RECOMP, MBAT, pSAFECER, nSafeCer, DESERVE, VARIES, VeTeSS
> Energy Efficient Communities and Electric Car: eDIANA, ME3GAS, e-GOTHAM, ENCOURAGE, IoE, POLLUX
> Low-power Multicore: INDEXYS, SCALOPES, ACROSS, ASAM, SMECY, PRESTO, CRAFTERS, PaPP
> E-health: CHIRON, HIGH PROFILE
> "Things of Internet": EMMON, iLAND, SMART, SOFIA, SIMPLE, WSN-DPCM, DEMANES
> Sustainable Manufacturing: eSONIA, R3-COP
> Human Machine Interface (HMI): CAMMI, SMARCOS, ASTUTE, D3CoS)

Special mention has to be made of the CESAR project, which has delivered a great number of very valuable and innovative results in various areas. All of the results are documented to a very high standard and many of the results have been made public for the benefit of the embedded systems community (many of them are currently being accepted outside of the consortium). With an impressive number of real breakthroughs having been made, the project's main achievement is the CESAR Reference Technology Platform which has attracted interest from well beyond the boundaries of the project.

## ARTEMIS TOOL PLATFORMS

The introduction of the 'ARTEMIS Tool Platform' concept is a response to the need for trustworthy, interoperable tools from reliable sources with assured long-term support. These virtual platforms are sets of commonly agreed interfaces and working methods, which may evolve and become more refined over time, that allow specific tools addressing particular elements or phases of a design flow to interoperate with other tools addressing the same design goal, so forming a complete working environment. In its simplest expression, it is a specification for interfaces and operating methods. One such tool platform is the CESAR reference technology platform.

CESAR's specific focus was to improve the development processes in embedded system engineering in terms of new methods, processes and tools to meet new challenges imposed by, for example, the many new standards and requirements in the transportation and automation domains, especially in respect to safer and more environmentally-friendly mobility.

## SUCCESS OF CoIEs AND THEIR ROLE IN ARTEMIS COMMUNITY

Centres of Innovation Excellence (CoIEs) exist mainly to create new, self-sustaining businesses that, in turn, drive employment and social responsiveness, among other things. However, in order for CoIEs to be successful, they must comprise a range of actors in a suitable environment and nurture a culture of cooperation in which various forms of partnerships work across boundaries. EICOSE, the European Institute for Complex Safety Critical Systems Engineering, is one such CoIE. Its focus is strategic R&D alignment in the domain of safety critical systems engineering for transportation. Another CoIE is ProcessIT.EU, which targets manufacturing automation within the framework of the ARTEMIS JU, and the most recent addition to the CoIEs is ES4IB, the final stage in structuring excellent partners working together in different international projects related to the innovation chain in ICT for intelligent buildings.

## SMEs

The role of SMEs in European industry and in the ARTEMIS make-up cannot be overstated. But what does it take to be a successful SME in the ARTEMIS programme? Dr Stefan Poledna, co-founder of TTTech Computertechnik AG suggests that 'it is about technology leadership in a very focused area. TTTech has a clear mission and vision. We are providing electronic robustness for a more electric world. We want to be leading in the very specific segment, that for embedded networks and modular safety controls in markets that benefit from reliability and robustness. And with this clear focus we aim to have a very strong technology position, so we have strategic investments in R&D and technology. A key way to do this is through European funded programmes like ARTEMIS, which for us as an embedded systems company plays a vital role.' He goes on to say that 'there's no free lunch in life and that's very true for research as well. So if you want to participate in a research programme, you have to set up your organisation in such a way to be able to do that. You need to have people who take time to collaborate with ARTEMIS and other programmes, people who have know-how and are experts in their field.'

## ARTEMIS INNOVATION PILOT PROJECTS (AIPPS)

Two AIPPs are highlighted in this book – Arrowhead and CRYSTAL. Arrowhead is an innovation pilot project, which relates to the manufacturing, process and energy industries. Its aim is to find ways of improving communication between embedded automation systems, so-called Service-Oriented Architecture. The demonstration pilots will move the innovation closer and more quickly to the market while the exploitation plans of the industrial partners will have an impact on the market in terms of both quality and opportunity. CRYSTAL is a three-year innovation pilot project due to begin in May 2013. Its underlying goal is to accelerate the quest for interoperability. As an industry-driven, application-oriented project it will establish workflows based on current and emerging technologies and enable these workflows to be used in the industrial domain of the partners' engineering environment.

## BUILDING ON SUCCESS

In his closing remarks in the book, Heinrich Daembkes makes the point that while 'we are in a very good position and lead the technology in several domains, we must strive to keep our leadership and stay ahead of the competition. We will be able to do this through a joint effort between European and national endeavours, involving the entire chain from research in key enabling technologies through SMEs and their entrepreneurial role up to large enterprises that are able to put in the required investment and effort to tackle the new challenges. ARTEMIS has proven to be an excellent instrument to facilitate this cooperation among all these valuable partners.' The actual path the ARTEMIS Joint Undertaking and the Industry Association will take may not yet be evident, but Heinrich was very clear in his conviction that 'the strong ARTEMIS identity should remain and continue to exert its very positive influence on the promise and prospects of the Embedded Systems industry in Europe beyond its current mandate.'

# SPRING EVENT

## DEBATING DISSEMINATION OF PROJECT SUCCESSES

Written by Irene Lopez de Vallejo & Chris Horgan

**"Debate sessions within the ARTEMIS community are absolutely necessary to share, in a less structured format, best practices and collective achievements of the projects funded by the programme." Irene Lopez de Vallejo, debate moderator.**

The five panellists – Patrick Pype, Josef Affenzeller, Jerker Delsing, Jürgen Niehaus and Alun Foster – all brought a specific ARTEMIS perspective to the debate. Irene Lopez de Vallejo opened up the session referring to the essence of self-awareness about projects' successes to understanding the enormous effort put by the European Embedded System community within the ARTEMIS framework. The numbers provided by Metrics reports provide a framework to understand the performance of ARTEMIS under a number of key indicators (www.artemis-ia.eu/publications). Addressing the debate on this topic, Patrick Pype alluded to the David Bowie song Heroes, which he had been listening to on his drive in to the Spring Event that morning. He suggested that for the ARTEMIS community the lyric "We can be heroes just for one day" should be "We have been heroes for seven years already", a claim borne out by the Metric reports whose conclusions included gathering momentum, fully operational networks and the strengths of an industry-driven approach along with a good scientific-industrial mix. Among the concerns that were voiced were uncertainty about the future – whether funding, administration or governance.

## CoIEs AND RTPs

The next topic was Centres of Innovation Excellence, now becoming well established and considered a success factor. Jürgen Niehaus commented on the centrality of these CoIEs to the ARTEMIS roadmap-based programme and their role in funnelling the results of completed projects into new projects as a kind of multiplier. Josef Affenzeller chipped in, adding that "CoIEs are a unique selling point of ARTEMIS. They provide a link between research and industry, enabling companies to orientate towards the opportunities that scientific development can generate for business." The topic of Centres of Innovation Excellence threw up a number of questions from the audience and these were generally well fielded and clarified by the panellists.

The debate went on to consider the ARTEMIS Tool Platform, specifically the CESAR RTP, and Josef Affenzeller explained what the purpose of an RTP was. And Alun Foster underlined the need for the development of RTPs given the "weak position of Europe" in this area and the "lack of toll providers". The final area that came under the spotlight was the AIPPs (ARTEMIS Innovation Pilot Projects) and Jerker Delsing stepped up to the plate to talk about the ARROWHEAD project that is already gaining momentum. AIPPs are kind of large-scale projects that are closer to the market and can really have a significant impact on transforming public funds into real products and services that benefit society. Which is, after all, what ARTEMIS is all about.

## THE PERFECT OCCASION

Looking back on the debate, Irene Lopez de Vallejo suggested that while the debate stressed the successes, a number of colleagues felt that a number of failures and shortcomings of the tools and instruments outlined (CoIEs, Tool Platform, AIPPs...) could have warranted more attention. However, as Lopez de Vallejo points out, "Fair enough, but in my opinion the debate was the perfect occasion to challenge the speakers, an opportunity used by our Executive Director, Eric Schutz, who will be sorely missed by the most outspoken part of the community when he retires in July this year."

"The speakers all did a fantastic job presenting the initiatives that lead to a captivated and critical audience. The debate is certainly a good format to encourage participation although I would personally kill the internet connection in the auditorium since it is far too tempting to check your inbox and miss opportunities to engage in the community discussion, which is the most important purpose of ARTEMIS Spring Event: communal sharing of best practices and concerns."

## GLOBAL REFERENCE

The future is uncertain. Will there be an ARTEMIS Spring Event in 2014? No matter what, there was a general consensus that we should continue to work towards building a similarly successful annual event, together with our fellow communities in the wider Electronics, Components and Systems field, whereby the focus is on discussing, sharing and creating synergies between this burgeoning field and stakeholders. With one objective: to ensure that the future JTI ECS becomes a global reference for this field.

# CRYSTAL

## CRITICAL SYSTEMS ENGINEERING ACCELERATION

### CRYSTAL – a truly European dimension

Written by Horst Pflügl, Christian El-Salloum & Ingrid Kundner

**CRYSTAL as an ARTEMIS Innovation Pilot Project (AIPP) takes up the research results of previous Reference Technology Platform and Interoperability projects in order to enhance and mature them with the clear target of industrialisation take-up. Following the ARTEMIS mission to strengthen the European market for Embedded Systems, CRYSTAL fosters cross-domain reusability (Aerospace, Automotive, Health and Rail) and drive forward the Interoperability Specification towards standardisation. 71 partners from 10 European countries are cooperating in a 3-year project with a total investment of €82m to accelerate critical systems engineering – CRYSTAL – starting on 1 May 1 2013.**

*Figure 1: The CRYSAL Project Consortium*

*" Previous projects have generated precious raw diamonds – now we are in the phase of refinement, maturation and polishing to finally hold a shining crystal in our hands!"*

*Horst Pflügl,*

*CRYSTAL coordinator*

CRYSTAL as an AIPP project, is an exciting next step in the journey along the ARTEMIS project evolution. Having results from previous ARTEMIS projects like CESAR, MBAT and iFEST available, CRYSTAL is a challenging transformation from research into industrial application - challenging in terms of defining common objectives, topics and handling of consortium size.

