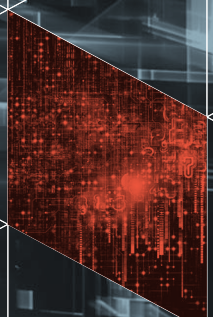
ARTEMIS Industry Association

17

ARTEMIS Magazine - December 2014

Cooperations are key to success



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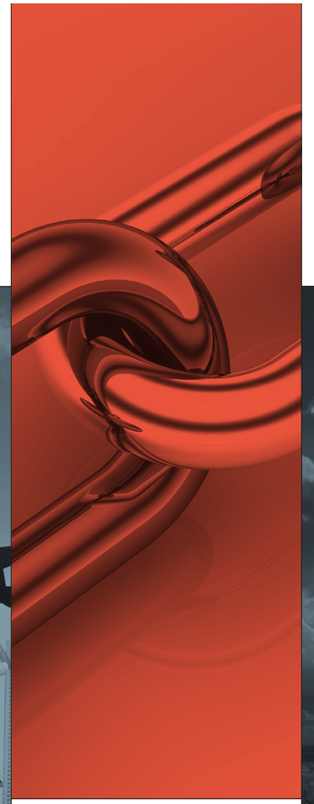
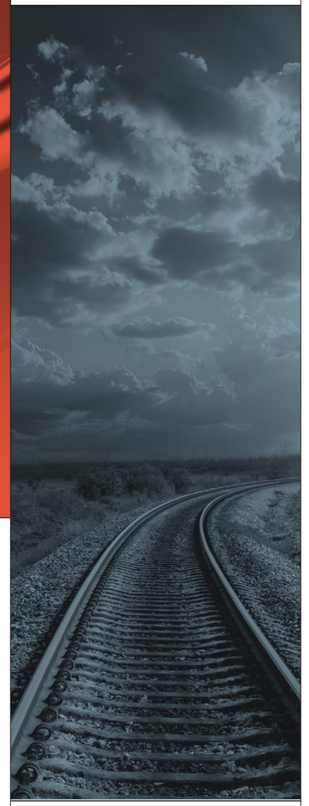




Content

10
COOPERATION IS KEY

16
RELIABILITY, A LEADING THEME IN EMBEDDED SYSTEMS

36
ON GOOD TRACK FOR 2015

FOREWORD

Jan Lohstroh
Secretary General
ARTEMIS Industry Association

Dear ARTEMIS friends,

Since the spring of this year, a lot happened. ECSEL Joint Undertaking got legally airborne in June, the three associations AENEAS, ARTEMIS-IA and EPoSS endorsed the statutes of the JU and supported the new JU to shape the first ECSEL MASP 2014 (MultiAnnual Strategic Plan), the first Governing Board meeting took place in July, and the first two parallel Calls took place with September 17 as closing date. At the time that this Magazine reaches your desk, the selected projects of these Calls should be known. By default all selected ECSEL-JU projects from these Calls will start during the year 2015. There are still many ENIAC-JU and ARTEMIS-JU projects running; these projects keep their ENIAC or ARTEMIS name, but are now supported by ECSEL-JU, because ENIAC-JU and ARTEMIS-JU are dissolved into ECSEL-JU.

We congratulate Andreas Wild with his increased responsibilities by assuming the task of Executive Director of ECSEL-JU as follow up of his task as Executive Director of ENIAC-JU. We thank Alun Foster for guiding ARTEMIS-JU as Acting Executive Director after the retirement of Eric Schutz last year.

While ARTEMIS Joint Undertaking does not exist anymore, ARTEMIS Industry Association is very much alive, and is continuing our well-known ARTEMIS-brand (since 2005 when we started the ARTEMIS-ETP) now on its own again. In this Magazine there are various articles of Heinrich Daembkes ('On good track for 2015'), Ad ten Berg ('ARTEMIS-ETP actions' and 'Cooperation is Key') and Jan Lohstroh ('ARTEMIS in the next timeframe') that explain the activities of ARTEMIS-IA in its double function as ARTEMIS-ETP and member of ECSEL-JU.

In Germany and Austria, national support organisations are set up for ECSEL by members of AENEAS, ARTEMIS-IA and EPoSS. In this Magazine you find interviews with the key persons in ECSEL Germany and ECSEL Austria. Furthermore an interview with Herbert Zeisel of the German Federal Ministry of Education and Research (BMBF) is presented about Industry 4.0 and Cyber-Physical Systems. This interview highlights the vision of the German Public Authority on these topics.

Further in this Magazine you can find background information about some ARTEMIS-IA activities and ARTEMIS-JU projects. Jürgen Niehaus explains the work of the Working Group Tool Platforms and several authors of the ARTEMIS-JU projects CRYSTAL, EMC^2, CONCERTO and VARIES highlight the topic Reliability in their respective projects. This series of five articles is preceded by an introduction by Ad ten Berg ("Reliability, a leading theme in Embedded Systems").

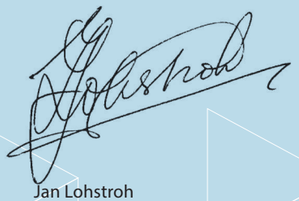
Standardisation is an important topic for our community. The new Horizon2020 support action project CP-SETIS – in which ARTEMIS-IA participates – is described by Jürgen Niehaus of SafeTRANS and Ad ten Berg.

The impact of software innovation on Smart Industry, in which Embedded/Cyber-Physical Systems play an important role, is continuously growing. You can find a very interesting article on this topic from Egbert-Jan Sol and Sam Helmer in this Magazine.

Also interesting is a contribution of Patricia Muoio from the USA, who discovered our ARTEMIS SRA and judged this document as very good for its purpose.

Finally you find information about the Co-summit with ITEA that will be held in Berlin on March 10-11, 2015, and the Baton Blues interview – this time with Jerker Delsing.

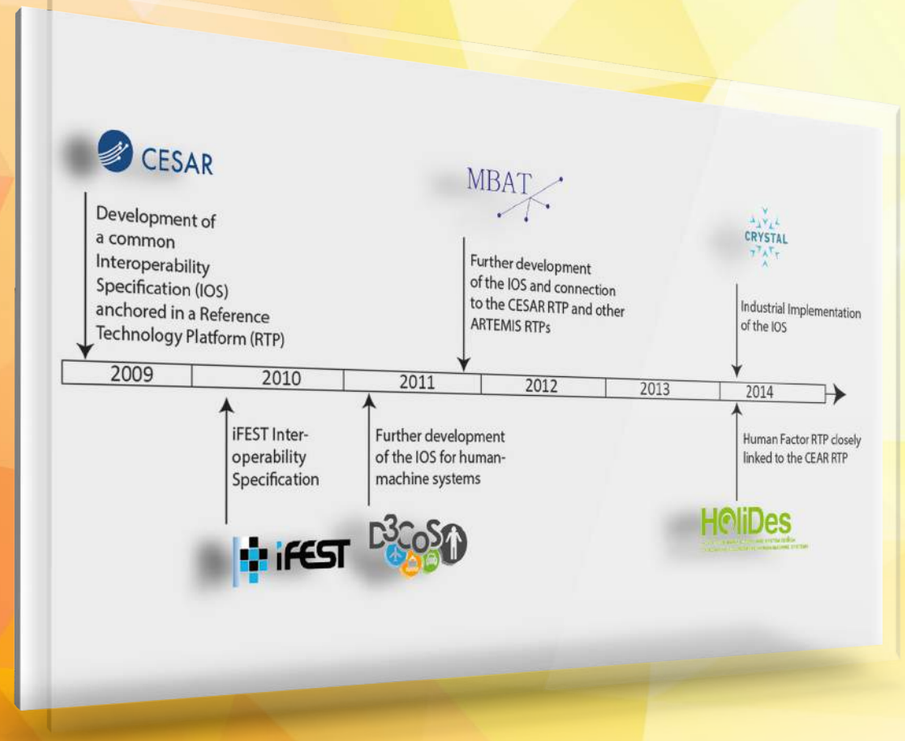
I wish you a lot of reading pleasure.



Jan Lohstroh

ARTEMIS WORKING GROUP TOOL PLATFORMS

By Jürgen Niehaus, SafeTRANS, Germany



One of the major challenges in Embedded Systems Engineering is the facilitation of the development process through a higher degree of automation despite very specialised software tools that hardly allow data exchange with other tools or the transfer from one application domain to another. Therefore, ARTEMIS is fostering open Tool Platforms[1] (TPs) through a dedicated Working Group that joins relevant stakeholders from industry and academia to coordinate the processes around open TPs within the ARTEMIS Community and beyond.

What characterises a so-called ARTEMIS Tool Platform (ATP)? An ATP is as a set of commonly agreed interfaces and working methods, which allow specific tools to (inter-) operate with other tools. These interfaces and working methods are continuously developed and used in ARTEMIS R&I projects and R&I projects from other funding programmes.

The benefits of a TP are the better use of proven processes and integration of R&I results to enhance development success. Furthermore, the transfer or switch to new tools is simplified. The use of a TP will strongly reduce the costs of integration, configuration, deployment and maintenance of tool chains, as well as complexity.

The first project to build the fundaments for a Reference Technology Platform (RTP) was CESAR (2009 – 2012), in which an ecosystem of end users, tool vendors and technical experts from academia and industry defined an Interoperability Specification (IOS) as a basis for tool interoperability. More projects followed, supporting the IOS for the development of safety critical Embedded Systems (see figure on the left).

Today the ARTEMIS Working Group Tool Platform (ARTEMIS WG TP) has the following objectives:

> to sustain long-term support for innovation and R&I results beyond project lifetime;
> to mitigate the high risks of having replicated Tool Platforms with overlapping scopes and the proliferation of competing platforms (counteracting the objective of the promotion of cross-fertilisation and reuse of technology results) and losing focal points for gathering research results;
> to propose to the Steering Board and the Presidium the approach for the ARTEMIS Tool Platform strategy, and the methods to implement it. The strategy and methods are inputs to the strategic documents of ARTEMIS-IA and ECSEL (MASRIA, RIAP).

To implement these objectives, the ARTEMIS WG TP clarifies and updates the ARTEMIS Tool Platform strategy implementation, identifies ATP candidates and organises the labelling of Tool Platforms based on defined criteria. Besides this, the Working Group assesses strategic, legal and architectural aspects with regard to the different ATPs, positions the ATPs in the Centre of Innovation Excellence landscapes and takes care of the life-cycle of labelled platforms.

For the continuous feeding and life-cycle of the CESAR RTP, the ARTEMIS WG TP cooperates with the Centre of Innovation Excellence *EICOSE* and the ARTEMIS WG Standardisation. EICOSE is the umbrella organisation aimed to keep the CESAR RTP alive; mostly to maintain R&I results touching the IOS and RTP, to bring these results in further R&I projects, and to provide access for the Community. In cooperation with the ARTEMIS WG Standardisation, the next steps towards the standardisation of the IOS are being prepared. There are regular meetings of the WG Tool Platform, collocated with ARTEMIS-IA events, e.g. with the ARTEMIS Spring Event and Summer Camp. The ARTEMIS WG TP is co-chaired by Werner Damm (OFFIS) and Francois Lafon (Airbus).

[1] *European dependence on too few companies for strategically important tools can be considered a major weakness and open-source alternatives, due to small user bases, are often not workable. The ARTEMIS MASP recognised the need for trustworthy, interoperable tools from reliable sources with assured long-term support. The introduction of the "ARTEMIS Tool Platform" concept is a response to this need. (ARTEMIS JU & ARTEMIS-IA. ARTEMIS Book of Successes. 2013)*

THE ARTEMIS STRATEGIC RESEARCH AGENDA

A LOOK FROM ACROSS THE OCEAN

By Patricia Muoio, G2, USA

Cyber-Physical Systems (CPS) have become the topic of much discussion in the United States, and there are several initiatives underway to coordinate activities in this area so that we can make fundamental advances that transcend traditional sector or industry boundaries. While the scope of CPS is not exactly the same as that of Embedded Systems, they offer the same promise, that of Smart Systems that sense the world around them, exploit digital information, communicate with each other and manage resources autonomously. For this reason, many of the insights reflected in the ARTEMIS Strategic Research Agenda (SRA) are very helpful in understanding the domain of CPS and how we might make progress in it.

