The ARTEMIS Magazine is published by ARTEMIS Industry Association and ARTEMIS Joint Undertaking. The magazine provides information on the developments within the ARTEMIS European Technology Platform and the ARTEMIS community.

ARTEMIS

May 2012 NO.12 ~ ARTEMIS Industry Association: 5 years

Ambient intelligence - it's all round us even if we can't see it. Emile Aarts takes us inside his 'always on' world

page 8

Helen Finch explains the importance for industry and academia to be well aligned.

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FOREWORD

Dear ARTEMIS friends,

It's there! The ARTEMIS-JU Call 2012 was published on 19 April! But I advise you to have a more detailed look at all relevant information on the JU website. This Call is different from the previous ones, and, to be honest, I don't know with which new characteristic I should start!

Well let's start with what, for most of you, is probably the biggest news: the size. The 2012 ARTEMIS Call will have bigger pockets (I mean more funding will be available) than every previous call. Slightly less than €140 Mio funding is available for your best projects: about € 90 Mio from the Member States and about € 50 Mio from the Joint Undertaking.

The second piece of good news is that you can propose projects addressing the 8 ARTEMIS sub-programmes, as in the previous calls, but you can also propose ARTEMIS Innovation Pilot Projects (AIPPs), a new type of project that is very large and more downstream oriented.

The third change: you are not in a hurry! This year, there is no Project Outline phase. You go directly for the Full Project Proposal phase. And if you want, you can contact the JU team for any advice or assistance you may wish! But we are not going to write the proposal for you!

Last, but not least, the deadline for submission has been delayed by one week. It's now 6 September, at 17:00:00, Brussels local time.

In conclusion, don't miss this new opportunity. And, compared with the previous calls, you can extend your August holidays by one week! One last recommendation: don't wait until 6 September in the afternoon to upload your proposal in the system. Every year, some of you discover, just before 5:00 PM on the closing date, that your IT system is down, or that it takes some time to make a pdf file!

I wish you every success for your participation in this exciting call!

Eric Schutz

'The ARTEMIS vision nurtures the ambition to strengthen the European position in Embedded Intelligence and Systems, to ensure its achievement of world-class leadership.'

(SRA2011, page 51)

FOREWORD

Dear ARTEMIS friends,

ARTEMIS is doing well. The Call 2012 of the ARTEMIS-JU, which is actually the fifth call, is the biggest call so far. Quite a lot of Member States took an interest in the new ARTEMIS innovation Pilot Projects (AIPP's) for which extra funding is available. We expect good proposals for these types of project.

This time we celebrate the fifth anniversary of the ARTEMIS Industry Association that was founded in January 2007, to continue the ARTEMIS European Technology Platform and to become the private partner in the ARTEMIS Joint Undertaking. You find quotes from Yrjo Neuvo who was ARTEMIS-IA president in 2007 and from Klaus Grimm, the current president. It was an idea of the editorial board of this Magazine to interview me, having served as Secretary General of ARTEMIS-IA for almost 5 years.