## MARKET INNOVATION

CRYSTAL will exploit industrial domain-specific insights into embedded system design and safety processes to investigate and establish cross-domain synergies. Such a cross-domain approach fosters the exchange of knowledge between partners of different domains creating synergies and hence strengthening the European market. CRYSTAL will reuse the results of previous European and national projects to focus on the improvement and industrialisation of the Reference Technology Platform (RTP): CESAR[1], MBAT[2], , p/nSAFECER[3], SAFE[4], TIMMO-2-USE[5], OPENCOSS[6] … Additionally, CRYSTAL will push forward the Interoperability Specification (IOS) towards a European

standard and will stay in close contact with standardisation bodies like ASAM, OASIS, OMG, CENELEC and others in order to build on existing achievements and to join forces through collaboration in the standardisation process. The technologies provided in CRYSTAL together with the maturation of RTP and IOS will lead to faster development cycles including early validation of design concepts, thus allowing faster demonstration of the feasibility of these concepts.

## THE CRYSTAL CONSORTIUM

Creating and establishing a new standard on a large scale in an already consolidated market cannot be achieved by individual organisations. With a budget of more than €82m and 71 partners from 10 different European countries, CRYSTAL has the critical mass to accomplish this endeavour. The project consortium is made up of participants from all relevant stakeholders, including OEMs, supplier, tool vendors and academia, and will cooperate with established standardisation organisations.

## TECHNICAL INNOVATION

CRYSTAL has been set up as an ARTEMIS Innovation Pilot Project to establish collaboration schemes on a large scale and to speed up technology maturation cycles. Accordingly, the strategy for CRYSTAL technical innovation is based on 4 pillars:

1. Apply engineering methods to industrially relevant use cases and increase the maturity of existing concepts developed in previous projects
2. Provide technical innovations ("technology bricks") with high maturity to fill gaps identified in the use cases
3. Contribute to the Cooperative RTP and push the Interoperability Specification towards standardisation
4. Support SME integration into the embedded systems engineering ecosystem

Within and across the industrial domains Aerospace, Automotive, Healthcare and Rail, CRYSTAL will cover the entire software product life cycle and support product line development towards ready-for-use industrial tool chains.

## THE CRYSTAL USER DRIVEN APPROACH

Following the philosophy of the AIPPs, CRYSTAL focuses on verifying and improving the usability of project results already developed. With four industrial domains represented in this project, the user scenarios are manifold. The project has therefore developed a user-driven approach that is based on user stories, use cases and technology bricks. In this context, a user story describes a typical action pattern or work flow within an industrial domain. These user stories are used to describe general processes that are at too high a level to directly derive development requirements. Hence, the use cases are a further refinement of the user story and represent a concrete company scenario. The requirements for the Reference Technology Platform and the Interoperability Specification are derived from these use cases, leading to technology bricks to fill the gaps identified in them. Such a brick may be:

> a SW tool or product,
> a SW component to build a SW tool or product,

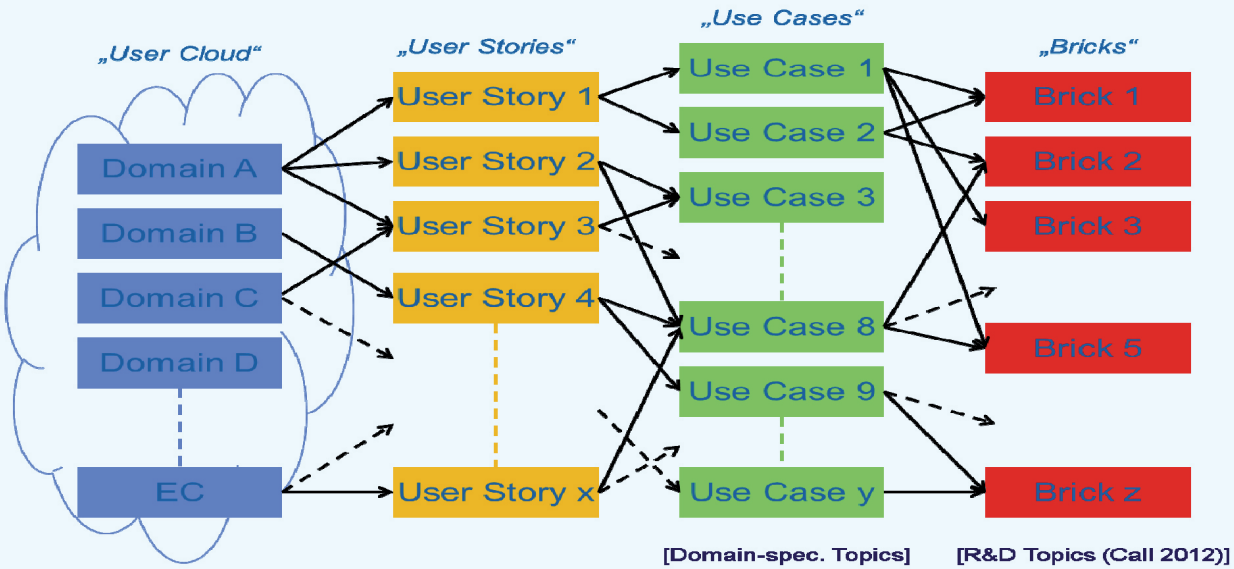


*Figure 2: CRYSTAL User Driven Approach*

> a systems engineering methodology,
> an interface or a standard or means for establishing interoperability that is needed for the efficient development of safety-critical embedded systems.

## CRYSTAL EXPLOITATION

CRYSTAL aims to reduce system design costs through the improvement and smart integration of system analysis, safety analysis and system exploration tools. In alignment with the RTP and IOS concepts, this leads to a reduction in development cycles and consequently a reduction in development time and effort. Two central topics of CRYSTAL are therefore (1) the further development of the Interoperability Specification towards a standard and (2) the maturation of integrated tool chains towards industrial application. Succeeding in the development of these two topics will lead to competitive advantages when applied and tailored to the industrial domain and company-specific needs. The CRYSTAL consortium represents a well balanced selection of relevant and important stakeholders in the European industry and research landscape, which will help to accomplish the ambitious objectives. During the project, a sustainability model will be developed that supports the handover of results to the ARTEMIS innovation ecosystem as well as to standardisation bodies that will enable and support further activities on the Cooperative RTP (CRTP) and the IOS. These concepts will further increase the flexibility for all stakeholders and have the potential to make a significant global impact on the market. OEMs can easily combine tools from different vendors, and tool vendors will be able to find new market opportunities in an open and extendable environment. The key elements for the integration strategy that CRYSTAL is following are sustainability, openness , communication and contribution to the ARTEMIS innovation ecosystem as well as cooperation with completed, on-going and future projects in the field of embedded systems engineering.

*CRYSTAL @ ARTEMIS Spring Event Press Lunch: http://vimeo.com/61879091*

*Acknowledgement: The research leading to these results has received funding from the ARTEMIS Joint Undertaking under Grant Agreement N° 332830 and from specific national programmes and / or funding authorities.*

[1] *www.cesarproject.eu*
[2] *www.mbat-artemis.eu/home*
[3] *www.safecer.eu*
[4] *www.safe-project.eu*
[5] *www.timmo-2-use.org*
[6] *www.opencoss-project.eu*

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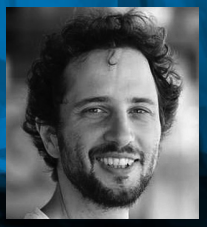

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# IN THIS CASE, THREE IS NOT A CROWD

**In an interesting and informal conversation, Marcel Annegarn (AENEAS), Wolfgang Gessner (EPoSS) and Jan Lohstroh (ARTEMIS-IA) swapped views and opinions on the initiative of the European Commission to arrive at a joint strategy in the field of Electronic Components and Systems. Food for thought and plenty of nutritious insight.**

*The European Council proposed an initiative to establish a new Public Private Partnership for Electronic Components and Systems with the aim of creating critical mass and bringing together the best minds in an essentially multi-disciplinary field. How can this aim be best achieved?*

**Jan:** If you look at projects, you already see people from the different areas collaborating and cooperating, so it is a logical step to bring the organisations under one umbrella to ensure that the best available expertise from each area is available for every project.

**Marcel:** Yes, it's about early identification of our strengths and about positioning Europe in such a way to make our industry strong and competitive. What you have to realise is that the scope of the projects is constantly expanding due to the complexity of the products and increasing integration occurring throughout the value chain. We need to bring together the best minds and achieve critical mass. Politically, too. If industry properly aligns with public authorities in a true partnership, it will become possible to create the context for Europe to compete against Asia and the US, amongst others.

**Wolfgang:** The new Public Private Partnership for Electronic Components and Systems will have three major advantages compared to the present situation: it will enhance the coordination of industry's R&D&I efforts, it will strengthen industry positions by forming a strong group that will act with a concerted approach, and it will lead to efficiency gains in management by putting three programmes under one administrative roof: nanoelectronics, embedded systems and smart systems.

*The initiative aims at a positioning along the innovation chain closer to product manufacturing to help European industry close the gap between research and innovation. What concrete measures will enable this to happen?*

**Jan:** The European Commission acknowledges that Europe has always excelled in R&D but lagged behind in terms of implementation and innovation. Horizon 2020, the successor to FP7, sets out to address this deficiency by now including funding on innovation and thereby getting R&D closer to the market and boosting the chances of successful products. The new joint undertaking will encourage large-scale innovation pilot projects. Once again, the contributions of the best minds from the different areas will be central to the success of such projects.