The SRA accurately identifies many of the challenges faced by the CPS community. These include: providing system interoperability, providing system autonomy, integrating mixed criticality systems to obtain system reliability, communicating reliably using open networking, enabling real-time decision-making, providing dependability in the presence of network degradation and compromised environment, addressing the need for semantic interoperability, computing with severe resource constraints, making decisions from multiple large, noisy data sets, and developing self-learning and self-optimising systems.

The SRA also develops many useful constructs that can help us think about these problems. One notion that is particularly useful is that of application contexts: industrial systems, nomadic environments, private spaces, and public infrastructures. Much of the discussion of how we might provide cyber security for CPS or how we should manage machine-to-machine communication becomes very confused when we think of the domain of CPS as one undifferentiated space. When we think of it in terms of these four contexts, however, the problems become more manageable, and a wider set of solutions emerges. Finding an access control mechanism that works equally well for a power plant and a pacemaker is a difficult problem. Finding an access control mechanism that works well in one setting or the other is not nearly so hard, and, given that they are in different application contexts, there is not much to be gained by insisting that the same mechanism works for both. We can have an overarching reference architecture which includes access control as an important function, and overarching tools and methods to address the general issue of access control, but pursue different implementation strategies in different application contexts, coming up with a range of solutions that are generally applicable over sets of things that operate in the same context.

Further, the SRA encourages collaboration by identifying two types of investigations that will benefit greatly from joint research initiatives: investigation into technical solutions that address pre-competitive industrial goals, and investigation into scientific foundations and technologies that break down sector barriers. Much can be gained by sharing ideas and combining efforts to address those problems that keep everyone from advancing. If we want to invent technologies that break down barriers, we must find ways of working that break down barriers, and the SRA enables us to make progress toward this goal by describing compelling problems that, if solved, improve market opportunities for all.

Finally, the SRA grounds all this technical work in three societal challenges that are as critically in need of solutions in the US as they are in Europe: affordable healthcare and wellbeing; green, safe and supportive transportation; and smart buildings and communities. It is at once inspiring and clarifying to look at the hard problems outlined above with an eye to providing solutions to these very real lived problems. The ARTEMIS SRA does the research community a good service by reminding us of the "why" while laying out an approach to the "how."

COOPERATION IS KEY

By Ad ten Berg, Office Director, ARTEMIS Industry Association

Cooperation is the core business of ARTEMIS. ARTEMIS Industry Association was established by companies that decided to cooperate in order to bring the message on the need for more structural R&D on Embedded Systems to a larger scale. Of course the whole ARTEMIS model is based on gaining impact of Embedded Systems on a European level through cooperative R&D projects. A new tri-partite cooperation model was the foundation for industry, European Commission and the European countries, to leverage the efforts by a unified pan-European strategy for Embedded Systems R&D. One of the underlying strategic approaches was "think big" to gain "impact", with the target to create sustainable impact for the programme for Europe and the European industry. Based on this approach, ARTEMIS and ARTEMIS Industry Association started to build large projects, culminating in later Calls to ARTEMIS Innovation Pilot Projects (AIPP's), huge projects with about a 100 partner/100MEuro target size.

WORKING GROUPS

To expand the R&D cooperation to supporting domains further, ARTEMIS started with Working Groups to address issues, such as Tool Platforms, Standardisation, SME involvement and Education and Training. Also a Working Group was established to promote stronger cooperation among the different players in the value chain in so-called "Centres of Innovation Excellence". These Working Group initiatives are dedicated to encourage and stimulate cooperation between our members and all project partners in the Embedded Systems community in Europe. In ARTEMIS Magazine 16, all ARTEMIS Working Groups were presented in detail.

Additionally, in this Magazine, we expand focus to cooperation with other associations and clusters – that contributes to the status we are in today.

ITEA

A long lasting cooperation between ARTEMIS Industry Association and ITEA started already with the ITEA Symposium / ARTEMIS Autumn event of 2008, which was organized back-to-back with one day overlap. Since there is a large common industry community to both programmes, this co-organised event became a success, and was successively integrated into a two-day Co-summit in 2009. Today, we can look back on five successful Co-summit events, of which the last two attracted between 650 and 700 participants, showing the relevance of the event for both programmes. A sixth Co-summit will take place in March 2015 in Berlin.

Besides this, a continuous cooperation with ITEA was started in 2011 under the name "High level Umbrella", where the positioning of both programmes was documented. Then, in 2012 a shared Vision2030 was written, looking 20 years ahead. In 2013 this Vision 2030 was extended with an economic outlook of the impact of software and Embedded Systems on industry in Europe. This cooperation between ITEA and ARTEMIS was from its beginning strongly supported by the Public Authorities of the participating countries.

AENEAS AND EPOSS

Also on European Technology Platform (ETP) level, a closer cooperation was started in 2012. On request of the European Commission, a common high level SRIA (Strategic Research and Innovation Agenda) was written together with AENEAS (ENIAC ETP) and EPoSS ETP, to outline a common view of the electronic components and systems industry in Europe. Based on this SRIA, the European Commission confirmed their earlier ideas to create an integrated successor under Horizon 2020 of both the ENIAC and ARTEMIS Joint Undertakings, also integrating the EPoSS ETP into this overall Joint Undertaking in the domain of electronic components and systems. This ECSEL-JU has been established by Council Regulation on June 27, 2014. Today, the three associations together are closely cooperating as private partners in this ECSEL-JU, a 5 Billon euro R&I initiative under the umbrella of Horizon2020.

INTERVIEW WITH HERBERT ZEISEL

Dr.-Ing. Herbert Zeisel from Federal Ministry of Education and Research (BMBF) about Industrie 4.0, Cyber-Physical Systems and the upcoming Co-summit

What is BMBF and what is its vision on European cross-border research?
The German Federal Ministry of Education and Research (BMBF) is a cabinet-level ministry of the Federal Republic of Germany. One of our tasks is to stimulate innovation in Germany by creating a reliable framework for research and innovation activities in science and industry. Innovation is the key to strengthening Germany as a competitive location for industry. The production sector is a main pillar of the German economy, with a quarter share in GDP and about 7.7 million employees. Today we are not just talking about the production of one company and a value-adding chain, but about complex value-adding networks. In our globalised world, these networks are no longer limited to one country, but span the whole of Europe and beyond. Hence, the importance of and necessity for cross-border research is increasing steadily. It is essential to complement the value-adding production networks by means of European – even international – research and innovation networks in order to strengthen the position and the competitiveness of Europe, and Germany as part of Europe.

Yet, cross-border research is not only vital for innovation in value-adding networks, but also for tackling major societal challenges like climate, demographic change, transport, etc. No single Member State can master these challenges on its own. The German Federal Government sees the further development of the European Research Area as an important driver for strengthening Europe's scientific performance as a whole and expanding its innovative capacity in all areas. Cutting-edge research must not stop at national borders. European research teams are the leaders in many areas of science and technology. In view of the limits to public funding and capacities, transnational cooperation and coordination of research efforts are of decisive importance for coping with the challenges our society is facing.

ARTEMIS Industry Association (also as an ETP) is continuously promoting the R&I interests in Embedded and Cyber-Physical Systems (CPS) of its members to the European Commission and the Public Authorities of the participating states. Germany plays a leading role in the field of (software-intensive) Embedded Systems – particularly in the car industry and engineering – and in this context, German Cyber-Physical Systems are becoming more and more important.

What role do you see for ECSEL Joint Undertaking (of which ARTEMIS Industry Association is partner) in this field and, more specifically, in this field in Germany?
Cyber-Physical Systems (CPS) are of great importance for the sustainability of many German and European industries. The automotive and aviation industries are just two examples. Additionally, Cyber-Physical Systems are the backbone of "Industrie 4.0". Therefore, research and development in Embedded Systems and CPS is of fundamental interest for Germany.

This interest is underlined by the engagement of many German companies and research institutions, as well as the BMBF, in the new JTI ECSEL. One of the aims of ECSEL is to maintain and extend European strengths in the areas of Embedded Systems, CPS and intelligent systems. We expect ECSEL to support a better coordination and alignment of strategy for research, development and innovation in the fields of CPS on a European level. Moreover, through increased cross-border cooperation the ECSEL programme helps to maximise the impact of investments by European industry, the European Commission and the EU participating Member States for CPS research and innovation. Germany – with its plethora of industrial and research partners –, as well as the BMBF itself, is actively involved and committed to ECSEL.

The European Commission has an amount of funding available for CPS, but this amount depends upon the amount of funding from the participating states in the respective fields.

What actions will BMBF take to get CPS on the agenda of the German government, as participating state, and to consequently increase the investment of the European Commission in CPS?
Embedded and Cyber-Physical Systems have been on the agenda of the German government for many years now.

DR.-ING. HERBERT ZEISEL (MINISTERIALRAT):

In 1983, Dr. Zeisel graduated as Dipl.-Ing. in Chemical-Engineering at the "Friedrich-Alexander-University" in Erlangen-Nuremberg. He started his professional career as Research Engineer at "PetroCanada" (Calgary, Canada), before he joined the "Institute of Fluid Mechanics" (Prof. Dr. F. Durst, University of Erlangen) in 1985 to do his PhD work. After he was awarded his PhD, he got employed at the "VDI/VDE IT" in Berlin in 1988. While working there, he was ordered to the "Federal Ministry for Research and Technology" (BMFT, Bonn) to work as a consultant in the field of "Micro Systems Technology". In 1990, Dr. Zeisel got employed directly at the BMFT, working as a research manager. He worked in different fields, such as "Microelectronics", "Advanced Software Development", "IT-Services" and "Internet Technologies"; since 1994 Dr. Zeisel filled these positions as "Head of Division". In 2002, Dr. Zeisel was ordered to the "DLR-Projektträger", a part of the German Aerospace Agency (DLR). There he took over the position of the Coordinating Director in the field of "Information and Communication Technologies" (ICT). In addition, he was heading the "National ICT Contact Point" within the 6th and 7th EU Framework Program. On behalf of the BMBF he also represented Germany in the "Information Society and Technologies Committee" (ICT-C) and in several other EU and international organisations as head of the German delegation.

In 2010, back in the "Federal Ministry of Education and Research" (BMBF), Dr. Zeisel was responsible for "Nanotechnology and New Materials". His special interest was laid on "Materials and Safety in Battery Storage Systems". Additionally, Dr. Zeisel´s responsibilities included the supervision of 7 Leibniz Institutes (IFW, IPF, IOM, LiKat, ISAS, INM, DWI), 2 Helmholtz Centers (HZG, KIT) and 1 Max-Planck Institute (MPI-E), where he served as a member of the Board of Trustees. Currently, Dr. Zeisel acts as Deputy Director General in the area "Key Technologies for Growth" at the BMBF.

IT IS MY PLEASURE TO INVITE EVERYONE TO TAKE THE OPPORTUNITY TO COME TO BERLIN TO SEE ALL THE POSITIVE AND SUCCESSFUL EXAMPLES OF WHAT A JOINT EUROPEAN EFFORT CAN ACHIEVE AND TO BE PART OF THE DISCUSSION ON THE FUTURE OF EUROPEAN INDUSTRY – SMART INDUSTRY.

For the BMBF, supporting the field of CPS and tackling open research questions in the context of CPS have always been a priority within the area of software-intensive and software-based systems. CPS is gaining importance for many industry sectors that are of relevance for Germany. Additionally, it is a given fact that there are still lots of interesting and unsolved challenges for Cyber-Physical Systems and their application in different industries. There is no doubt that CPS will remain an important topic on the agenda of the BMBF. We very much welcome the fact that the European Commission has taken up this topic and is addressing CPS research and innovation on a European level in various ways, either via ECSEL or via H2020 calls. The commitment of the European Commission to research and innovation projects in ECSEL has been successfully increased from 16 % to 50 % of the public funding for these projects. That is a remarkable increase, which confirms the priority of ECSEL projects for the Commission and leverages the given funding of Member States for CPS research.

Germany was innovative by being the first to discuss 'Industrie 4.0' (the fourth industrial revolution), and after that, Smart Industry became a more discussed theme and is even called a 'game changer for businesses' in Europe.