**Marcel:** We must remember that the target is to create wealth and jobs in Europe, and to do that you need a healthy industry. To improve the health of the industry, a continuum in innovation is required, starting with fundamental research and ending with the market introduction of a new product. In the recent past, the in-between aspect of pilot lines and pilot projects was neglected.

**Jan:** A good analogy to make here is the concept car. It's not always something that actually goes into production but it is a finished product that contains all the special features you want to demonstrate in a similar way that a pilot project is a demonstration of what is feasible.

**Marcel:** Or, in a more classical sense, an advanced manufacturing facility that enables you to make a small series run. Both are appropriate instruments. At the same time, fundamental research also needs attention and steering by the Industry. For instance, semiconductors are getting smaller and smaller and smaller. But where does it stop? What comes after this? This is a fundamental research question that requires a paradigm shift in thinking and the answer may shape the future of the industry.

**Jan:** And universities with their 'free minds' can sometimes come up with solutions that industry is unable to find. This may be the case with generating safety and security features that are completely reliable – error-free systems that cannot be hacked, for example.

**Wolfgang:** Talking about the innovation chain and overcoming the gap between research and product manufacturing means, of course, addressing R&D issues of higher technology readiness. At the same time, we have to be aware that higher technology readiness levels can only be achieved if an adequate basis is created through the preceding research steps. It is therefore indispensable that industrial relevance is established as the guiding principle at all TR levels.

*In working towards a global level playing field for the industry concerned and in making the European Union an attractive place for investment and high-quality/high-value added jobs, who will be affected (Industrial, RTO and Academic stakeholders, Member States and Regions), how will they be affected and how should they respond?*

**Marcel:** The semiconductor industry in Europe recently proposed a partnership to the European Public Authorities. From the industrial side, the intention was expressed to invest some 100 billion euros until 2020 in R&D addressing TRL levels 2-8. The Public Authorities have been invited to contribute not only in terms of funding (7 billion euros has been proposed) but also in terms of political, educational, fiscal and legislative support. We expect them to help create an attractive environment in Europe for our industry in order to boost our continent's attractiveness.

**Jan:** Looking at Embedded Systems in Europe, the industry is in a stronger position. But it is important for us to have a strong semiconductor industry in Europe because we are then less dependent on sources from outside Europe for the hardware.

**Marcel:** There are specific reasons why the hardware industry is lagging behind. Investment levels are very much higher than for the software industry so shareholders look to where they can get the best return on their investments – and Europe was not one of those environments. Taiwan, China, Singapore and even the US, on the other hand, are actively creating an attractive environment to invest. The result is industry withdrawal from Europe. This is a trend we need to reverse and this is our main goal for the proposed partnership with Public Authorities.

**Wolfgang:** The European Smart Systems industry is still very competitive in global terms and it possesses in Europe nearly all the necessary technologies and disciplines. It is characterised by high added value and a differentiated spectrum of a highly-skilled workforce, by innovative companies with more than 800,000 employees, and by efficient public research infrastructures. In a series of product segments – from driver assistance systems through security devices and components for medical equipment – European industry is still the global leader. However, other world regions are catching up, not least because governments are increasing their efforts to support. The new JTI should be considered a very important answer in ensuring European competitiveness in global terms.

**Jan:** And it is not just a matter of the industry but public authorities are also responsible for creating, for their regions, boundary conditions that are at least at international level for their industry to flourish; so to create a level playing field for the European industry.

*Europe is the home for several excellent academic laboratories and Research and Technology Organisations (RTOs), each of which covers rather broad domains of expertise with certain overlap and limited coordination. To what extent can a joint strategy for electronic components and systems resolve this situation?*

**Jan:** We do see, for instance, at brokerage events industry coming up with technical issues they cannot solve and looking to academic and research partners to help solve them while universities generate bright ideas and seek contact with industry to look at possible applications. This kind of collaboration and cooperation within a project is becoming more common, not just on a national but also on a pan-European scale.

**Marcel:** A recent initiative, called ENI2, sees industry and universities getting together on long-term programmes. A subsequent step could be the sharing of investments – R&D is expensive. My expectations of this initiative are high. Universities are one of our real strengths in Europe. Their scientific excellence is something we need to leverage.

**Wolfgang:** Broadness and overlap, which partly result from competition, are not per se a disadvantage. RTOs play a crucial role as technology service providers for industry and by that contribute significantly to European competitiveness. Their involvement in the new JTI will help them to even better understand industry requirements and to stay tuned to them.

*Marcel Annegarn*

*Wolfgang Gessner*

*Jan Lohstroh*

*In just a few sentences, describe your greatest hopes and fears for the future.*

**Marcel:** Europe is a wonderful place with such cultural diversity, a continent that is very environmentally-conscious, strong in the field of energy efficiency. If we can devote our software and hardware industry to solving such major societal challenges, then we can create a further boost. With a large proportion of elderly people, we are in an excellent position to develop ambient assisted living and medical technology. But we are hampered by the diversity of laws and legislation, so we do need politicians to help us out in that respect. There are ample opportunities, so let's not hold back.

**Jan:** I agree. We do have a wonderful continent with huge potential. We also have great education. But we do need to boost our entrepreneurial spirit and, of course, interest in technology among younger people. And we still have to deal with fragmentation that should not be a logical consequence of our great diversity.

**Wolfgang:** Global competition is a competition of systems wherein governmental policy plays a decisive role. First and foremost, it is a policy issue to provide appropriate conditions for keeping and attracting industry by offering favourable framework conditions for markets, by improving infrastructures – also in research by developing the educational system, by attracting skilled people and by an appropriate technology policy. I believe that Europe still has the basis and ability in the long run to be a leading world region in many aspects. The new JTI is an important contribution in this direction.

# ARTEMIS BROKERAGE EVENTS IN 2013

BY AD TEN BERG AND CHANTAL SCHOEN

**The 6th Brokerage Event for the ARTEMIS-JU Call 2013 took place on 15 and 16 January at the Sheraton Skyline Hotel, Heathrow Airport, London, UK.**

We welcomed 216 participants to the event that saw 33 project ideas discussed and elaborated as well as three new ideas for large AIPP projects. In total 9 breakout rooms were available to host the breakout sessions.

Many participants were attracted especially to the project ideas for AIPP2 (Healthcare technology) led by Philips, AIPP3 (Smart environments) led by Cassidian and AIPP5 (Compute platforms) led by Infineon. In some cases this led to very full and overheated meeting rooms. However, the interest level was and remained high.

Even the picturesque swimming-pool area with its large tropical trees was occupied by several discussion groups.

This year there was a healthy mix of participants from both large companies and SMEs as well as research organisations.

| | Call 2013 | Call 2012 | Call 2011 |
|---|---|---|---|
| **Large enterprises:** | 61 (35) | 50 (27) | 37 (26 ) |
| **SMEs:** | 38 (28) | 36 (32) | 39 (29) |
| **Research org.** | 48 (28) | 53 (32) | 55 (32) |
| **Universities:** | 59 (40) | 62 (35) | 90 (44) |
| **Non-Member:** | 47 (42) | 52 (48) | 58 (50) |

The table above shows the numbers of participants per category and the number of organisations they represented (in brackets).

Since 2011, there has been a substantial increase in the participation of large enterprises while SMEs remain well represented with participants from 28 companies. Besides the ARTEMIS-IA members, we welcomed 47 participants from 42 non-ARTEMIS-IA member organisations. Again the International level was high with participants coming from 18 countries, the largest groups being Spain, the UK, Finland, France and Germany.

After the introductory plenary meeting, where the draft AWP2013 was presented by the SRA co-chair Laila Gide, almost 20 fresh project ideas were introduced in a lively pitch presentation session.

The first round of discussions took place in a well-visited poster session in a separate room. Even during lunch many discussions continued there.

The second day started with an explanation of the Call2013 process by Alun Foster, Programme manager of the ARTEMIS-JU. Then an inspiring presentation of successes of ARTEMIS was made by Eric Schutz, Executive Director of the ARTEMIS-JU. Jan Lohstroh, Secretary General of ARTEMIS-IA finished this informative session by addressing the ARTEMIS-IA Future under Horizon2020, which will become reality after 1 January, 2014.

The final plenary session was held in the afternoon, where many enthusiastic coordinators showed the progress made in evolving their proposals.

This year, the ARTEMIS separate national Brokerages were held in London (December 2012), Paris (4 February) and Vienna (12 February) along with a joint local brokerage with ITEA in Brussels (4March).

morning was closed by Ad ten Berg and Chantal Schoen who introduced the ARTEMIS Annual Working Programme 2013 and the ARTEMIS Partner search services available.

In the afternoon, AIPP2 and AIPP5 were presented by Casper Garos (Philips) and Knut Hufeld (Infineon), followed by a lively discussion and several smaller project pitches on new project proposals. Various meetings were held during the event to especially involve French partners in both Innovation Pilot Projects.

## BRUSSELS, 4 MARCH

INNOVIRIS, IWT and Sirris hosted this first Belgium Brokerage event in the Ellipse Building, Brussels in which ARTEMIS and ITEA combined their strengths for a joint National Brokerage event. The purpose of the event was to show the potential of both ARTEMIS and ITEA programmes so as to

## PARIS, 4 FEBRUARY

67 participants attended the meeting at UbiFrance in Paris. After the welcome and introduction to ARTEMIS by Laila Gide, Steering Board member ARTEMIS Industry Association and Co-Chair Working Group SRA, the role of NCP and the importance of contact was explained by Fabien Terraillot of DGCIS.