What influence do you think that Smart Industry has on the German industry?
The fourth industrial revolution is undeniable. Driven by the internet, the real and virtual worlds are growing closer together. Industrial production of the future will be characterised by the strong individualisation of products under the conditions of highly flexible production and the extensive integration of customers and business partners in business and value-added processes. Production will be linked to high-quality services, leading to so-called hybrid products. It is a matter of fact that this industrial revolution will affect not only most German but also most European companies. Along with increased automation in industry, the development of intelligent monitoring and autonomous decision-making processes is particularly important in order to be able to steer and optimize both companies and entire value-adding networks in almost real time. These value-adding networks, which span the whole of Europe and beyond, are the key to strengthening production in Europe and to succeeding in the global competition. German industry is well aware of the opportunities and challenges that "Industrie 4.0" is offering and has set up a "Plattform Industrie 4.0", whose aim it is to actively shape the fourth industrial revolution and strengthen the German economy.

In what timeline do you see the fifth industrial revolution (Industrie 5.0), what focus would it have and will Germany be again the initiator of a so-called revolution? Will autonomous systems based on CPS play a role there?
Regarding a potential fifth revolution, we should not put the cart before the horse. The new steam-engine "Industrie 4.0" has just started to produce steam, there is still a lot to do before our industry is revolutionised. "Industrie 4.0" really has the potential to become a game changer for businesses as it picks up technology that is mature for widespread implementation in industry. We should focus on the next steps of this fourth revolution, so that Europe is the one changing the game, not other regions in the world.

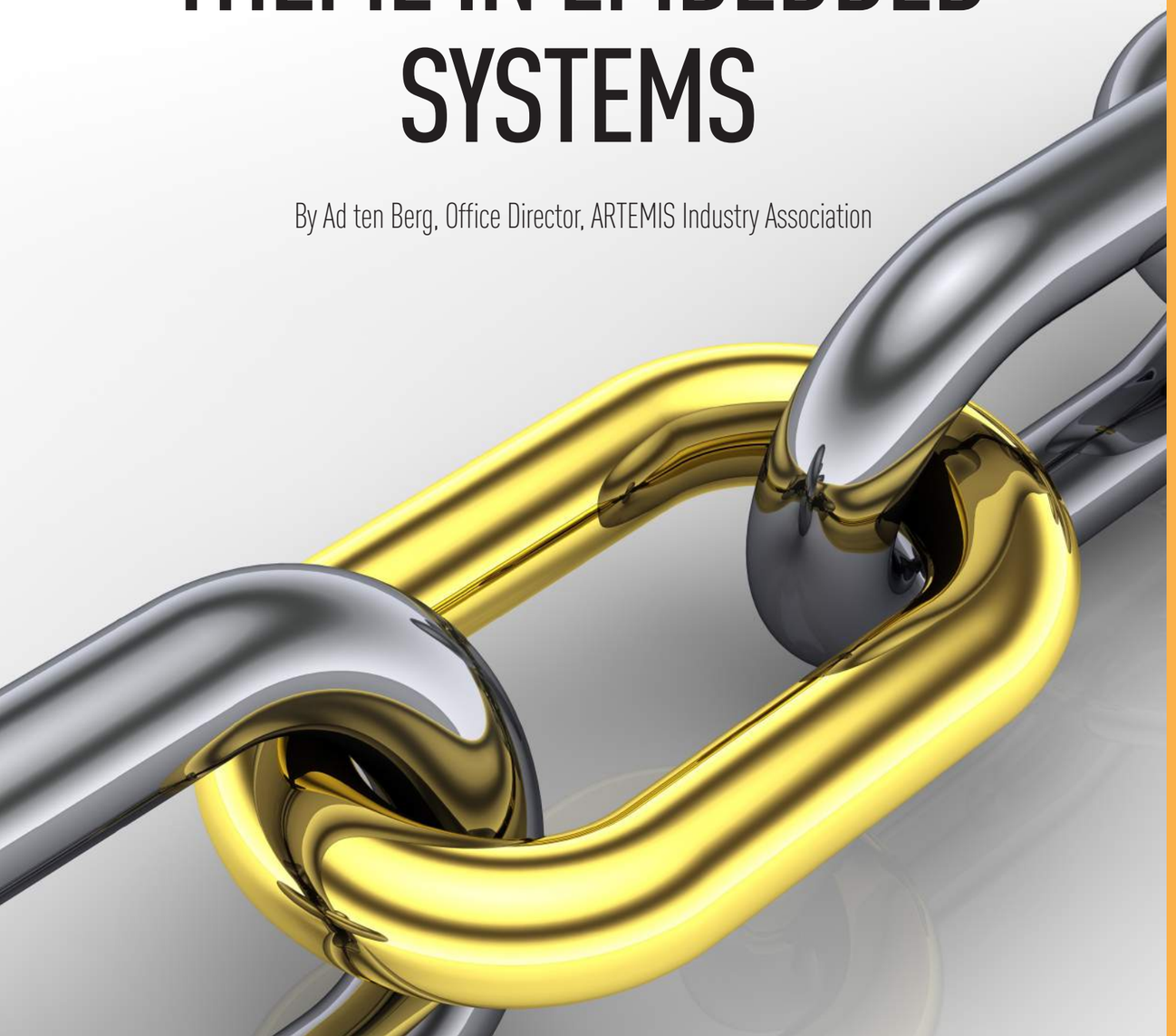
The Co-summit 2015 – themed: "Smart Industry: Impact of Software Innovation" – is organised by ARTEMIS and ITEA and will take place in Berlin, Germany in March 2015.

In view of the strong relations of Germany with ARTEMIS and ITEA and the high participation of the German industry in both programmes, what is the expectation you have of the Co-summit 2015?
From the perspective of the BMBF, the Co-Summit is an important platform for exchange, communication and networking for all European partners in the fields of software-intensive systems, including Embedded Systems and CPS. It is an opportunity for industry, Member States and the two organisations ARTEMIS-IA and ITEA to come together and to present the successful exploitation of research results, to discuss current research activities as well as future needs for research. Thus, we are very happy to have the Co-Summit in Berlin in a few months' time. I am convinced that German companies and German research institutions in particular – with "Industrie 4.0" being a priority topic in Germany – can offer a broad range of competences in the discussion on "Smart Industry: Impact of Software Innovation".

I wish the ARTEMIS-ITEA Co-Summit office all the best and plenty of energy in preparing the summit.

RELIABILITY, A LEADING THEME IN EMBEDDED SYSTEMS

By Ad ten Berg, Office Director, ARTEMIS Industry Association



Secure, industrial-strength interoperable software design tools are important to many sectors of European industry, and in particular to the automotive, aerospace, industrial processes and medical/healthcare sectors. These industries form the backbone of virtually all European industrial output and the future economic success of these industries depends upon being able to deliver very high quality, ultra-reliable products.

Designing ultra-reliable products is the core of the domain classified in the "ARTEMIS Book of Successes" as the ARTEMIS "Hi-Rel" (high reliability) cluster. The projects in this domain are therefore of particular importance and interest to industry, which is illustrated by the size of this Hi-Rel cluster.

CESAR

The long series of projects in this cluster started with and around the CESAR project. CESAR was a very large project and, for the first four Calls, the largest project in the ARTEMIS portfolio. Its importance, in terms of both size and topic, has generated such gravitational pull that many projects, after starting out as essentially free-standing entities, have quickly connected to CESAR.

What CESAR has created is a "Reference Technology Platform" (the CESAR RTP or CRTP). In essence, this is a sophisticated toolkit to manage the plethora of tools needed when developing software-intensive products for markets that demand the absolutely highest standards of reliability, which must pass through complex certification processes. The CRTP allows relevant and interoperable tools to be selected for particular market/product requirements and generate a customised working environment in which these tools can be used to their best advantage. It is in essence a "Tool Platform", as described in the ARTEMIS AWPs. For this, it feeds on its own technological developments, and a large and expanding database of tools and process descriptions (methods of working) from within itself or provided from outside sources (often other projects' output). In 2012 the CESAR RTP successfully applied for the ARTEMIS Tool Platform label. CESAR has ended, but its successor project Crystal has taken over the baton and is now well underway. In this Magazine, we focus on the later projects in the ARTEMIS programme in this "Hi-Rel" cluster.

TECHNOLOGY CONFERENCES

A key issue identified in this cluster is the interoperability of the tools and data-formats they use, and CESAR and other projects around it organised a forum, the ARTEMIS Technology Conference 2012, specifically to discuss this topic in-depth. This event, in hindsight the first of a series, was hosted by CESAR and co-hosted by iFEST, MBAT and pSAFECER in conjunction with the Embedded World 2012 and the ARTEMIS Spring Event 2012.

The second European Conference on Interoperability for Embedded Systems Development Environments was held in 2013, then back-to-back with the Co-Summit 2013 in Stockholm. The main goal was to provide a meeting place for all interested in Interoperability Specifications (IOS) related efforts working towards a common understanding of the main IOS related challenges. This second conference was organised by the ARTEMIS projects MBAT, CRYSTAL and iFEST, and the CPSE project of EIT ICT Labs, and was again a great success, reported in this Magazine.

A third conference in this series and on this topic has been held on October 9 in Paris. This 3rd European Conference on Interoperability for Embedded Systems Development Environments was organised again by MBAT and Crystal. The main focus of this year's conference was on ALM and PLM interoperability. Events like this ARTEMIS Technology Conference, now developing on its own path, are a proof-point on the way of creating sustainable development communities in Embedded Systems, beyond the projects. Events like this show the engagement of all stakeholders to push the harmonisation of approaches forward and to foster and continuously improve the interoperability concepts, which are so essential for the successful application of Embedded Systems.

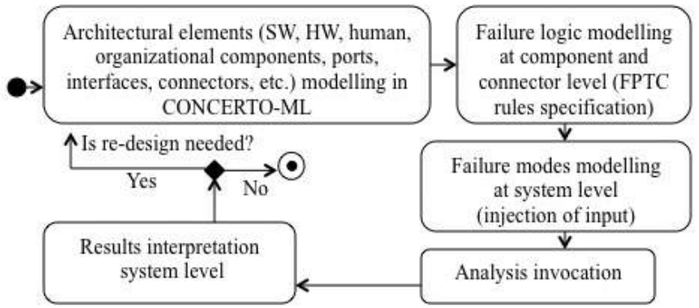
CONCERTO ARTEMIS CALL 2012

By Silvia Mazzini, INTECS, Italy

As technology advances, we become increasingly dependent on automated systems, which serve and assist several aspects of our daily activities. The reliability and safety of such systems must be carefully evaluated before putting them to use. Indeed, many application domains, from telecommunications to medical, from petroleum to automotive, have to account for the provision of these properties all along the development process.

Presently, multiple heterogeneous techniques are used to this end, as a reflection of the diversity of the application domains and of the involved actors. In spite of the considerable maturity reached by the state of the art, not all the aspects of interest are fully covered yet; the complexity of modern systems keeps increasing, with new challenges being presented, responded by new standards (e.g., ISO 26262, functional safety of road vehicles).

The principal goal of the CONCERTO project is to provide a consistent methodology for designing, deploying, and operating reliable and safe systems. We pursue this objective by identifying cross-cutting concerns, which are relevant for multiple application domains, notably avionics, telecommunications, telecare, petroleum, and automotive, and propose solutions to address them in a uniform way.



FAILURE LOGIC ANALYSIS (FLA) FOR SOCIO-TECHNICAL SYSTEMS

The scope of the safety analysis to be supported in CONCERTO extends to socio-technical systems, where human and organisational factors play an important role. A thorough and comprehensive coverage of the reliability and safety issues of a socio-technical system requires acquiring a profound understanding of its human and organisational factors, as well as of its technical components. For example, on a petroleum installation – which is one of the use cases studied in CONCERTO – safety depends both on the reliability of technical installations, such as gas detectors, controllers etc., as well as on the actions of human operators. Analysis approaches that solely focus on technical components without considering, for example, how human decision makers may respond to a technical failure, are incapable of adequately capturing the wide variety of safety risk scenarios that need to be considered.

To address this challenge in CONCERTO, we propose a method called CONCERTO-FLA.

As depicted in the diagram, CONCERTO-FLA enables architects and analysts to interpret human actors and organisations in terms of (system) components, and their behaviour in terms of failure logic. CONCERTO-FLA includes multiple voices, as in a musical concert: not only technological components, but also human and organisational components. The CONCERTO proposal builds on a pre-existing classification of typical organizational and human failures, and combines it with the typical failure classification provided in and used in CHESS-FLA (the result of a precursor approach, initiated in the CHESS project (http://www.chess-project.org), predecessor to CONCERTO, which only targets architectures composed of software and hardware components). The result is a novel approach to model-based safety analysis that:

- is specifically aimed at socio-technical systems,
- supports the capture of human, organisational and technical components in a common model, thus facilitating unified analysis of complex socio-technical systems,
- is based on existing classifications of human, organisational and technical failures, thereby exploiting existing domain knowledge, and
- facilitates automated analysis of complex failure propagations and transformations, with back-propagation of analysis results to the component model, in order to ease understanding of the results.

Website: http://www.concerto-project.org

CRYSTAL AIPP, ARTEMIS CALL 2012

By Christian El Salloum and Annemarie Hamedler, AVL List GmbH, Austria

A safety-critical system is a system whose failure or malfunction may cause death or serious injury to people, loss or severe damage to equipment, environmental harm or significant financial loss. The reliability requirements for such systems can be extremely high, and may require that the system is designed to achieve less than one failure per billion hours of operation, which is very demanding.
A promising approach to improve the reliability of a safety-critical system is to eliminate manual steps in the development process whenever possible, since people will always make mistakes and exactly such mistakes are the most common cause of catastrophic system failures.

A particular challenge regarding this topic is that systems engineering for safety-critical systems requires a multitude of specialised tools supporting the different engineering activities throughout the entire development process. OEMs (Original Equipment Manufacturers) and suppliers are typically operating a large set of tools from different vendors, often complemented by customised in-house solutions. To eliminate the manual steps, which are required for transferring data from one tool to another, the individual tools have to be integrated into a seamless System Engineering Environment (SEE). Today, tool integration is often done in an ad-hoc manner, by creating proprietary bridges between each pair of tools. Such an

approach does not scale, since the number of required bridges grows exponentially with the number of employed tools. Moreover, the resulting tool chain becomes extremely vulnerable to common changes, such as version upgrades from tool vendors, and the efforts for maintaining a large set of bridges is sooner or later no longer acceptable.
The main technical challenge in addressing this problem is the provision of open and common interoperability technologies supported by the different tools which generate and provide access to data covering the entire product lifecycle.

THE CRYSTAL APPROACH

The CRYSTAL (CRitical sYSTem engineering AcceLeration) project has identified this need and takes on the challenge to establish and push forward an Interoperability Specification (IOS) as an open European standard for the development of safety-critical Embedded Systems in the automotive, aerospace, rail and healthcare domain. This standard will allow loosely coupled tools to share and interlink their data based on standardised and open web technologies that enable common interoperability among various life cycle domains.

CRYSTAL implements the IOS in industrial use cases from the automotive, aerospace, rail and health sector. Furthermore, the project partners will deliver more than one hundred interoperable building blocks for constructing tailor-made system engineering environments. These building blocks address Requirements Based Engineering, Heterogeneous Simulation, Safety Engineering, Product Lifecycle Management, Multi-viewpoint Engineering, Variability Management and several other engineering domains.

COLLABORATION AS A CORNERSTONE

Collaboration is the cornerstone of CRYSTAL's implementation strategy. Instead of being restricted to competitive thinking, the mission of the project is to cooperate with other running European and national projects and to reuse the results of successful projects that are already finished. CRYSTAL brings the individual results together, harmonises and enriches them. The overall aim is to bring promising results to maturity, so that they can be taken up for adoption in the industry. Examples of related projects are CESAR, iFEST, MBAT, p/nSAFECER, SAFE, TIMMO-2-USE, OPENCOSS and EMC^2.

The CRYSTAL interoperability standard is also not necessarily a competitor to other standards. Instead of developing everything from scratch, CRYSTAL analyses existing standards in the different areas and incorporates successful elements whenever appropriate. Throughout the entire project, CRYSTAL will stay in close exchange with standardisation organisations, such as ASAM, ProSTEP iViP, OASIS, OMG, CENELEC and others, in order to build up on existing achievements and to join forces through collaboration in the standardisation process. With a budget of more than 82 million euros and 68 partners from 10 different European countries, CRYSTAL has the critical mass to make the big vision come true – *a Uniform European Standard for Tool Interoperability.*

MARKET IMPACT

The aims of CRYSTAL are ambitious and the expected results will have significant economical and societal impacts. OEMs will benefit from better supplier collaboration, as well as from reduced system design costs due to the improved and the smart integration of system analysis, safety analysis and system exploration tools. In addition, the CRYSTAL IOS will increase the flexibility for all stakeholders and has the potential to deeply impact the market on a global level. OEMs can easily combine tools from different vendors, and tool vendors will be able to find new market opportunities in an open and extensible environment.

CURRENT STATE AND OUTLOOK

CRYSTAL started on May 1, 2013 and has successfully passed the first annual review in June 2014, where all due deliverables were accepted by the reviewers. The presented results included the first version of the Interoperability Specification (IOS), the methodologies, the tools and tool extensions, as well as the first version of the definition, specification and design of the use cases in the four application domains. Among the highlights were also running prototypes of selected aspects of the use cases demonstrating the feasibility of the CRYSTAL approach. The project team is currently working on the next version of the IOS and on maturing the methodologies and the use cases in the four industrial domains.

Acknowledgement: The research leading to these results has received funding from the European Union's Seventh Framework Program (FP7/2007–2013) for CRYSTAL – Critical System Engineering Acceleration Joint Undertaking under grant agreement No. 332830 and from specific national programs and/or funding authorities.

Website: http://www.crystal-artemis.eu/

VARIES ARTEMIS CALL 2011

By the VARIES consortium

The general goal of the VARIES project is to help Embedded Systems developers unleash the full potential of product variability in safety-critical Embedded Systems.

PRODUCT PLATFORM MODEL

Many companies are confronted with the question how to offer a large product variety to their customers, without increasing costs and without losing product quality. Product quality entails the technical product performance, as well as the requirement to meet safety standards. Learning from the automotive industry, companies have discovered the benefits of product platforms as a way to offer a large amount of reliable product variants at a reasonable cost. In the VARIES project **Barco**, **Vlerick** and **Sirris** have joined forces, to build a quantitative model to determine the optimal strategic product platform decisions, such as how many platforms to develop, what these platforms should look like, and which products to derive from which platforms. After gaining insight on technical constraints, product and platform features and the product portfolio's scope and characteristics, the analysis focused on capturing different costs impacted by the platform decisions – such as the cost of development, purchasing, inventory, certification and maintenance. The model shows that an integrated cost perspective is indispensable for correct platform decisions, and that multiple platforms can be cost beneficial. In short, the following principles can be applied: re-use components, segment the product portfolio, design bottom-up in the portfolio, and re-use schematics. The cost model can bring more insights on the optimal number of segments. The supply chain performance of current selected concepts has been assessed, and gave the following results: 12% less different components (24% less relative to the number of products), 5.3% less safety stock inventory and 46% less development time in a mature platform phase.

REUSABILITY

Spicer, together with **FMTC** and **Sirris**, is looking for synergies between the off-highway, commercial and light vehicles, and power technologies market. Several characteristics of these markets drive variability decisions on technological level and on business level. Spicer strives for a high reusability of hardware and software components for the different safety-critical mechatronic systems that will be developed in future applications for these markets. The re-use is crucial: different variants of the hardware and software are needed to offer solutions for low, mid and high-end controllers with related attractive cost. Product variants are tested in a more efficient and effective way with a better coverage to obtain higher quality and reliability, and the effort of certification of product variants is decreasing. First results show that the number of re-use is heading towards 75% for different applications with simple variability management techniques.

UNIFIED CONFIGURATION

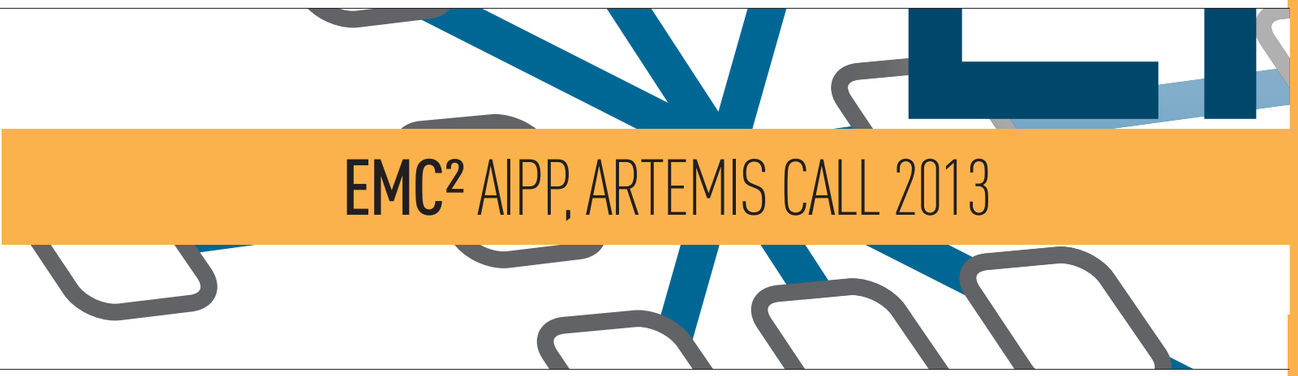
Autronica Fire and Security develops, produces and markets fire alarm systems for the professional global market. The products are safety critical and conform to a wide set of both general and country specific rules and regulations (IEC61508). Typical applications are large public buildings, off shore oil rigs and cruise liners. All installations are different and need specific configuration, both of the topological structure and of different system properties that control the system's behavior. The main focus for Autronica in the VARIES project has been to simplify and unify the configuration of Autronica systems. The long term goal for Autronica is to have a common unified configuration process for all products. **Autronica**, together with **SINTEF** and **ITU**, have made a detailed model of the domain that covers two of the fire alarm systems, AutroSafe and Autroprime. VARIES

technology, BVR, has then been applied on this model to automatically generate prototype configuration tools for the two systems from this common core model. This approach will simplify maintenance of the configuration tool and ensures that constraints due to market, regulations, safety etc. are taken care of in the produced configurations.

CONSISTENT, INTEGRATED AND CONTINUOUS VARIABILITY MANAGEMENT

The **Metso** and **VTT** co-operation in VARIES focuses on product upgrade services and their variability management activities for the industrial automation product sector. Metso's industrial automation systems are multi-technological systems that contain in-house developed and COTS hardware and software sub-systems. In some cases these systems must also meet the requirements of safety criticality (IEC61508). Automation systems have strict requirements on the system's reliability, since all downtime is costly for factories. In such circumstances, all upgrades require special concern and planning, in a context of collaboration between the automation system's provider and user, to minimise downtime in the user's critical processes. In the VARIES project, with the help of VTT, Metso has increased automation in the planning process of upgrades and is now able to provide accurate life cycle plans, precise cost and change estimations for each Metso's customers. This is remarkable improvement e.g. in ensuring the reliability of the customer's automation system and in supporting the upgrade negotiations with the customer. With better upgrade services and more systematic variability management practices Metso can increase upgrade service business, by keeping the customer's automation system up-to-date by gradually upgrading it based on a jointly (customer – provider) agreed plan and, therefore, avoid costly big-bang upgrades that might come as a surprise.

Website: www.varies.eu



EMC² AIPP, ARTEMIS CALL 2013

By Daniel Schneider1, Eric Armengaud[2], Erwin Schoitsch[3], Knut Hufeld[4]

Embedded Systems are already integrated into our everyday life and play a central role in our society, by improving existing services or providing new solutions in all domains, including automotive, aerospace, automation, healthcare, industry, energy, communications, and consumer electronics. In 2010, the Embedded Systems market accounted for almost €852 billion, and is expected to reach €1.5 trillion by 2015 (assuming an annual growth rate of 12%)[5]. With the advent of the new computing paradigm of Cyber-Physical Systems (CPS), the Embedded Systems segment is presently undergoing a disruptive innovation process, where different kinds of systems are connected to each other, boundaries between application domains become blurred, and interoperability plays an increasing role. This implies that formerly closed systems are forced to open up for the dynamic integration with other third-party systems. At the same time, multi-core and many-core processors are becoming available, whose exploitation for critical and real-time applications is presently too slow, inefficient, and expensive.