Alun Foster presented the Call 2013 highlights and timeline, after which the gain good insight into the call process and work programmes of both ARTEMIS and ITEA, enabling highly innovative projects to be set up or integrated. In separate parallel sessions INNOVIRIS and the IWT explained their roles as partner funding agencies for these programmes. In an interactive session, PiCToR, the industrial research cluster, showed how it supports companies to integrate these funding programmes in their own global strategy or to transform their ideas into a successful project proposal.

Throughout the day several enterprises such as Barco and 3E presented their testimonial-based information about what it really means to be involved in a European R&D project. The event was a great success with 43 participants, lots of discussions and answers to many questions.

# LOCAL BROKERAGE

## WORKSHOP IN BRUSSELS

**The organising of a local brokerage event/workshop on 13 and 14 March in Brussels signalled a first for ARTEMIS, and yet another success. We asked two of the co-organisers – Nico Deblauwe of IWT, the agency for innovation through science and technology, and Mathilde Reumaux, EU policy and projects officer at INNOVIRIS – about their post-brokerage views.**

*Read more on page 27*

# ARTEMIS SPRING EVENT 2013

CRTP

CESAR CRTP

# ARTEMIS Spring Event 2013

# ARTEMIS Spring Event 2013

*This is the first brokerage you have organised. What was the specific reason to organise a brokerage now and why not before? Is there a specific reason for choosing to organise a local rather than a more global brokerage?*

**Nico:** Actually it was ARTEMIS-IA who asked us to organise a national brokerage. In the past we had not considered this option since there were many other channels through which the information found its way to the companies. Now, with the two-stage approach disappearing, with the consequence that proposals and topics have become less visible, we welcomed this event as a way of involving (once again) those players that are not part of the 'in-crowd' a bit more.

**Mathilde:** When ARTEMIS-IA and our Flemish colleagues suggested the organisation of a national brokerage event, we jumped at this chance to make ARTEMIS known amongst our regional enterprises. The organisation of such a national event was indeed a great opportunity to increase the enterprises' awareness not only of the programme in itself but also of the various assistance and support tools offered by the different regional and national actors to help them build up or join a consortium.

*How was the cooperation with ITEA established and are you likely to proceed further with this in the future?*

**Nico:** Well, we don't believe in just promoting one 'instrument'. For us ITEA and ARTEMIS are complementary and we have always favoured an approach where both organisations approach the industry hand-in-hand. So it felt right from the beginning to also involve the ITEA network in the brokerage. Additionally, as innovation funding is a regional matter in Belgium, we contacted INNOVIRIS, our colleagues from the Brussels Region, to give the event a Belgian dimension. Both IWT and INNOVIRIS are involved in ITEA and ARTEMIS, so this made a nice 2x2 square of opportunities.

**Mathilde:** ARTEMIS and ITEA have complementary topics and approaches and we thought promoting both of them in a single event would have several advantages. With this event, we could thus present a wider range of opportunities to our enterprises and research organisations, and so not only avoid the proliferation of information sessions but also meet the strategies of more attendees. Moreover, as many enterprises are, or could be, involved in both ARTEMIS and ITEA projects, gathering the information allowed us to present them with a more coherent and strategic scheme.

*What is the added value of a local brokerage?*

**Nico:** Well, it does allow questions to be asked in your own language, with a "real" local situation that is familiar. It also means that funding possibilities can be discussed directly from a concrete point of view rather than getting stuck on an abstract level, which sometimes tends to be the case. Also on the networking side, it is easier (for further use) to get to know fellow-countrymen with international experience and/or interests. This lowers the hurdles for further contacts.

**Mathilde:** Local events allow closer discussions and more personalised explanations and accordingly facilitate the understanding of the positive outcomes which can arise from the participation in European programmes. National or local events are also the best opportunity for potential future participants to discuss with more experienced actors and with regional project officers. This is particularly relevant for enterprises for which this event was a first contact with ARTEMIS and which may have been somewhat lost in the "jungle" of more global events. However, European-scale brokerage events have not been set aside and interested parties were encouraged to attend future events.

*What did the local brokerage generate for you and was it what you expected?*

**Nico:** There was a nice upswing, from both regions, and many stayed for the second part of the day (the real brokerage). The morning sessions (which were focused more on explaining the general contexts) were valuable, but could be improved a lot by stressing more promotional viewpoints and practical information, and paying much less attention to organisation-structure issues. But, all in all, it was a really good event (which is evident from the feedback we received) and now our minds are already turning to a second, improved edition next year!

**Mathilde:** We had a high turnout rate, got positive returns and, despite the (too) high amount of technical details that were communicated on, many participants showed a strong interest either in pursuing the European adventure or in taking the plunge. I think we can say that overall, for a first try, it was a success but there is a scope for further improvement!

# TIME FOR CHANGE

## FROM 'THINK BIG' TO 'THINK BIGGER'

WRITTEN BY ERIC SCHUTZ

**"Good morning everyone. To me falls the task of warming you up before and saying a few words about the ARTEMIS successes. We are at an important moment in time where the future of our community is being discussed. What I would like to do is to give you a kind of retrospective of ARTEMIS up till now and a view of what the future could hold heading towards the horizon of 2020." Words spoken by Eric Schutz due to the release of the ARTEMIS Book of Successes and his retirement.**

"This year is an important year, for two reasons. For all of us it is the final call and for me, personally, this is the year when I finally call it a day with ARTEMIS. And what next? What is clear is that on 1 January 2014 things will change. How they will change we don't know. The decision processes are all very complex. Just as they were in 2007. So before looking at what could happen, perhaps it would be instructive to go back to the beginning and look at what happened to get ARTEMIS off the ground.

## RETROSPECTIVE

"It was November 2006 that I first presented my vision of the world of ICT ETPs – from cross-application to application-specific in the contexts of the ARTEMIS, ENIAC and EPoSS joint undertakings. Even then, my slide predicted a merging of the efforts of the JUs. I hear certain people today surprised or even becoming anxious at the mention of the word 'merger'. But this was already in our minds back in 2006. It was already clear that there were synergies and overlaps between the three programmes. I remember that week before ARTEMIS was officially 'born' I passed on a message to my friends at EPoSS, where I had been a steering board member. And that message was: JTI or die. It wasn't a very popular message at the time but I was convinced that the only way forward for ETPs would be through joint undertakings.

"Our first call came in 2008, followed in 2009 by a second round of calls. It was in September 2009 that I became Executive Director of ARTEMIS and I recall saying that ENIAC and ARTEMIS were two sides of the same coin. In fact, my message was to work together and create self-sustaining innovation ecosystems for European leadership in nanoelectronics-based embedded systems. Each partner needs the other to achieve our goals.

"In 2010 another important event occurred, the first co-summit with ITEA2 in Gent. At the time I suggested a common annual event with ARTEMIS, CATRENE, ENIAC and ITEA2. I saw great benefits for both European industry and citizens if we could break down the walls and remove the barriers between the four programmes. I'm sure that this type of approach will emerge and be successful and that European industry will prove to the political world that such an investment is good for Europe, when we do it all together.

## STEPPING STONES TO SUCCESS

"But let's take a look at the situation today, after four calls. How does the portfolio measure up? What has ARTEMIS realised after two-thirds of the projects have been completed? Well, I try to imagine what people will see looking back in 2020. I believe that they will see three equally important monuments. They will see that ARTEMIS was the biggest ever programme to focus on safety-critical systems, that it contained **the largest multi-core technology programme and, in creating ARTEMIS Embedded Systems Innovation Pilot Projects, or AIPPs, these are the largest participation projects that target the key societal challenges.**

"So, how did we get from nothing to where we are today. The first phase, from 2004 to 2009, took us from the germ of the idea to actual projects, and the keys to this have been the Strategic Research Agenda and the ARTEMIS culture. And then came phase 2, from projects to clusters, which covers the period 2010 to 2011. The CESAR projects is a very clear example of clustering. Phase 3, from 2012, is the shift from clusters to AIPPs. And a time for change, from 'think big' to 'think even bigger'.

"It just rests for me to say thank you for all your support over these past years and for your continued support for just a few months more. And even though my tenure comes to an end this year, I hope I will be able to serve this community in many other and different ways."

## FINAL FLOURISH

The valedictory could not be complete without a final flourish. To Eric's surprise and joy, a spectacular serenade by a flamboyantly dressed dancer on stilts was the prelude to the presentation to him of the ARTEMIS Book of Successes, a publication that bears testimony to his considerable efforts over the years*. He received it in true Hollywood Oscar style by thanking his mother and sister and friends. And indeed everyone present, the community, who "are and will remain my family." Eric left the stage to very warm and heartfelt applause.

*see picture on page 25

# CYBER-PHYSICAL SYSTEMS: CONCEPTS, CHALLENGES, FOUNDATIONS

BY MANFRED BROY

**Cyber-Physical Systems are the step into globally integrated embedded software systems connected to data and services in global networks. They are the result of the combination of embedded system with cyberspace. Cyber-Physical Systems support real world awareness in the Internet and the access to global data and services by embedded systems. The engineering challenge for Cyber-Physical Systems is in the combination of characteristic properties of embedded systems such a real time, functional safety, dependability, closedness with characteristic properties of the internet such as openness, partial availability, restricted quality of service and reduced dependability.**

Introduction - Cyber-Physical Systems
The term Cyber-Physical Systems addresses a new type of system which is the result of an amalgamation of embedded software systems, connected on the one hand to their physical environment by sensors and actuators and to global networks such as the Internet with its data and services, on the other. Through Cyber-Physical Systems the Internet gets real world aware and embedded systems become location independent, connected on a global scale, and get access to global data and services.
In line with Moore's Law, ongoing advances in very large-scale digital circuits integration enable electronic components to become ever smaller, more powerful, and cheaper. As a result, devices and objects are increasingly equipped with "invisible" embedded systems connected directly to the physical world through a range of sensors and actuators, and that, consequently, can be deployed in a broad range of applications in ways allowing them to be controlled, monitored and networked. Global networks such as the Internet connect embedded computers, their data, their services and their applications. The drivers of change in connection with Cyber-Physical Systems are technology push and market pull – Cyber-Physical Systems are an enabling technology in the ambition (never ending hunger) for innovative functionality in a vast variety of areas of application.