The objective of the EMC² (Embedded Multi-Core systems for Mixed Criticality applications in dynamic and changeable real-time environments) project is to foster this change of Embedded Systems through an innovative and sustainable service-oriented architecture approach for mixed criticality applications in dynamic and changeable real-time environments. With almost 100 partners and a volume of approximately €100 million, the ARTEMIS EMC² project stands out as the largest project ever on these topics. The project builds on the results of previous ARTEMIS and European projects and is making the big step from basic research to industrial applications. The following challenges will be addressed and solutions will be developed to overcome:

- dynamic adaptability in open systems;
- utilisation of expensive system features only as service-on-demand, in order to reduce the overall system cost;
- handling of mixed-criticality applications under real-time conditions;
- scalability and utmost flexibility;
- full-scale deployment and management of integrated tool chains throughout the entire lifecycle.

As can be seen from the EMC² core challenges, the project has a specific focus on two somewhat related core characteristics of CPS: their openness towards dynamic integration with other systems and their ability to adapt themselves to changing environmental conditions. On the one hand, these characteristics are one central reason for the tremendous potential of CPS – but on the other hand, they also impose significant challenges regarding the assurance of safety, reliability, and security, since established engineering approaches need to be adapted according to the non-linearly growing system complexity. Without adequate evidence of dependability, however, product releases may be prevented, or there might even be costly recall actions. These risks might well prove to be a significant hindrance for the proliferation of CPS, particularly in light of the fact that many of the most promising application domains (such as automotive, aviation, production, medical care, etc.) are inherently safety-critical.

EMC² has consequently dedicated one of its six technical work packages (WP6) to the topic of qualification and certification. In this work package, the following challenges shall be answered:

- **Safety and security co-engineering framework**
  In the context of CPS, safety can no longer be considered independent from security. EMC² will therefore investigate, develop, and validate methodologies and technical solutions for a holistic approach to safety and security throughout a system's lifetime, taking into account mission-critical and real-time requirements. Security might have an impact on safety, by giving advice on how to integrate the security aspect as an additional hazard (risk) for the safety-critical system, i.e. by looking at the safety impact of security breaches and then deriving requirements for the safety-critical system based on a joint hazard, risk, and vulnerability analysis.
- **Trust assurance case compilation**
  Due to the increasing complexity of systems, it is also becoming increasingly complex to soundly argue their safety. Thus, the goal of EMC² is to provide the capability to compile seamless argumentation on why the developed system or product is sufficiently safe (and secure) for its intended application. This argumentation is intended to serve as documentation (red story line) for certification activities.
- **Modularisation of the safety and security co-engineering framework for use in distributed environments at design time**
  Next-generation systems of systems are being developed by many different manufacturers. EMC² thus strives to provide import / export capabilities for the safety / security co-engineering framework at dedicated development milestones, so that specific activities performed by external teams can be integrated into the overall framework.
- **Concepts and mechanisms for runtime trust certification of Cyber-Physical Systems**
  Due to the highly dynamic nature of CPS, it is not feasible to completely pre-analyse them at development time already. Therefore means are needed for shifting certain safety- and security-related checks to runtime, when a CPS is actually integrated and (re-)configured. EMC² intends to develop a runtime certification approach that determines and tracks valid safety guarantees during runtime, based on the resolution of safety and security demands with respect to the system's environment (i.e. other systems or even the physical world).

Website: http://www.emc2-project.eu/

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ARTEMIS-ETP ACTIVITIES

By Ad ten Berg, Office Director, ARTEMIS Industry Association

Already from its first day of existence, ARTEMIS Industry Association represents/embodies the ARTEMIS European Technology Platform (ETP) covering the domain of Embedded Systems. The first and most visible activity is the creation and updating of the ARTEMIS Strategic Research Agenda (SRA) that provides a pan-European scope in the domain of Embedded and Cyber-Physical Systems. The SRA always formulates the industrial research challenges and priorities for at least ten years ahead.

The first version of the ARTEMIS SRA was finalised in 2006 and the second version was completed in 2011. As preparation for the first Multi Annual Strategic Research Innovation Agenda (MASRIA 2014) of ECSEL Joint Undertaking, an intermediate updated SRA has been realised in 2013. The next version of the ARTEMIS SRA is now planned for 2016, as has been decided by the ARTEMIS-IA Steering Board in its meeting of October 6, 2014. The ARTEMIS Working Group SRA, co-chaired by Laila Gide and Tatu Koljonen, manages all activities around this important strategic document.

As the ARTEMIS-ETP has been supported by a dedicated research programme on Embedded Systems, executed by ARTEMIS-JU, the focus over the last years has been on the support of the ARTEMIS programme, with the aim to create maximal impact and opportunities for our members.

However, as the ARTEMIS-ETP has a pan-European focus, ARTEMIS-IA also builds links to other organisations that are active in domains with a clear relation to Embedded and Cyber-Physical Systems. The most prominent relation is with ITEA, expressed by the Co-summit yearly event that we co-organise and the strategic document 'Vision 2030', which we co-developed.

The ARTEMIS-IA activities for reaching out to other organisations will get more attention in the coming years, to create even more opportunities for our members and strengthen the R&I community of Embedded and Cyber-Physical Systems. In this scope, we will approach a shortlist of ETP's and institutional PPP's for which Embedded and Cyber- Physical Systems are crucial enabling technologies to realise their research targets. The H2020 ICT community will also be addressed.

In order to make a start with this renewed reach-out, representatives of EFFRA and NESSI will present respectively the Factories of the Future PPP and the Big Data PPP at the ARTEMIS-IA General Assembly and Pre-Brokerage event in December 2014, Vienna. The supporting activity CyPhERS will present its findings that are relevant for the CPS community. The Working Group SRA is also active to create better links to the relevant sections of the LEIT ICT programme of Horizon2020. As a result, this year for the first time, the WG SRA has provided input of the ARTEMIS-IA members to the LEIT ICT work programme for 2016-2017. We consider this an important step to create broader opportunities for ARTEMIS-IA members and to make existing opportunities more visible.

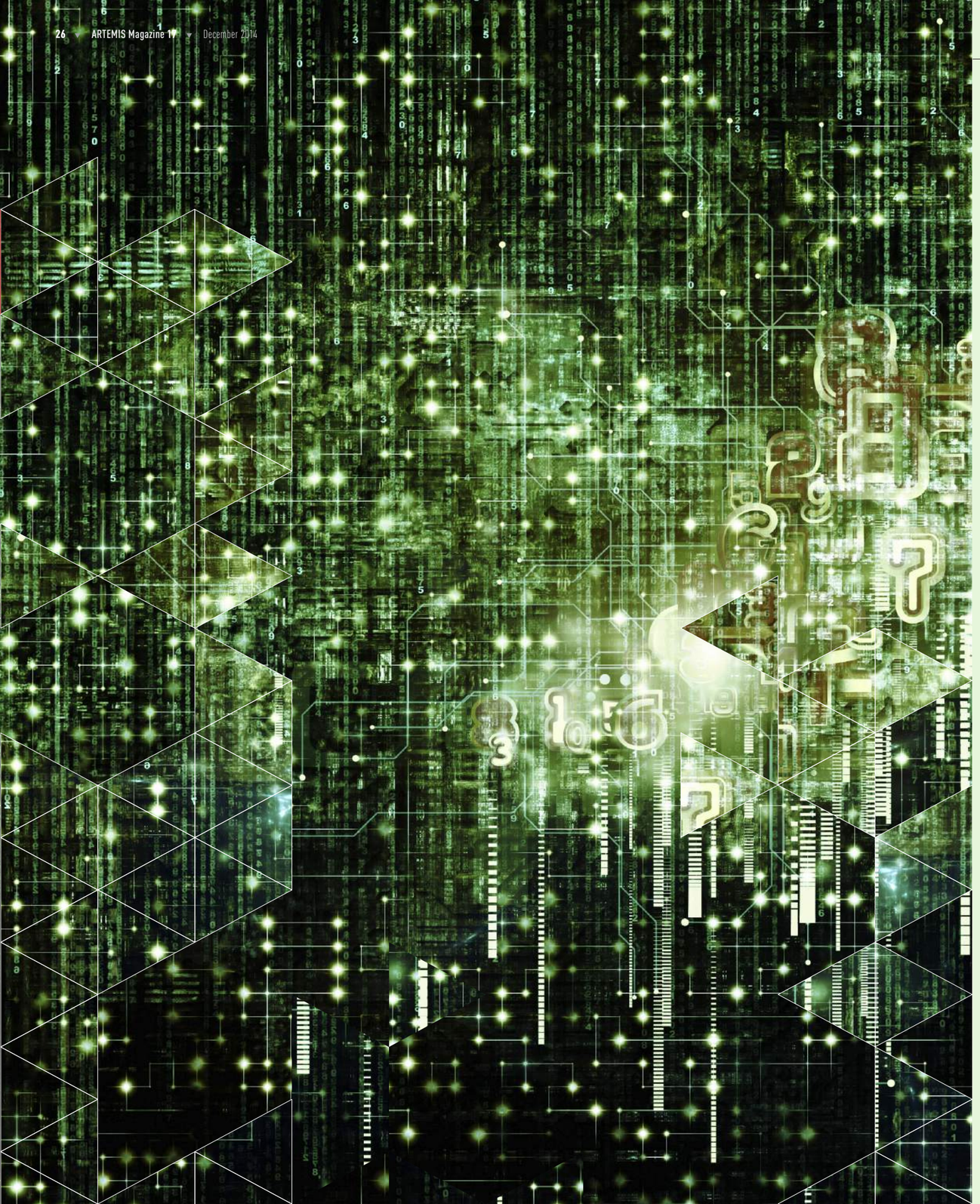
CP-SETIS, A STANDARDISATION SUPPORT ACTION

By Ad ten Berg, Office Director of ARTEMIS Industry Association and Jürgen Niehaus , Managing Director of SafeTRANS

Additionally, as ARTEMIS ETP, ARTEMIS Industry Association will participate in the CP-SETIS project, an Innovation action in Horizon2020. CP-SETIS is an acronym for: "Towards **C**yber-**P**hysical **S**ystems **E**ngineering **T**ools **I**nteroperability **S**tandards". CP-SETIS is also supported by the Working Group Standardisation, with Josef Affenzeller and Laila Gide as co-chairs of the WG. The coordinator of CP-SETIS is Jürgen Niehaus of SafeTRANS. This project will push the complex topic of managing Interoperability Standards for CPS engineering tools to the next stage.

CPS require multiple engineering competences across various engineering disciplines. The development of such systems is a huge challenge, also because of the heterogeneity of engineering tools involved in development platforms across the development lifecycle. In order to overcome this challenge, past and on-going EU research projects, most of them in the ARTEMIS-JU programme, have developed the basis for a Standard for Development Tool Interoperability, the so-called Interoperability Specification (IOS). However, due to lack of coordination, current IOS-related activities - especially with respect to its standardisation and possible extensions - are uncoordinated, endangering the huge financial effort that has been put into the IOS and the chance to establish it as a formal International Open Standard.

The main goal of CP-SETIS is to conceive and setup a sustainable organisational structure as a platform, joining all stakeholders to coordinate all IOS-related activities. CP-SETIS will ensure the commitment of all stakeholders to coordinate all IOS-related activities within this structure. In this way, CP-SETIS will secure the huge effort that has been put into the IOS, furthering and enabling the setup of the IOS as a formal standard, and enabling the enormous potential of the IOS for innovations in interoperable tools needed for engineering future generations of Cyber-Physical Systems. CP-SETIS will also use lessons learned during this process to update the ARTEMIS/PROSE Standardisation Agenda.



SMART INDUSTRY

By Egbert-Jan Sol (Director of Innovation – High-Tech Systems & Materials, TNO), Sam Helmer (Business Development Manager – TNO High Tech Systems & Materials), Chris Horgan (CPLS Text & Copy)

The industrial revolution of the 18th and 19th centuries saw the introduction of mechanical production cause a shift from an agrarian, handicraft-based economy to one led by industry and machine manufacturing. The second transition at the turn of the 20th century brought industrial mass production, with assembly lines and factories creating products for mass consumption. At the end of the same century came the deployment of electronics and IT in industrial processes and robotics, automating and optimising production lines with machines taking over complex, repetitive human tasks. Now we are on the brink of a fourth industrial revolution, based on two decades of rapid advances in Internet Technology with a sweeping impact on the economy and society as a whole. Information and Communication Technologies are combining and converging with sensor technology and robotics to form an Internet of Things that will profoundly transform the industrial system.