## WHAT IS A CYBER-PHYSICAL SYSTEM?

The term system is widespread and is used with many different meanings. Below, we focus on the conceptual notion of system, as used in software and systems engineering.

Definition: System
A system (Greek σύστημα, systematic - literally, the structure, prepackaged, associated) is a set of related elements that interact in an organised way, to achieve and purposefully conduct a common goal.
The resulting characteristics of a system are its

> system boundary separating the system more or less clearly from its environment,
> internal structure,
> clear and usually dedicated interaction with its environment via its system boundary.

The system boundary is determined by the system interfaces through which the system interacts with the environment.

Cyber-physical systems emphasise two aspects, "physicality" and "connectivity" into the "cyberspace". In the US initiatives for cyber-physical systems the aspect of "physicality" is more emphasised.

## ARE CYBER-PHYSICAL SYSTEM EMBEDDED SYSTEMS?

There is a fast evolution in the field of systems with embedded software – from mechatronic to embedded systems to further to cyber-physical systems. In the following we view and discuss this evolution in terms of functionality – not so much in terms of technical implementation.

Historical steps in system evolution:
> Mechatronic systems
> Closed embedded systems with focused functionality
> Multi-functional embedded systems
> Smart embedded systems (assistance, adaptivity, context awareness, autonomous systems)
> Open embedded systems – connected to the internet ("internet of things", system of systems) – cyber-physical systems

The term Cyber-Physical Systems came up in the United States several years ago addressing systems, which are tight combinations of computational and physical elements. This is a characterisation, which also applies to the term Embedded Systems. Not surprisingly, there is some confusion about the differences between these notions.

Mechatronic System is an old term, which goes back to a time when software did not play a key role for systems, which were composed out of electronic and mechanical elements – although later, there was an attempt to generalise a term of Mechatronic Systems to systems, which also contain a lot of software. The original of the term "mechatronics" due to the technical situation in the 60s does not address a large amount of software involvement directly.

**Mechatronics (Wikipedia)**
*"Mechatronics is a multidisciplinary field of engineering, that is to say, it rejects splitting engineering into separate disciplines. Originally, mechatronics just included the combination of mechanics and electronics, hence the word is a combination of mechanics and electronics …"*

Historically this first Embedded Systems developed quickly into systems with a lot of software. Often Embedded Systems are understood as restricted as a computer system designed for specific control functions with a larger system, often with real time computing constraints. Now what is the difference between an Embedded System and a Cyber-Physical Systems?

**Embedded System (Wikipedia)**
*"An embedded system is a computer system designed for specific control functions within a larger system, often with real-time computing constraints."*

Well, both notions refer to systems where computing elements are directly connected to physical elements.

## TWO VIEWS ONTO CYBER-PHYSICAL SYSTEMS

The term Cyber-Physical System was created in the United States und used in a way that it addresses basically the same as Embedded Systems, however, with more on emphasis on modelling and understanding the physical

elements in such systems, as they are related to the computing elements and in addition emphasising that such systems also show connected elements, such as networks of controllers (see [Lee 08], [NSF 06]).

**Cyber-Physical System (US NSF):**
*"Cyber-physical systems (CPS) are engineered systems that are built from and depend upon the synergy of computational and physical components. Emerging CPS will be coordinated, distributed, and connected, and must be robust and responsive. The CPS of tomorrow will need to far exceed the systems of today in capability, adaptability, resiliency, safety, security, and usability."*

In an initiative of the German Academy of Technology acatech the phenomenon of Cyber-Physical Systems was understood broader than in the US. In the acatech study Cyber-Physical Systems were understood as the amalgamation of conventional Embedded Systems with Cyber Space, which goes the step from the generally closed real-time control systems to open systems that are connected to the internet to a number of other Embedded Systems and lead into phenomena, such as systems of systems and also notions as the Internet of Things are covered under that term.

In particular, Cyber-Physical System as understood in the agenda Cyber-Physical Systems of acatech show all the phenomena of systems of today and even more in the future, where there is no longer a possibility to draw a clear line between a classical software system running on a host computer and a conventional Embedded Systems integrated in some device, but where all systems are connected by and over networks.

Some people talk rather about the "Cloud" that embraces millions of computers and Embedded Systems that are connected by global networks to services in the Internet but also are connected to functionalities that are offered by these various Embedded Systems. This leads to a much more functional view of systems, where Cyber-Physical System are connected to physicality and to cyberspace, showing a number of application specific user interfaces and open interfaces that allow accessing services within the system and to connect to the services to other systems outside.

Therefore in this sense, Cyber-Physical System is a very general notion, which addresses the whole spectrum of digital technology as we face it today and in the future with its dominance of software and what is sometimes called smartness, such as adaptivity, autonomy, a systems functionality and context awareness.

## KEY CAPABILITIES OF CYBER-PHYSICAL SYSTEMS

There are two complementary views of systems: technology biased and functionality biased. Technology biased views characterise systems in terms of implementation technology characteristics (such as "embedded software"). Functionality biased views characterise systems in terms of their functionality.

Cyber-Physical Systems as understood by the actatech study lead into increased openness, connectivity, complexity, autonomy, "smartness" and evolution of the systems (with disruptive effects in the fields of application). To realise and master the development of Cyber-Physical Systems we need a number of capabilities both in engineering and within the systems as described in detail in the following.

The key issue for Cyber-Physical Systems (CPS) is the collection and acquisition of data such as parallel data collection (via sensors), data fusion, processing of physical data from the environment, locally, globally and in real time. Data from sensors combined with data fusion, data mining and interpretation enable physical awareness of systems. The interpretation aims at regarding achievements of objectives and tasks of Cyber-Physical Systems. In the acquisition and interpretation techniques of deduction are usefully combined with the prediction of faults, obstacles, and risks. A key property of Cyber-Physical Systems is the interaction between Cyber-Physical Systems and their context consisting of users, the physical environment, and systems and services

**The acatech position:**
*"Cyber-physical systems are systems with embedded software (as part of devices, buildings, means of transport, transport routes, production systems, medical processes, logistic processes, coordination processes and management processes), which:*

- *directly record physical data using sensors and affect physical processes using actuators;*
- *evaluate and save recorded data, and actively or reactively interact both with the physical and digital world;*
- *are connected with one another and in global networks via digital communication facilities (wireless and/or wired, local and/or global);*
- *use globally available data and services;*
- *have a series of dedicated, multimodal human-machine interfaces.*

*The result of the connection of embedded systems with global networks is a wealth of far-reaching solutions and applications for all areas of our everyday life. Subsequently, innovative business options and models are developed on the basis of platforms and company networks. Here, the integration of the special features of embedded systems – for example, real-time requirements – with the characteristics of the internet, such as the openness of the systems, represents a particular technical challenge."*

from the cloud. This requires interoperation, integration, rules for and control of CPS components and functions in a globally distributed, networked, real-time control and regulation.

At a higher, more domain specific level, the interpretation of context and situation evaluating data over several levels, depending on different application situations, becomes essential. To offer comprehensive functionality a systematic selection, incorporation, coordination, and use of services depending on specific situations, local and global objectives, and behaviour is indispensable. Using services in the cloud, service discovery, composition and integration are needed. Due to the many sub-systems working in parallel patterns of decentralised control has to be developed controlling the recognition of missing services, data, functions and active search and dynamic integration. Finally, a high degree of autonomic behaviour and self-organisation are to be achieved that way.

For the specification and evaluation of required quality for applications concepts of Quality of Service (QoS) and overall system quality of components and services are to be incorporated. In addition, possible risks and guarantees of dependability including reliability and compliance with respect to guaranteed QoS have to be considered. Security issues, such as the controlled access to system's own data and services, have to be solved.

Context awareness is to result in a comprehensive, continuous context monitoring on the basis of a continual collection, observation, selection, processing, evaluation, decision-making, communication of context data, situation and application data. Context awareness enables a systematic adaptation of the interaction, coordination, control with/of other systems and services.

A more advanced adaptive behaviour requires the recognition, analysis and interpretation of plans and intentions of objects, systems and participating users. This is mastered in engineering by model creation for application field and domain, for participants, including their roles, objectives and requirements, available services and tasks. This has to include the assessment of objectives, taking into consideration alternatives with regard to costs and risks.

A further step into Cyber-Physical Systems leads to self-awareness in terms of knowledge about the systems' own situation, status and options for action. This requires the learning of, for example, modified work processes, logistics processes, habits, interaction, etc. and corresponding behaviour adaption finally providing capacity for self-organisation.

The integration of a high number of systems requires distributed, cooperative and interactive perception and evaluation of the situation and the distributed, cooperative and interactive determination of the steps to be carried out – depending on the evaluation of the situation, on the objectives of individual participants and on the objectives

of the community these participants belong to (local vs. global objectives). This cannot be done without subsequent coordinated assessment and negotiation of the decision ultimately taken, i.e. self and shared control and decision-making autonomy.

To achieve such a level of autonomy requires decision-making on the basis of uncertain knowledge, cooperative learning and adaption to situations and requirements estimating the quality of own and external services and abilities. A special goal is the coordinated processing of mass data as they are produced by billions of embedded systems.

The future does not lie so much in completely autonomous systems. Humans will interact with such systems in various ways. Thus, in general, Cyber-Physical Systems will offer several user interfaces. This requires intuitive, multimodal, active and passive HMI – support (with simplified control) and support of a broader (space, time) perception and capacity to act for individuals and groups. The systems need to be able to recognise and interpret human behaviour including emotions, needs and intentions. For adaptive behaviour acquisition and evaluation of data concerning state and context of human and system (extension of perception and evaluation skills) are required. A capability difficult to achieve is the integrated and interactive decisions and actions between systems and individuals or groups.