SMART INDUSTRY: IMPACT OF SOFTWARE INNOVATION

Automation, robotisation, digitisation, globalisation, customer personalisation and new production methods like 3D-printing have conjoined to sneak up on us almost unnoticed with a monumental shift: the Fourth Industrial Revolution. Equipment and production system scan communicate with each other without a human interface. Intelligent sensors and Embedded Systems are bringing zero- defect production with flexible, customised items within reach. Big data enables value to be added both within and outside the chain, something that had not previously been possible. Logistics by the minute, for example. European industry must embrace all these developments to compete worldwide. Developments that go by the name: Smart Industry.

Smart Industry is built on three pillars:

> High quality, network-centric communication between players, humans and systems, in the entire value network, including the end-users.
> Digitisation of information and communication among all value chain partners and in the production process on all levels.
> Granular, flexible and intelligent manufacturing technologies adjustable on the fly to meet highly-specific end-user demands.

There is no single technology or technology domain that governs the Smart Industry revolution. What we see is an alignment and convergence of rapid progress in multiple domains, with sensor technology making devices aware of other devices and the world around them, Embedded Systems equipping them with 'a brain' to process and communicate their observations, while cloud technology and big data solutions collect, process, transport and store the massive amounts of information sensed and communicated by billions of devices. Together, these developments constitute the Internet of Things, an internet-style network of interconnected, intelligent machines, termed Cyber-Physical Systems (CPS). A key challenge for Smart Industry will be to create robust and secure networks. New and more intuitive forms of Human-Machine Interaction will also play a pivotal role in managing secure and robust networks, and smart industry value networks in general.

MASS CUSTOMISATION

These are some of the conclusions presented in *Smart Industry, Dutch industry fit for the future*. This report, presented to Dutch Prime Minister Rutte in April 2014 – and co-authored by TNO – the Netherlands Organisation for Applied Scientific Research, is the Dutch riposte to the German concept of *Industrie 4.0*, whose concept of the extremely automated production of unique products is largely geared to the automotive sector. Where a factory used to have the three basic requirements of labour, material and machinery – the hardware, a fourth has now become essential: information – the software. Smart Industry is about using information smartly, or software innovation, and to the full. Machines that talk to machines within and outside the chain. Smart software and communication will enable all component parts for a vehicle or installation or device to be delivered punctually in the right order and without fault. This requires the embedding of intelligence in the production environment. Enter the Internet of Things.

THE INDUSTRIAL INTERNET

The Internet of Things enables assets – physical things – to communicate something about themselves: what they are, where they are, their condition, their temperature and so on. These interconnected devices can then form a convergence point between the physical world and the digital world and enable the system to make smarter and timelier decisions about matters in the real world. This represents a paradigm shift in industry: a convergence of the real manufacturing world with the digital manufacturing world, to enable organisations to digitally plan and project the entire lifecycle of products and production facilities. Enter the industrial internet.

The full potential of the industrial internet will be felt when the three primary digital elements –intelligent devices, intelligent systems and intelligent automation – fully merge with the physical systems to enhance productivity, lower costs and reduce waste throughout the entire industrial economy. The huge shift that is happening in manufacturing today with the advent of new technologies, smarter assets and smarter devices have made today's advanced factories essentially data centres that present data to the right user at the right time. A real, sustainable manufacturing renaissance will be based on software technology and its profound effect on the entire manufacturing value chain. The boost this will give to productivity, efficiency and innovation, speed-to-market and flexibility will, in turn, lead to a powerful new cycle of growth and value creation: an era of *virtual-to-real manufacturing*.

URBAN MANUFACTURING

"What we are seeing today is that the manufacturers of yesterday – like Philips – are becoming the solution providers of today and tomorrow – close to the customer", says Egbert-Jan Sol, Director of Innovation – High-Tech Systems & Materials at TNO. "For instance, Philips does not make the light bulbs themselves anymore, but creates lighting solutions, for highways, buildings or even city centres. And suppliers have to perform sub-assembly manufacture at the drop of a hat – fast and custom-made. In this new business model, supplier-manufacturers will have to be able to interface intelligently and flexibly with their large customers, whose role is increasingly becoming manager of the user experience. This implies a need for modular, urban manufacturing close to the demanding user, whether professional or consumer."

3D PRINTING

A game-changer here is the increasing use of three-dimensional (3D) printing and additive manufacturing technology enabled by software and advanced technology. "A network of 'local' factories with additive manufacturing capability and a few robots will enable the customer to have his product assembled and delivered to his doorstep within a few hours of ordering," Sol suggests. "It is a matter of downloading the software and configuration – the logistics are facilitated by ICT rather than wheels – and products are built by machines layer by layer according to digital blueprints." Although the technology has been in use since the 1980s, until recently applications in industry had been limited to prototyping parts or products for analysis and testing. Increasingly, 3D printing technology can fabricate complex, high-value parts using powdered metals and lasers, and advances in 3D printing technology are enabling customisation at increasingly granular levels.

Medical device manufacturers can already make personalised orthopaedic joint replacement kits custom-fitted to an individual's anatomy. One is as likely to come across a 3D printer in a hospital as in a central production facility. And by adding a smart component such as a chip, a product can even 'interact' with the user. An example is the idea mooted by a university in the UK for a compact helmet containing a chip, complex algorithm and airbag, to be worn by people susceptible to falling, so that a fall can be anticipated and the impact thereby limited.

"Another advantage of additive manufacturing," says Sol, "apart from its flexibility, is that it requires fewer raw materials. Since it uses only what is needed, it is a much more sustainable form of manufacturing. Now we have to significantly boost the speed." Advanced manufacturers are actively pursuing the next frontier in production capabilities. The next cycle of software integration, advanced digitisation and networking will harness big data feedback in real-time from customers and suppliers, as well as information about the operation of the production machinery and the product as it is used. Production machines will become self-optimising.

CLUSTERS OF SOFTWARE EXPERTISE

It is in the European interest to facilitate these developments, and cooperation and collaboration will be vital. "The urban manufacturing concept will become a global phenomenon," Sol warns, "so it is essential for Europe to stay ahead of the game, certainly in our own market of 500 million consumers. It is a mature market that wants smart, personalised products and services rather than mass production. Innovation, software development and education will be keys to enabling Europe to reassert itself as a manufacturing leader. In terms of education, there is likely to be a greater focus on design, so not just programming for a virtual reality but for an actual product. Additive manufacturing offers possibilities for enriching engineering and technology with creativity. Print your own food – what shape, what texture, what flavour, what experience? Manufacturing then becomes a much more dynamic user-oriented interplay. It will create jobs and be essential in promoting innovation and long-term competitiveness, accelerating economic growth in both Europe and beyond."

Since all these goals depend on sophisticated software design and architecture, the role of clusters of software expertise is vital. This new era of advanced, virtual-to-real manufacturing will reorder the global business landscape for decades, and the key success factors for companies, countries and regions will be innovation, software and education. Manufacturers need to take a close look at their operations and look for opportunities to capitalise on software and advanced technology across their entire development and production process. These will be the *leaders* that set the future landscape in and for Europe.

ECSEL-GERMANY

JOINING FORCES, DEVELOPING COMPETENCE

How Europe will regain economic strength and prosperity

By Reinhard Ploss, Infineon Technologies AG, Germany

Competition on the global market is getting fiercer. Europe has to secure its competitiveness, but cannot and should not compete as a low-cost location for businesss, but by generating higher value. Despite current geopolitical risks, the world's current economic situation still seems to be intact. This may open a window of opportunity for regaining industrial power in Europe – to thus compete successfully with the Asian industry and the newly ambitious U.S. industry.

Key technologies can make a substantial contribution to building and strengthening reindustrialisation. I therefore welcome the decision of the European Commission to define Micro- and Nanoelectronics as one of the Key Enabling Technologies for Europe that particularly need to be supported. In this context, a public-private partnership on Electronic Components and Systems was established in the summer of 2014, in the form of ECSEL Joint Undertaking (Electronic Components and Systems for European Leadership). It merges the ARTEMIS Embedded Systems JTI and the ENIAC Nanoelectronics JTI together with the European Technology Platform on Smart Systems integration (EPoSS). ECSEL enables pan-European research activities with a broad application focus covering the entire value chain in the areas of Micro- and Nanoelectronics, Embedded/Cyber-Physical Systems and Smart integrated Systems. The joint undertaking targets a high project volume of almost five billion euros over the next seven years, thus aiming at critical mass.

German research and industry partners already launched ECSEL Germany in the spring of 2014, to support the new ECSEL Joint Undertaking. ECSEL Germany gives us a public voice for the dialog with our national authorities and policymakers, as well as with other German and European associations and communities.

With ECSEL Germany we will develop a comprehensive strategy for research and innovation in the area of electronic components and systems to sustainably improve Germany's competitiveness. In addition to Nanoelectronics and sensor-based Smart Systems, we will also focus on Embedded and Cyber-Physical Systems. We expect this technology in particular to have a major positive impact on further industrial development in Europe. We just need to think of the "Industry 4.0" approach, which has the potential to revolutionise and dramatically speed up manufacturing processes through the real-time integration of entire value chains.

Electronic components and systems are essential for Europe's industrial landscape and are an important foundation for future success and sustainable growth. European leadership in sectors like automotive, aerospace, railway, medical and health applications, energy networks, security systems and building infrastructure will benefit from an advanced capability and capacity to design and manufacture innovative and suitable electronic components and systems. Furthermore, this technology has to be seen in conjunction with the major challenges we – Germany, the European Union, the world – are facing. When we think about limited energy resources, greenhouse gas emissions and global warming, increasing demand for protecting sensitive data, demographic change and population explosion, growing megacities – electronic components and systems provide the solutions to make our world smarter, cleaner and safer.

With ECSEL we are taking a step in the right direction. Truly sustainable reindustrialisation is primarily not so much about production, but about competence. Competence in technology fosters differentiation, thus triggering competitive production. If we lose the competence, we will lose production. Competence is therefore the most important condition for sustainable jobs that add real value for people and our society.

Competence is at the center of ECSEL. By strengthening our know-how in electronic components and systems, we strengthen our competitiveness in a multitude of products and make the best of our industrial potential. We should remember that Europe has several qualities that serve as important conditions for successful reindustrialisation:

> A strong ability to manage complexity and diversity, including the understanding of systems in our industries, not only single elements
> Valuable patents
> An independent and reliable jurisdiction
> A culture of new ideas
> A good infrastructure
> And – not forgetting – peace, at least in the core of Europe

We can observe how this has positively affected European industries that are already successful, like automotive, aerospace or producers of environmental solutions. They have developed complex products and system solutions that are based on a wide and effective network – with electronic systems and components and with a wide system competence as a core element. Truly leading industries are enabled through differentiating technologies and competences along the entire value chain.

The ECSEL approach – joining forces and building competence – is a promising way to regain Europe's competitiveness, create and safeguard high-quality jobs, and ensure further growth and prosperity.

Reinhard Ploss is Chairman of ECSEL Germany; Deputy Chairpersons are Heinrich Daembkes (Airbus) and Günter Lugert (Siemens).

ECSEL-AUSTRIA

GOOD WORK IN PROGRESS

Josef Affenzeller (AVL, Austria) interviewed by Chris Horgan

ECSEL-Austria is an industry-driven national research, development and innovation platform representing the technology areas of Micro- and Nanoelectronics, Embedded & Cyber-Physical Systems and Smart Systems. Dr. Josef Affenzeller, Director of Research (Coordination) at AVL, explains the raison-d'être for ECSEL-Austria.

Founded by the former technology platforms ARTEMIS-Austria (Embedded Software and software architecture) and ENIAC-Austria (Micro- and Nanoelectronics) in 2013, ECSEL-Austria was enlarged by the areas of Smart Systems, framework conditions and visibility and network development in 2014 to form the five main pillars of the mission: to secure supply of key technologies and critical knowhow in the field of electronic components and systems to support innovation in all major sectors of the economy and society in Austria and in Europe.

It should be remembered that Austrian actors were prominent in helping to establish two associations to support the Joint Undertakings ARTEMIS and ENIAC during FP7. This led to the creation of the ARTEMIS-Austria and ENIAC-Austria associations to enable an aligned approach towards the Joint Undertakings in Brussels and to bring together the different players from universities, research centres and industry in Austria. ARTEMIS-Austria is a member of the Centres of Innovation Excellence EICOSE and ProcessIT.EU. Via this network, members of ARTEMIS-Austria became coordinators of the largest projects. In the area of semiconductor manufacturing, members from ENIAC-Austria actively coordinated the first European pilot line projects. As a result of these activities, the partners not only generate benefits for their respective organisations, but also contribute significantly to innovation in Austria, thus increasing knowledge and employment.

THE FIVE PILLARS

Looking at the five pillars, a brief summary of where the focus lies might help to identify the Austrian landscape a little more clearly. In the *Embedded Software and Software Architecture* pillar, ARTEMIS contributes, in particular at the level of increasing the impact of electronic components and systems, through mastering complexity to meet the environmental challenge. Furthermore, ARTEMIS activities contribute on a high level to the competitiveness, as well as cost efficiency in this market sector. In terms of *Micro- and Nanoelectronics*, the focus is on design technologies, process and integration, equipment, materials and manufacturing for Micro- and Nanoelectronics, while targeting miniaturisation, diversification and differentiation, heterogeneous integration. *Systems & Architectures* targets multi-disciplinary approaches for Smart Systems, supported by developments in holistic design and advanced manufacturing to realise self-reliant and adaptable Smart Systems with sophisticated interfaces and complex functionalities. The central spearheads of the *Framework Conditions and Visibility* area are the need to strengthen the common approach of the actors to increase the visibility of the Austrian Electronic Smart System sector and enhance framework conditions for innovation investments for the growth and improved employment in Austria, as well as Europe. Finally, *Resource and Network* development aims to create a platform for forging alliances and increasing the availability of resources.

LINK IN THE VALUE CHAIN

In essence, then, the goal of ECSEL-Austria is to strengthen the international competitiveness of Austrian companies in this sector and increase the international visibility of Austrian businesses and R&I facilities. "Austria is basically a supply country – providing goods like microchips for the automotive Industry," Affenzeller points out. "This gives us a good link in the value chain, but because we lack the end user, we need to be active in Europe to be successful. ECSEL-Austria supports business and industry to do that." So by encouraging cooperation, focus and performance among Austrian R&I institutions, input can be developed for European research activities, based on the strengths of Austrian actors. Not only does this accentuate the Austrian innovation landscape in Europe, but it also promotes Austria as an attractive location for establishing a business and expanding high-technology production.

BOOSTING SYNERGIES

"The challenge is to combine the activities of ARTEMIS, ENIAC and EPoSS in the newly merged ECSEL-Austria association," Affenzeller explains. "The various interest groups are still active, but they are also seeking to generate the potential of synergies and additional value chain for the future. Another challenge is to generate more projects as pilot lines with the integration of hardware, software and Smart Systems. In fact, during the recent Call for projects, there was so much interest, that an oversubscription can be expected. What is also important is that SMEs are also benefiting from conferences and workshops that are being organised in the context of the new ECSEL-Austria association. Ultimately, the aim is to create synergies along the full value chain towards innovation and leadership in electronic components and systems made in Europe."

ARTEMIS IN THE NEXT TIMEFRAME

By Jan Lohstroh, Secretary General, ARTEMIS Industry Association

Already some time ago, in 2005, ARTEMIS started as a European Technology Platform (ETP) on Embedded Systems. As name for the ETP "ARTEMIS" was chosen, which is an acronym for "Advanced Research & Technology for Embedded Intelligence and Systems".

As all ETP's did, ARTEMIS issued its first pan-European Strategic Research Agenda (SRA) in 2006, in which was stated that the topic Embedded Systems is so important for Europe that a Joint Technology Initiative (JTI) with the European Commission and participating European Member States should be constructed.

After many meetings with the European Commission and interested European Member States, the ARTEMIS Joint Undertaking (JU) – as legal embodiment of the JTI – was constructed in 2008, with a planned closure at December 31, 2017. A year before, in 2007, ARTEMIS Industry Association was founded as a legal entity to become the private member of ARTEMIS-JU, while still continuing its ETP activities.

ARTEMIS-JU issued 6 Calls, of which the last one was issued in 2013. The selected projects of this last Call started during the first half of this year and are supposed to finish before the end of 2017. The ARTEMIS-JU programme has been (and still is, due to the still running projects) quite successful, although – mainly due to the economic crisis – it has suffered from less funding by the participating Member States than originally anticipated. The total activities will be 1.1 BEuro versus the original anticipated 2.6 BEuro.

The ARTEMIS logo has successfully been used for the branding of both ARTEMIS Industry Association (ARTEMIS-IA) and ARTEMIS Joint Undertaking (ARTEMIS-JU).

As you all know, during the last couple of years, many meetings with the European Commission and participating states took place, to construct a combined follow-up for ARTEMIS-JU and its sister organisation ENIAC-JU on Nanoelectronics and also including Smart Systems. This follow-up should issue its first Call in 2014. The outcome was a new Joint Undertaking with the name ECSEL (acronym for "Electronic Components and Systems for European Leadership"), which was officially founded per June 6, 2014, and its first Governing Board meeting was held in July 2014. Like its predecessor, the new JU is with the European Commission and participating European Member States, but now with three industry associations as private members: AENEAS (for Nanoelectronics), ARTEMIS-IA (for Embedded/Cyber-Physical Systems) and EPoSS (for Smart Systems). The logo of ECSEL-JU is completely different from the logos of the three industry associations.

Per June 27, 2014, the ARTEMIS-JU and ENIAC-JU are terminated. However, all their running activities to support the still running ARTEMIS-JU projects and ENIAC-JU projects (which keep their names as ARTEMIS-JU and ENIAC-JU projects) and dissemination of their results are fully taken over by ECSEL-JU.

In the meantime the General Assembly of the ARTEMIS Industry Association endorsed amendments in its Articles of Association to legally become a member of ECSEL-JU while still continuing its activities as ETP on Embedded and Cyber-Physical Systems.

The branding of ARTEMIS is no longer in combination with the now non-existing ARTEMIS-JU. To underline that we as industry association are stepping into a new timeframe and into a new relation with the new ECSEL-JU, that has three associations as partners, we slightly adapted our logo (now including "Industry Association").

In the years before us, we – the ARTEMIS Industry Association – will, under the flag of ARTEMIS, continue to be very active to promote the Embedded and Cyber-Physical Systems in Europe and will increase efforts to explain to the public and governments how important these systems are for the competitiveness of European industry and the consequent prosperity of Europe. We will strengthen partnerships with other ETPs and Eureka clusters, to work out the roadmaps for the work to be done in order to pave the way for a prosperous future. The Vision 2030 – co-authored by ARTEMIS Industry Association and ITEA –, which was published in 2013 and presented in January 2014 to Commissioner and Vice President Kroes, is the first step in that direction.

ON GOOD TRACK FOR 2015

By Heinrich Daembkes, Airbus Defence and Space, Germany

It is of course too early to already look at the year 2014 as a "passed year". But a few thoughts are already possible.

With the end of the FP7 period, ARTEMIS Joint Undertaking was terminated and ongoing activities were transferred to the new ECSEL Joint Undertaking. Besides the new activities, the ECSEL office will continue to organise the execution of the still running projects of ARTEMIS. These projects started as ARTEMIS projects and will be executed under this name until their completion. Several of the ARTEMIS projects awarded under the last (6th) Call, such as EMC² and DEWI, are already marking the transition into the next generation and fit very well to our extended view in ECSEL.

ARTEMIS paved the way for Advanced Research and Technology for EMbedded Intelligence and Systems, enhancing the awareness of these fairly new approaches to an appropriate level among participating states and the EU. By extending the concept of Embedded Systems (ES) towards Cyber-Physical Systems (CPS), we include the new dimension of networked intelligence in our scope. Today it is uncontested that these new technologies are the essentials to determine the characteristics of our new products and allow the competitive differentiation from other participants in the market.

Quantitative data from market analysts and dedicated feedback from industry were used by ARTEMIS Industry Association, in cooperation with ITEA, to create – for the first time in that domain – a solid base to quantify the impact on our economy in terms of value creation and employment.

Some conclusions are:

> The leverage effect of ES/CPS on product innovation and economy was – and partially is still – underestimated.
> Some major European economies might fall far behind competitors from other regions if they just continue the past.
> ES/CPS has to be considered as a real Key Enabling Technology.
> The effort on R&I in the ES/CPS field needs to be enhanced by at least a factor of 2 to 3 to keep a leading competitive edge.

Presentations to the European Commission and to participating states authorities in several countries were used to disseminate these impacts. The full set of information is available to policymakers, researchers, and to industrial leaders in our High-level Vision 2030.

This insight – in intensive cooperation, but also in competition with our partner domains from AENEAS and EPoSS – is reflected as one of the three scopes in the new Council Regulation of the EC which creates ECSEL-JU. So, the support to build the future is ready and is waiting for us to take the opportunity to shape the future.

FUTURE ROLE OF ARTEMIS-IA

In the next phase, ARTEMIS Industry Association will have to play several roles:

> As ETP, we will have to continue to take responsibility for the road mapping.

We will invite all organisations that (partly) work in or closely to our expertise area, like related PPPs, ITEA and national organisations. This shall be activity led by the ARTEMIS Working Group SRA. ARTEMIS-IA will also continue to use the ARTEMIS brand.

> As member of ECSEL-JU, we have already successfully set the boundaries for the future of our domains in the Council Regulation and contributed to set the rules to operate ECSEL-JU. The cooperation with our neighbouring associations is laid down in the Private Members Board (PMB) rules. We helped to bring the ECSEL-JU into operation, with Heinrich Daembkes serving as Chairman of the Governing Board, Andreas Wild being elected as Executive Director and Alun Foster and the members of the ARTEMIS-JU office, together with their former ENIAC colleagues, being now core of the ECSEL-JU office.

> As a member of ECSEL, we should exploit the wealth created by our ARTEMIS-IA Working Groups. Several of them should explore extending their activities to the new ECSEL perimeter, to enable the entire community to benefit from common focussed expert work.

ECSEL 2014

The first integrated MASP was prepared and accepted by the Governing Board of ECSEL, serving as base for the ECSEL Calls 2014, which were published in July this year. The response to the first ECSEL Calls shows that the new venture is well received by the community: 48 proposals were submitted, with a volume that exceeds the available budget by a factor of at least three. Before evaluation by the experts, the ARTEMIS related part is about 30%. The start of the next generation seems to have been successful; the final results are still to come.

THE NEXT STEPS

By intensive cooperation between the experts of AENEAS, ARTEMIS, and EPoSS, the new MASRIA 2015 was prepared, in parallel to finalisation of projects submissions by the 17th of September this year. This was a real challenge and a high load for too many of us, but the result is an encouragingly integrated version of a common plan for the next years, adding a real value for our members. The Governing Board will start reviewing the draft after its meeting of November 5th. We are waiting for their feedback.

LOOKING TOWARDS 2015

The new Commission will start their work in November 2014. We will need to re-emphasize the links to our responsible Commissioners. Coming from different responsibilities in the past, we will enhance the awareness for ES/CPS, the role of SW, and embedded intelligence. After discussion at our ARTEMIS-IA Steering Board meeting, we will prepare in 2014 and launch latest in 2015 a new campaign to explain the role of Embedded Systems and CPS technologies with respect to the economy of Europe, especially for OEMs:

> get more OEMs involved;

> get the support of EC and national officials and launch relevant events with high visibility.