In the long run the ability to learn will lead to more flexible user interfaces as they are required for mobile access to Cyber-Physical Systems.

in the long run the significant capabilities of Cyber-Physical Systems are context awareness (correct perception and interpretation of situation and context). To some extent self-awareness in reflecting the systems' role and situation in an operational context, third party-awareness, human awareness (status, objectives, intentions, ability to act) is needed. Key capabilities are learning and adaption (behaviuor), self-organisation, flexible cooperation, negotiation and decision-making (within defined boundaries following some specified compliance).

Partial autonomy requires decision-making on the basis of uncertain knowledge.

The key area of human-centric systems requires transparent HMI, shared control, integrated situation evaluation and predictable actions.

Finally, the systems are operating in a number of critical areas. This needs careful risk management.

## CONCLUSION

Cyber-Physical Systems open up the door for a whole world of new applications based on software and connectivity. Today we see the first examples of these applications in cars connected to the Internet, in smart phones using via apps several services including sensors and actuators. In the future we will see a large scale of highly connected Cyber-Physical Systems which are systems of systems containing special-purpose embedded systems connected to larger systems of coordination control and monitoring. Humans will be integrated into these systems by adaptive man-machine-interfaces finally leading to Human-centric Cyber-Physical Systems.

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# THE VISION & MISSION OF THE NEW PRESIDENT OF THE ARTEMIS INDUSTRY ASSOCIATION

**Heinrich Daembkes, the new man at the ARTEMIS-IA helm for a few months now, takes a brief look at the ARTEMIS he has inherited and, more importantly, considers the mission and vision in the light of the current and likely future landscape.**

*The recent High Level Vision 2030 document presented the ARTEMIS vision as "nurturing the ambition to strengthen the European position in Embedded Intelligence and Systems and to ensure its achievement of world-class leadership in this area by establishing an environment that supports innovation, stimulating the emergence of a new supply industry and avoiding fragmentation of investments in R&D." What is your take on this?*

I think this document spells out very clearly what our intentions are and what it is we are looking to achieve but still we have need to be a little more specific and pronounced. In other words, our scope is very broad but we have to focus on a few key changes that will drive us over the next few years. And this is what is being done at the moment in a working group led by Laila Gide, defining specifics that are really needed. ARTEMIS will certainly continue as an ETP, generating a roadmap and strategic research agenda for the European domain. Of course, such instruments are living instruments and will be regularly updated in line with evolution that is taking place. One very important evolutionary phase is whereby embedded systems are connected to each other and to the world around them and resulting in a very large network of embedded systems. This may be called cyber-physical systems So this is an area we need to specify and examine the technologies that are needed. This is described in more detail in the very fascinating article on CPS that appears in this magazine. So I see ARTEMIS continuing to provide the programme or platform to enable such evolution to take place, to continue addressing the key challenges and supporting industry innovation. In terms of the organisational aspect, we will see the merging of ARTEMIS, AENEAS and EPoSS, not only because they are increasingly naturally converging but also because there is greater interdependence as microelectronics, nanoelectronics and embedded systems need to feed of and feed each other. The user will also become an integral part of the equation.

*Do you see the need to change or refine the ARTEMIS-IA vision in the light of a changing European and global landscape?*

In principle, the vision is solid but, as I have already said, we do need to get more specific and take account of the more 'open', connected embedded systems involving real-time applications. And this means that – for certain areas - we need a guarantee of quality in terms of both content and reaction time – quality of service. Of course, we also need to consider Europe's strengths. Do we re-engage in the smart-phone battle or do we focus on industrial processes and products, on things that are part and parcel of our daily lives? My view is that we should opt for the latter, where we have a strong leadership position.

So we need to have an updated roadmap that points us in the right direction. And we have to take into account the growing integration between the different worlds – of hardware, of smart systems and of embedded systems somewhere in between.

*What progress has been made to realise the ARTEMIS mission to "establish collaborative innovation ecosystems by stimulating the emergence of self-sustaining European groups of all the actors involved in embedded systems innovation"?*

I think it has taken us a while to fully realise what it requires to build and implement an ecosystems, what it takes to really cover the whole chain from research through development and implementation to operational service. The Centres of Innovation Excellence are the first steps in achieving this awareness. And now we have a few, very nice examples of this. Such as ProcessIT. Once again we need to engage in focused activity and not play the broad field as we tended to do previously. A highly focused, tangible target encourages partners to get involved and contribute. We have to understand, too, that the creation of such ecosystems can happen in very different playgrounds and that by being aware of this, many more opportunities can be created. For instance, the significant progress made in the field of smart mobility has not yet really transferred to the domain of medical care, but now I am seeing major groups daring to become involved and I believe that we will soon see the first ARTEMIS innovation pilot project in this medical domain. It could be the ice-breaker for others to follow.

*What are your hopes for the future – of ARTEMIS-IA, of embedded systems, of society?*

Well, whether we like it or not we are faced by major societal challenges – urbanisation, food, scarcity of resources, mobility, the information society – and will continue to face them. We need to find answers to questions like in the development of intelligent systems. My hope is that we can use these systems for the benefit of society, that industry drives the welfare of our society and that Europe is in the development driving seat full of creativity, mastering the emerging complexity and developing new processes, tools and methods to keep us ahead of the competition. And, finally, that all of this is not misused – no Big Brother – but that it allows respected personal freedom.

# WORK IN PROGRESS

## BUILDING ON THE NEW JOINT UNDERTAKING

by Jan Lohstroh

**Since 1January 2013 the discussions of ARTEMIS-IA with the Commission, Member States, AENEAS and EPoSS on the new Joint Undertaking have intensified, as the new Joint Undertaking should become operational during the first quarter of 2014.**

Since 1January 2013 the discussions of ARTEMIS-IA with the Commission, Member States, AENEAS and EPoSS on the new Joint Undertaking have intensified, as the new Joint Undertaking should become operational during the first quarter of 2014.

So far there is consensus that the new JU will be a tri-partite institutional Public Private Partnership, in which the Commission, Member States and three Industry Associations will be members. The Commission together with the Member States, as in the current ARTEMIS Joint Undertaking, will fund projects. However the set-up should be flexible to also allow bi-partite funding (by Commission only) in certain circumstances.

The Commission has already produced a first draft of a Council Regulation, which will be the legal founding document that, after many iterations and discussions with the stakeholders, will be sent in June of this year to the European Parliament (for comments) and to the Council (for adoption, including amendments of the Member States). As the funding budget from the Commission for this new Joint Undertaking comes from its Horizon 2020 budget, both Parliament and Council must agree the Horizon 2020 programme and budget before any agreement on the new JU can be obtained. So if a delay occurs in the process of agreeing on Horizon 2020, the agreement on the new JU will be delayed as well.

An important element in the Council Regulation is the technical scope description. The Commission has asked the three associations to come with a short description that comprises their total activity area. The draft description, in which you can recognise the three ETPs /associations, is as follows:

*(1) Heinrich Daemkes (l) hands over the ARTEMIS BOOK OF SUCCESSES to Robert Madelin (r).*

The technical scope of the Electronic Components and Systems Joint Undertaking includes:

> design technologies, process and integration, equipment, materials and manufacturing for micro- and nanoelectronics while targeting miniaturisation, diversification and differentiation, heterogeneous integration;
> processes, methods, tools and platforms, reference designs and architectures, for

SW-intensive and/or control-intensive Embedded/Cyber-Physical Systems, addressing seamless connectivity and interoperability, functional safety, high availability, and security for professional and consumer type applications, and connected services;

> multi-disciplinary approaches for smart systems, supported by developments in holistic design and advanced manufacturing to realise self-reliant and adaptable smart systems having sophisticated interfaces and offering complex functionalities based on, e.g. the seamless integration of sensing, actuating, processing, energy provision and networking.

The integration of these elements in applications constitutes the foundation for solving societal challenges.

In the draft Council Regulation a Governing Board for the new JU is foreseen in which the three industry associations each have a lead delegate (the Commission and Member State provide the other lead delegates). The voting rights of the industry associations' lead delegates are not indicated separately as percentages of the total of Governing Board voting rights, but as a percentage for them together; the associations have to agree between them how to split this percentage.

For the costs of the JU office, again the industry has to pay a significant part. For the current ARTEMIS-JU, ARTEMIS-IA pays 66% of the JU office costs. For the new JU this will be 50%. This amount has to be paid by the three industry associations together; between them they have to agree how to split these costs.

Initial discussions between the three associations have been started regarding how the split of voting rights and payments are to be defined. The first idea for the voting rights is to start with default percentages that later will be adapted according to participation in the programme. For the payments the first idea is to relate these directly to the programme participation. Final arrangements have to be adopted by the Steering Boards of the three associations and need to be signed in a contract between them.

As was announced in the March 2013 General Assembly meeting of ARTEMIS-IA, the Articles of Association (AoA) and ARTEMIS Supplementary Agreement (ASA) of the ARTEMIS Industry Association have to be adapted/renewed to allow for participation in the new JU. This process will take place during 2013.

A draft Multi Annual Strategic Plan and a Work Programme for 2014 for the new JU are to be elaborated by the three associations together in the autumn of this year. The three associations should recognise themselves in the programme, not only for the in-depth specialist areas as described in their respective SRAs, but also for connecting and umbrella projects that bring innovation to the full value chain. ARTEMIS-IA will dedicate its Summer Camp 2013 to this subject and will invite experts from not only the ARTEMIS-IA experts group but also from AENEAS and EPoSS.

Altogether 2013 is a very busy year for ARTEMIS-IA, and we all work very hard to produce quite a lot of documents and legal texts, and to defend our position in many meetings.