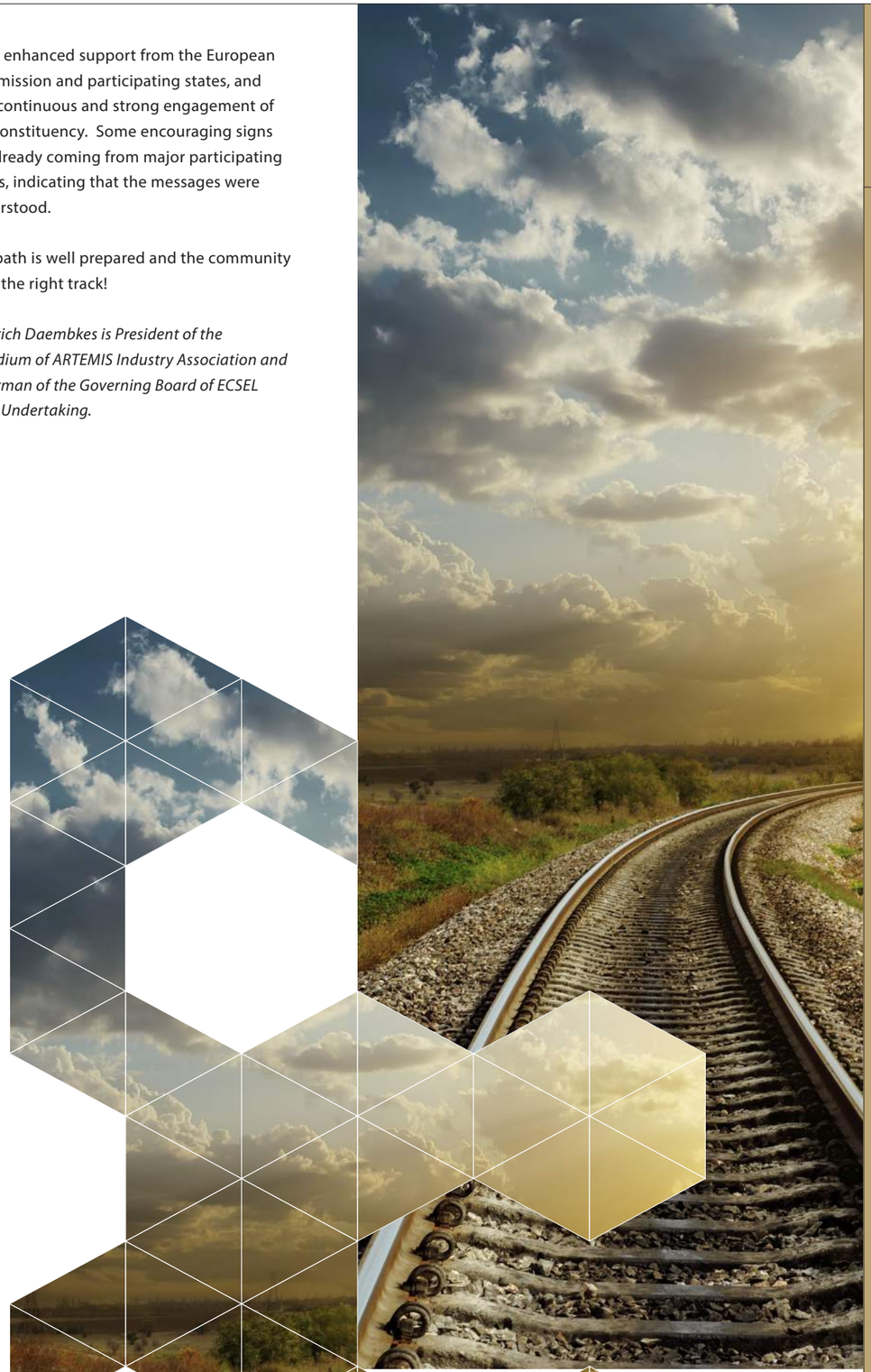
This might be started at the Co-summit – organised in cooperation with ITEA – in March 2015.

Further, we need to support emerging industrial needs and trends; become the leader and a launch platform for new priorities: automated and autonomous systems with all their needed technologies – such as system design for safe operation, access to high performance computing power required for high automation and autonomy, extended and certifiable tool chains, a higher degree of automated design processes for trusted systems, reliable / safe / secure communication systems with minimum latency and high QoS.

Many exciting challenges are in front of us, fitting into the new boundaries. We will need enhanced support from the European Commission and participating states, and also continuous and strong engagement of our constituency. Some encouraging signs are already coming from major participating states, indicating that the messages were understood.

The path is well prepared and the community is on the right track!

Heinrich Daembkes is President of the Presidium of ARTEMIS Industry Association and Chairman of the Governing Board of ECSEL Joint Undertaking.



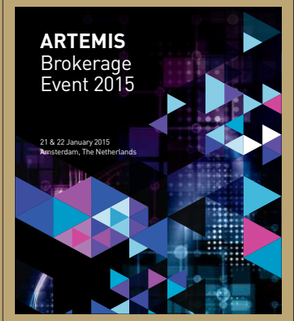
ARTEMIS EVENTS CALENDAR

ARTEMIS-IA PRE-BROKERAGE DECEMBER 2014

This Pre-Brokerage event is for ARTEMIS-IA members only and aims to pre-align project ideas for the call for projects in 2015 - including the ECSEL Calls 2015 - and to prepare for the Brokerage event, scheduled for January 2015.

Date
09-10 Dec 2014
Location
Vienna, Austria

ARTEMIS BROKERAGE EVENT FOR CALL 2015



The ARTEMIS Brokerage Event provides the opportunity to meet consortium partners and to draft project proposals with the starting consortia. The event is an important indication for Public Authorities to sense the field of interest in advance. Furthermore, information will be provided about the draft Multi-Annual Strategic Research and Innovation Agenda (MASRIA) of 2015, which is under preparation by the three industry associations in ECSEL.

Date
21-22 Jan 2015
Location
Amsterdam, Netherlands

CO-SUMMIT 2015

The 2015 Co-summit – organised by ARTEMIS & ITEA – will be held on 10 & 11 March in Berlin. The bcc Berlin Congress Center is this years 'place to be', to meet about 700 participants from industry, academia, Public Authorities and press from all over Europe. The 7th edition of the Co-summit is dedicated to:
'Smart Innovation: Impact of SW innovation'

Date
10-11 Mar 2015
Location
Berlin

COLUMN

BATON BLUE(S)

This column is the ninth 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 ***Jerker Delsing, Lulea University of Technology.***

Jerker Delsing cuts a familiar figure in the ARTEMIS Community. Heading the Arrowhead AIPP and being member of the Steering Board, this university professor with a real affinity with industry takes time out to run his leg with the baton passed on by Knut Hufeld.

Can you please introduce yourself?
I am Professor of Industrial Electronics at Lulea University of Technology in Sweden, where I have been the past nineteen years. While the academic world is my bread and butter, as it were, I have a lot of contact with industry and it is very exciting to work on the problems that confront industry. It may take some time for the solutions to filter into real applications, but when it does, it is very rewarding. It had even been my intention to enter industry after graduating, but my professor at the time convinced me of the appeal of a PhD. Even when I finished, my industrial sponsors also appeared to see the benefits of funding my research and so I enjoyed, and still do, the dual benefits of both worlds in a nice academic-industry balance.

Your university is member of ARTEMIS-IA and you were elected Steering Board member. What was your main reason for joining the Steering Board?
For me, being on the Steering Board gives me an opportunity to get a wider understanding of what is going on. Not just with regard to the technical aspects, but also regarding the politics, the organisation, the business strategies, and so on. As a leader of a larger research group, I am dealing with industrial problems and so being part of this body and network helps me personally as well as my research group and fits in with the philosophy of our university. It gives me an opportunity to work with industry in a way that would not otherwise be possible.

You are involved in both ProcessIT.EU, an ARTEMIS CoIE, and at Lulea University of Technology; what are important focus points for each of these organisations in the ARTEMIS programme?
Starting with ProcessIT.EU, when I came to the university some twenty years ago, there was a strong mining and pulp industry in the area – and such industries like these would not be around without automation. You just have to look at companies like ABB, which are world leaders in automation, to realise how important and relevant automation is. We wanted to take this initiative and our competencies onto a European level and it was clear to us that ARTEMIS provided the appropriate platform to do this.

What are important achievements of ARTEMIS in your view?
Bringing the industry together and promoting Europe as an industrial continent, where the major players, SMEs and academia converge into a powerful whole to create the spearheads for the future.

And where does Arrowhead fit into this?
Just by having the opportunity to be the coordinator of Arrowhead, I see the evidence that this really works. Just after a year and a half, we are now being contacted by American standardisation bodies and other firms that want to enter into some kind of relationship with us and there is also interest among a few very large Chinese companies. This is down to the 'think big' strategy and creating a European lead. Arrowhead is an example of that scale. Of course, as AIPP, Arrowhead benefits in a couple of ways. Both the European Commission and the respective countries involved are committed to this approach and believe that such projects will really make a difference. And as I already suggested, become big enough, then other parts of the world will stand up and take notice. It is both a statement of intent and having a real impact.

Knut Hufeld handed over the baton to you and he has a particular question to you: 'ARTEMIS and now ECSEL is basically an industry driven approach. Do you have the impression that science is integrated in a fair and appropriate manner and that the right topics are being addressed?'
Let me answer that with a yes and no. In terms of the topics, I would say that industry is giving us the right things to think about. On the other hand, whether science is integrated in a fair and appropriate manner, I would suggest not. I think that too few scientists at universities are taking the opportunity to work with industry. It is all about finding the right balance, I think; the right climate of cooperation – in terms of ideas and resources. That is something we are doing in ARTEMIS and ECSEL, and the worlds of academia and industry could benefit from such a model.

What is your personal big motivating factor in your professional life?
I am really fortunate to work with so many talented students. Being able to take my place in society as a teacher of these students, mainly PhD candidates, and seeing their development is something that really motivates me – as I was motivated by my professors when I was a student. The other motivating factor is the new knowledge we create that is used for the benefit of industry and society.

What do you believe is the biggest challenge in the R&I of Embedded and Cyber-Physical Systems for the coming years?
Taking it to the extreme, we are talking about huge usage of data and systems. We can produce thousands of millions of devices, but have no means to putting them to work in an efficient way, either from a productivity or energy point of view. One massive challenge lies in not only enabling machines to increasingly take over automation, such as in a city like London, but also getting people to appreciate this – acceptance. And, another aspect, how can we ensure that those with malicious intent – terrorists or criminals, for example – are prevented from misusing such systems to cause harm, disruption or damage?

To whom do you wish to hand over the baton/column and why? What particular question do you have for this person?
I would like to pass the baton on to Claude Le Pape of Schneider Electric. I am intrigued to find out what he makes of the question: 'How can we really make use of the academic competence within the industry-driven approach of ARTEMIS?'

What music goes together with reading of the column?
It has to be Nils Lofgren with 'YOU' – it is quite simply a beautiful thing to listen to.

EDITORIAL INFORMATION

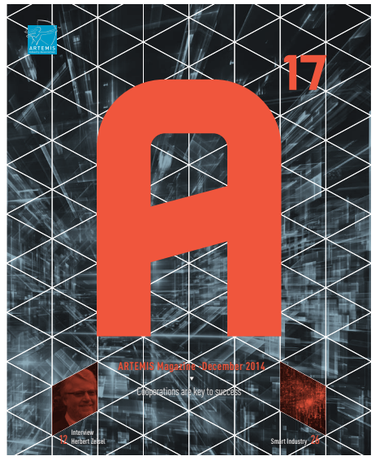
ARTEMIS Magazine is published by ARTEMIS Industry Association

ARTEMIS Industry Association, a non-profit association for the European R&I actors and private partner in ECSEL Joint Undertaking, supports formation of consortia and initiation of project proposals for joint collaboration and creates a meeting place where key industry players and other R&I actors identify strategic high priority topics for collaborative R&I projects. It represents an influential network of organisations focused on the innovation and development of Embedded & Cyber-Physical systems in Europe with about 180 members. Its ambition is to help European industry consolidate and reinforce its world leadership in embedded computing technologies.

Partnerships between participating states, EU-industry and European Commission, implemented as Joint Technology Initiatives (JTIs), are the most effective way of boosting Europe's electronics design and manufacturing capabilities in economic sectors such as cars, planes, trains, medical equipment, home appliances, energy networks and security systems. Between 2008 and 2013, the ARTEMIS JTI has achieved: 56 projects worth 1.1B Euro of eligible costs, involving more than 720 organisations, of which around 36% are SMEs, 35% large enterprises and 29% research organisations.
In 2014, the JTI's ARTEMIS, ENIAC and EPoSS joined forces and merged into one stronger JTI on Electronic Components and Systems called ECSEL (Electronic Components and Systems for European Leadership).
In recognition of the strategic importance of embedded computing systems, the European Union launched the ECSEL Joint Technology Initiative (JTI) as a Joint Undertaking (JU), or public-private partnership, between:

> European Commission
> participating states
> ARTEMIS Industry Association
> AENEAS Industry Association
> EPoSS Industry Association

The 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, ECSEL Joint Undertaking, programme status & progress, achievements and events in Embedded & Cyber-Physical Systems. An online version of the ARTEMIS Magazine is available on www.artemis-ia.eu.



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