*(2) From left to right: Khalil Rouhana, Heinrich Daembkes, Robert Madelin, Jan Lohstroh, Max Lemke*

What is essential is that high-level public servants and politicians are well informed about the importance of embedded and cyber physical systems for society and for European industry. This is not an easy task, because embedded systems are in almost all cases hidden or intangibly present in most products and services, and therefore inherently often overlooked by the majority of non-technical people.

To improve the visibility of embedded systems and to plea for a fair share of the funding that will be made available to the new JU, Heinrich Daembkes and Jan Lohstroh had a meeting with Robert Madelin, Director General of the Directorate CONNECT on April 19 . Robert Madelin and his organisation supports the EU's Vice-President Neelie Kroes. The meeting took place in his office in Brussels, to which he also invited Khalil Rouhana (director for Components and Systems) and Max Lemke (Deputy Head of Unit Complex Systems and Advanced Computing) from his organisation (see photo 2).

We took the opportunity at this meeting for Heinrich Daembkes to personally deliver the ARTEMIS book of Successes to Robert Madelin, reporting the output of the first four calls of the current ARTEMIS Joint Undertaking (see photo 1).

# ARTEMIS JOINT UNDERTAKING NEWS

*written by Alun Foster*

## THE OUTCOME OF CALL 2012

The last few months of 2012 saw the evaluations of the proposals submitted in response to the ARTEMIS 2012 Call and the subsequent decision of the Public Authorities Board that allowed the ARTEMIS-JU Office to launch negotiations. Which promptly, and without further ado, was done…

But, why "negotiations" you may ask? The fact of the matter is that, due to the "tri-partite" funding model used in ARTEMIS, the top-scoring projects only would be fully funded, leaving some otherwise excellent project proposals with some "gaps" in them. And, as in all things, other surprises may have happened along the way, such as some partners having unexpectedly turned out to be non-fundable in their country for a variety of other reasons, which can also create some "gaps". To make sense of all this variability, the ARTEMIS-JU Programme Officers need to work with the project coordinators to find suitable replacement partners and/or agree (= "negotiate") other changes to the technical content of the selected projects to be sure that the resulting projects will be strong and able to deliver good contributions to the ARTEMIS programme.

At the time of writing, the negotiations for eight proposals are nearing completion which, subject to completion of their contracts, will represent a total investment of more than €220 m, with a total public-sector funding of over €102 m.

| AIPPs | Total Cost (€m) | AIPP1 | AIPP2 | AIPP3 | AIPP4 | AIPP5 | AIPP6 |
|---|---|---|---|---|---|---|---|
| CRYSTAL | 82.6 | 70.2 | 12.4 | - | - | - | - |
| Arrowhead | 67.8 | - | - | - | 40.7 | - | 27.1 |
| | | 31% | 5% | 0% | 18% | 0% | 12% |

| ASPs | Total Cost (€m) | ASP1 | ASP2 | ASP3 | ASP4 | ASP5 | ASP6 | ASP7 | ASP8 |
|---|---|---|---|---|---|---|---|---|---|
| E-SCOP | 5.8 | 0.3 | - | - | 5.2 | 0.3 | - | - | - |
| HoliDes | 23.4 | 7.0 | - | - | - | - | - | - | 16.4 |
| CONCERTO | 9.7 | 7.2 | - | - | - | 2.4 | - | - | - |
| ACCUS | 12.8 | 1.3 | - | 3.2 | - | - | - | 8.3 | - |
| COPCAMS | 15.5 | - | - | 5.4 | - | 10.1 | - | - | - |
| With-Me | 10.0 | - | 8.0 | - | 0.5 | - | - | - | 1.5 |
| | | 7% | 4% | 4% | 3% | 6% | 0% | 4% | 8% |

If we look at what these projects represent in terms of contribution to the ARTEMIS programme, I think we can view Call 2012 as fairly successful. Of course, this is the first Call where AIPPs are being asked for, and the community has risen to this challenge to produce two strong AIPPs representing in total some 66% of this investment: CRYSTAL, at 36% of this total investment from the Call, covering AIPP1 and a small part of AIPP2, and Arrowhead, at 30% of total investment covering AIPP4 and partly AIPP7. With these two, strong AIPPs, the step up to the next level in ARTEMIS projects is well under way.

Of course, the remaining 34% of this investment in the 6 "ASP" projects must not go unmentioned! The projects represent some very nice, punctual contributions across the board, with all ASPs except ASP6 ("ES for Security and Critical Infrastructures Protection") being represented. A brief description of each project is given below, demonstrating their individual contributions to the programme.

## AIPPS

### CRYSTAL:

*Critical System Engineering Acceleration*

CRYSTAL aims at fostering Europe's leading position in engineering quality and cost effective, safety-critical embedded systems. It aims to enable sustainable speeding up of the maturation, integration and cross-sectoral reusability of "technology bricks"

for the "factories" for safety-critical systems engineering in transportation (aerospace, automotive, and rail) and healthcare. CRYSTAL fits perfectly with other ARTEMIS projects contributing to the Cooperation Reference Technology Platform (CRTP) initialised by CESAR and will set up a sustainable innovation eco-system, targeting a "de facto" standard for an interoperable European RTP.

## ARROWHEAD:

*maximise efficiency and flexibility, increase energy efficiency and flexible usage of energy through cooperative automation, in buildings and public infrastructures, manufacturing, process and energy industries*.

Society's energy and competitiveness challenges require new, dynamic interactions between energy producers and consumers, between machines and systems, between people and systems, etc… i.e. cooperative automation, enabled by the Internet of Things and Service Oriented Architectures. Arrowhead will provide a technical framework, including solutions for integrating legacy systems, to implement and evaluate cooperative automation through real application pilots in electro-mobility, smart buildings, infrastructures and cities, industrial production, energy production and the "virtual energy" market, leading the way to further standardisation.

## ASPS

*With-Me: The European Platform to Promote Healthy Lifestyle and improve care through a Personal Persuasive Assistant*

With-Me will develop an ecosystem consisting of various embedded devices, including consumer electronics (mobile phone, computer, TV, media centres, etc), dedicated health equipment (HR/BP monitors, activity sensors, glucose analysis devices, etc.), external information sources and personal feedback, and servers providing the necessary computational environment. The ecosystem continuously provides seamless monitoring and persuasive guidance for healthier behaviour. With-Me ensures continuity of personalised assistance thereby reducing the total healthcare cost.

## E-SCOP:

*Embedded systems Service-based Control for Open manufacturing and Process automation*

E-SCOP aims to overcome the current drawbacks for the shop-floor control level (i.e. MES and deterministic / real-time control), thus improving the state-of-the-art of the overall production control system architecture, introducing an innovative approach called Open, Knowledge-Driven Manufacturing Execution System (OKD-MES). COPCAMS: COgnitive & Perceptive CAMeraS Vision systems are ubiquitous, and complex analysis of images from multiple cameras will become the norm in the future, aimed at extracting meaningful, context-dependent information. Today's market is dominated by simple, fixed-function cameras streaming video to networked gateways but these cannot scale well. COPCAMS aims at a new, many-core programmable accelerator platform for smart cameras and gateways, able to extract relevant information and autonomously react to the environment, operating on a large, distributed scale.

## HOLIDES:

*Holistic Human Factors and System Design of Adaptive Cooperative Human-Machine Systems*

HoliDes addresses development and qualification of Adaptive Cooperative Human-Machine Systems (AdCoS). Such systems are urgently needed to enhance usability and safety as well as to increase the confidence of human operators. For this, HoliDes will develop a Human Factors Reference Technology Platform (HF-RTP) to foster interoperability and to support human factors along the whole engineering life-cycle. The HF-RTP will be closely connected to the CESAR RTP to enable holistic development and qualification from both human factors and technical systems design perspectives.

## ACCUS:

*Adaptive Cooperative Control in Urban (sub) Systems*

Urban systems like traffic, energy, and outdoor lighting are managed by self-contained embedded systems. New applications and collective optimisation require integration of these systems, presenting a "systems of systems" integration problem, managing emergent behaviour and taking non-availability of components as the norm. Building on the work of several other ARTEMIS projects, ACCUS aims at methodologies and tools for creating these "systems of systems" that will be validated and demonstrated in two extended use cases in Poland and Italy and with at least four different urban systems.

## CONCERTO:

*Guaranteed Component Assembly with Round Trip Analysis for Energy Efficient High-integrity Multicore Systems*

New platforms harnessing heterogeneous, multicore embedded architectures for the next generation of mission-critical applications demand across-the-board advances in design and development for which component-based design with model-driven development creates a potent combination. Building on ARTEMIS-CHESS and several other projects, CONCERTO will deliver a reference framework for multicore systems, including their non-functional properties, demonstrated for several industrial use cases including aerospace, telecoms, automotive, and medical.

COLUMN

# BATON BLUE(S)

*This column is the fourth in a series in which various members of the ARTEMIS community pick up the baton and have a say on developments from a personal perspective and in their own way before passing the baton on. In this edition* ***Josef Affenzeller****.*

**Josef Affenzeller is Director of Research Coordination at AVL List GmbH in Graz, Austria. Since 1994, he has coordinated many international RTD projects and participated in several EC working group committees. He has been an active member of ERTRAC (European Road Transport Research Advisory Council) as well as EARPA (European Automotive Research Partners Association) since its foundation in 2002 and is currently its chairman. He is a member of the ARTEMIS Industry Association Steering Board.**

*Jan van de Biesen mentioned that you were, like him, actively involved from the beginning of ARTEMIS. How did it all begin for you?*
Yes, that's right. It goes back to the beginning of 2005 when we were contacted about our interest in becoming part of the board charged with creating the ARTEMIS-IA platform. And, of course, the ARTEMIS embedded systems activities fitted in very well with our future strategy, so these activities complemented our business case at AVL. As a member of the steering board I focused on developing the terms of reference and documents that were needed at that time.

*You have initiated one of the largest projects in ARTEMIS, the CESAR project, almost the size of an AIPP "avant la lettre". What was your core motivation to create such a large project?*
The CESAR project was created under the auspices of EICOSE, and we were involved in discussing the ideas, the structures, the potential partners that could shape CESAR. Because we had the experience of handling larger projects, we were asked to lead this project. Our involvement was motivated by the fact that it fitted in with our strategy and at that time we were focusing very much on safety-critical systems.

*You have a prominent role in ARTEMIS Austria. Why did you choose to establish this organisation? How is it expected to evolve over time?*
Based on our activities in the steering board and the structure of EICOSE, it was clear that in Austria we are strong in terms of ICT activities and the embedded systems supply industry and so it was a next step in consultation with the Austrian Ministry of Transport, Innovation and Technology to create ARTEMIS Austria. This was a good way of getting all the existing and potential players in the information loop, and this has been successful to date. And such an organisation can serve as a multiplier of activities, especially for Austrian SMEs who would otherwise not have the possibility to be in the Brussels loop, and so through ARTEMIS Austria they can become involved. We are growing and are currently discussing alignment with a view of the European Commission on Horizon 2020.

*CESAR developed the interoperability topic and eventually evolved in CESAR RTP, the first with an ARTEMIS tool platform label. What was the main reason to pursue the creation of the Tool platform? What was your role in this development?*
CESAR is a project that has many tangible results that are being transferred to other follow-up projects that are based on the developments and outcome of CESAR. EICOSE partners also play a strong role in this research reference technology platform, which is a kind of baseline for many projects within the ARTEMIS, ITEA and national programmes. The CESAR project is a very good example of the ARTEMIS premise that a project is not finished when it is over but provides the springboard for further projects. My own role is to ensure that the ideas generated are taken forward and developed further. It's a kind of supervisory role, you could say.

*Jan van den Biesen handed over the baton to you and he has a particular question to you: What are your views on the benefits of ARTEMIS and its added value compared to other funding programmes from the perspective of a very innovative, medium/large company?*
Through the projects, ARTEMIS creates a specific momentum for Europe in understanding problems and contributing to the solutions.

Europe will benefit from this at a high level as well as both large and small companies. In terms of getting standards accepted, one project is not enough for industry acceptance – more time is required so other projects have to take this development of standards on and forward before industry is prepared to adopt specific standards and ultimately benefit from them.

*What is your personal big motivating factor in your professional life?*
I did not start off as an expert in embedded systems but over the years I have learned a lot and I am very happy to be part of these activities. For me the big motivating factor is to contribute ideas that help AVL specifically and Europe in general. And fortunately, that is what I am able to do.

*What do you believe is the biggest challenge in the R&D of Embedded Systems for the coming years?*
In my opinion, our systems are becoming more and more complex – in aeronautics, automotive, robotics. This also applies to the integration of system of systems. There are many safety and security challenges that have to be overcome. We have to think in terms of a system approach, or cyber-physical systems as it is now termed. We have to influence chip design and the specific features that are incorporated in the chips. Embedded systems do offer a real opportunity to tackle the societal challenges that lie ahead and enhance our connected lives.

*To whom do you wish to hand over the column and why? What particular question do you have for this person?*
Karlheinz Topp of Robert Bosch GmbH. He is active in ARTEMIS, CATRENE, ITEA and ENIAC. What are his thoughts about the future of the parallel activities?

*What music goes together with reading of the column?*
Mozart. Eine Kleine Nachtmusik. A nice gentle piece to go along in the background.

# ARTEMIS-IA DEPARTING STEERING BOARD MEMBERS

1 2 3 4 5 6 7

(1) Emile Aarts - *Philips* (2) Dagfin Brodtkorb - *ABB* (3) Alessandro Cremonesi - *STMicroelectronics* (4) Klaus Grimm - *Daimler A.G. GERMANY*
(5) Petri Liuha - *Nokia* (6) Pettersson, Paul - *Mälardalen University* (7) Andrea Vitaletti - *WLAB*

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(1) Jan van den Biesen - *Philips* (2) Patrick Candry - *Barco* (3) Tatu Koljonen - *VTT* (4) Rafael Socorro - *Acciona* (5) Roberto Zafalon - *STM*

# ARTEMIS EVENTS CALENDAR

## ARTEMIS SUMMER CAMP 2013

***Date***
11-12 June
***Location***
Madrid, Spain

## THE 2013 MEDITERRANEAN CONFERENCE EVENT: EMBEDDED AND CYBER-PHYSICAL SYSTEMS

The Mediterranean Conference will bring together academic researchers and teachers, industrial researchers, developers and decision-makers, as well as PhD students in Budva - a popular resort and touristic destination located in the inspiring beautiful natural environment of the mountainous Adriatic Sea shore of Montenegro.

***Date***
12-20 June 2013
***Location***
Budva, Montenegro

## EURONANOFORUM 2013

EuroNanoForum 2013 is supported by the European Commission Directorate for Research and Innovation and is planned to gather more than 1000 attendees.

***Date***
18-20 June 2013
***Location***
Dublin, Ireland

## WORKS-2013

2nd Workshop on Open Resilient human-aware Cyber-physical Systems (WORCS-2013) is in conjunction with the 43rd Annual IEEE/IFIP International Conference on Dependable Systems and Networks - DSN – 2013

***Date***
24 June 2013
***Location***
Budapest, Hungary

## EUROPEAN MICROELECTRONICS SUMMIT

Semoconductors for Smart Infrastructure & Transport. Attendees will be 200 French and European decision-makers CEOs, CTOs, marketing & strategy Directors, R&D managers, Public authorities, Research Institutes, Universities, Finance, Journalists, SMEs, Start-up and venture capitalists.

***Date***
26 September
***Location***
Pavillon Gabriel in Paris, France

## JTI EVENT

***Date***
1-2 October 2013
***Location***
Brussels
***More information***
More information will follow soon

## ICT 2013: CREATE, CONNECT, GROW

ICT2013 will bring together Europe's best & brightest in ICT research, with businesses old & new, web start-ups and digital strategists to chart a path for Europe's ICT research policy. Join us to share your vision for the future with EU policy-makers, and see the latest advances in EU-funded ICT research.

***Date***
6-8 November
***Location***
Vilnius, Lithuania

## SEMICON EUROPA 2013

SEMICON Europa 2013

SEMICON Europa is the place to see the leading companies, technologies, and people driving the future of micro- and nanoelectronics design and manufacturing.
SEMICON Europa exhibitors are the suppliers to and partners of the Europe's leading microelectronics companies. From silicon to system - and everything in between and beyond - SEMICON Europa showcases the biggest and brightest names in microelectronics manufacturing.

***Date***
8-10 November
***Location***
Dresden, Germany

## EUROPEAN NANOELECTRONICS FORUM (ENIAC)

***Date***
27 – 28 November
***Location***
Barcelona, Spain

## ARTEMIS – ITEA 2 CO-SUMMIT 2013

***Date***
4-5 December 2013
***Location***
Stockholm, Sweden

# EDITORIAL INFORMATION

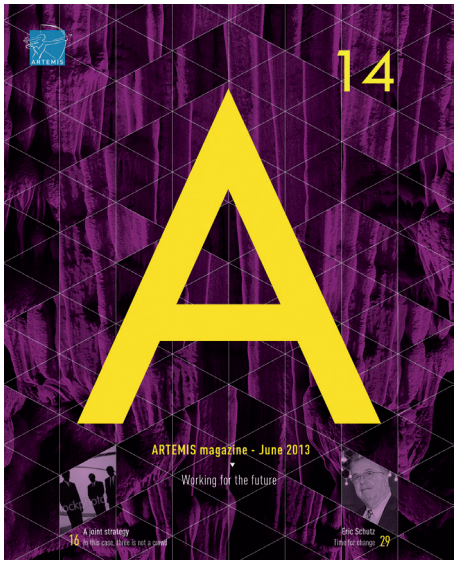
**ARTEMIS Magazine is published by ARTEMIS Industry Association and ARTEMIS Joint Undertaking.**

ARTEMIS aims to tackle the research and structural challenges faced by European industry by defining and implementing a coherent research agenda for embedded computing systems. Its ambition is to help European industry consolidate and reinforce its world leadership in embedded computing technologies.

ARTEMIS Industry Association is the association for R&D actors in embedded systems with 200+ members around Europa. The Industry Association is the private partner in the ARTEMIS Joint Undertaking. It continues the work of the European Technology Platform and is therefore responsible for the ARTEMIS Strategic Research Agenda. The Industry Association creates the meeting place where the stakeholders identify topics for major R&D projects that they want to pursue together, form consortia and initiate project proposals for joint collaboration, and building of ecosystems for embedded intelligence.

The ARTEMIS Joint Undertaking is a Brussels based organisation legally established in February 2008 and gaining autonomy in October 2009. It is a Public Private Partnership with the EC and 23 participating Member States. The ARTEMIS Joint Undertaking adopts a commonly agreed research agenda closely following the recommendations of the Strategic Research Agenda developed by the members of ARTEMIS Industry Association. The ARTEMIS JU will manage and co-ordinate research activities through open calls for project proposals through a 10-year, €2.5 billion research programme on embedded systems.

ARTEMIS Magazine provides information on the developments within the ARTEMIS community. Its aim is to keep the ARTEMIS community and beyond updated about the Association, Joint Undertaking, programme status & progress, achievements and events in embedded systems. An online version of ARTEMIS Magazine is available on www.artemis-ia.eu and www.artemis-ju.eu

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Do you want to contribute with ARTEMIS news? Mail to: communications@artemisia-ia.eu

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Advanced Research and Technology for EMbedded Intelligence and Systems

# A 14

ARTEMIS

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