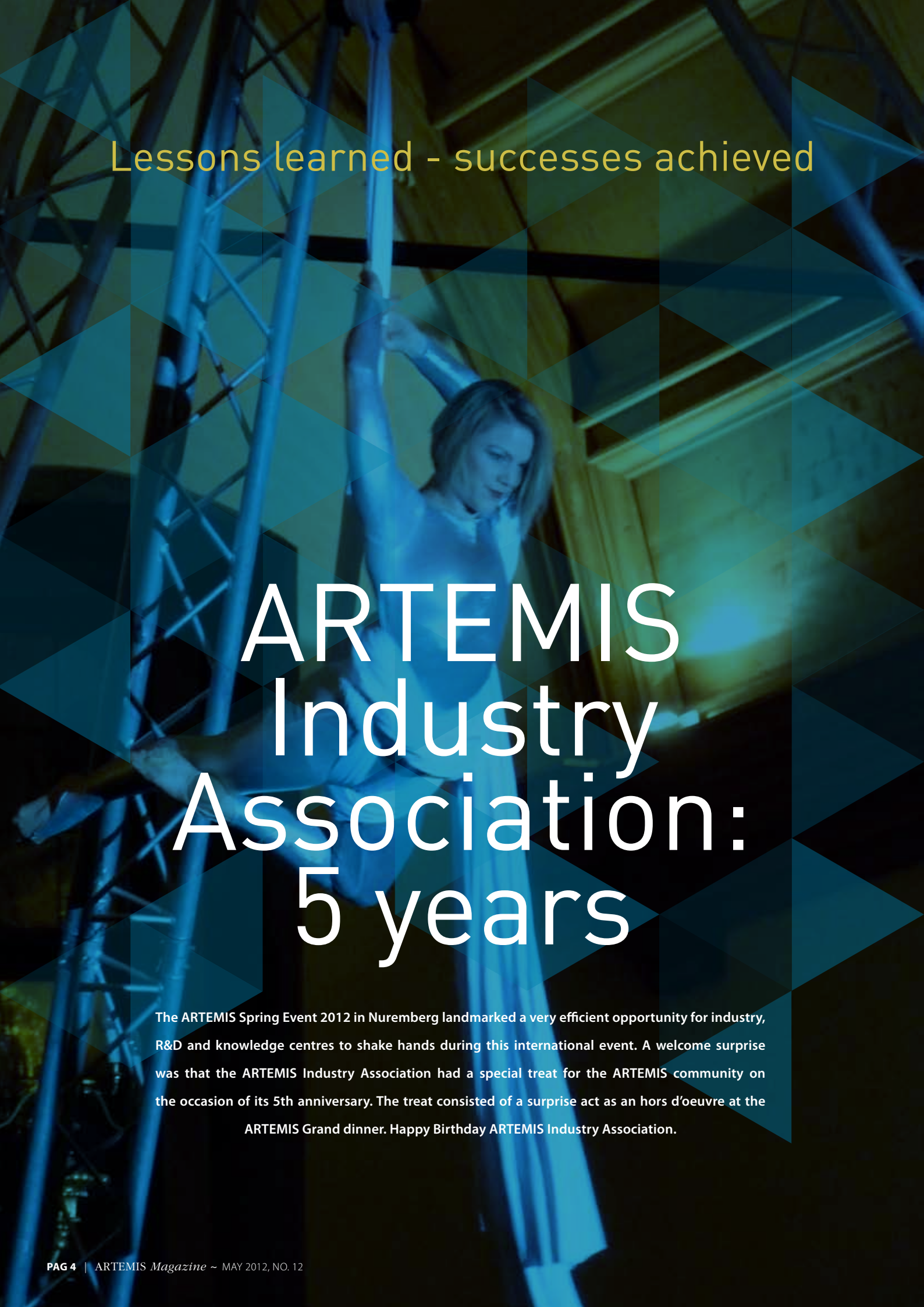
This Magazine is a very interesting read. Emile Aarts, former Vice-President of ARTEMIS Industry Association, is now stepping down as ARTEMIS-IA Steering Board member because he is leaving Philips; he gives his view on "A world that is always on". Helen Finch explains how important the network of ARTEMIS is for her company, Infineon. Then EICOSE, our first Centre of Innovation Excellence, gives insight into its way of working. Laila Gide gives some background on the new AIPP's and Roberto Zafalon also highlights these AIPP's, making a bridge to the KET report of the manufacturing technology companies in Europe. Jerker Delsing talks about his experience of building an AIPP proposal in his field of interest.

Further in this Magazine: Information about the Call 2012, Project-information on two projects (CHESS and PRESTO) and Bola Rotibi talking about sustainable interoperability. A report is given of the ARTEMIS Technology Conference in March this year.

We welcome Poland as the latest ARTEMIS Member State; it provides funding for the first time in Call 2012. Irene Lopez de Vallejo and Pauli Kuosmanen visited the Future Internet Assembly in Poznan in the autumn of last year to raise the interest for ARTEMIS in Poland. Finally the Baton Blues column is written by Werner Damm.

I wish you an enjoyable read.

Jan Lohstroh



Lessons learned - successes achieved

ARTEMIS Industry Association: 5 years

The ARTEMIS Spring Event 2012 in Nuremberg landmarked a very efficient opportunity for industry, R&D and knowledge centres to shake hands during this international event. A welcome surprise was that the ARTEMIS Industry Association had a special treat for the ARTEMIS community on the occasion of its 5th anniversary. The treat consisted of a surprise act as an hors d'oeuvre at the ARTEMIS Grand dinner. Happy Birthday ARTEMIS Industry Association.

By Jan Lohstroh
Secretary General
ARTEMIS Industry Association

'Retirement' was not something that appealed to Jan Lohstroh when his contract expired after 36 years with a Dutch multinational. Free to do something else, he embraced the opportunity to join the ARTEMIS Industry Association when invited to apply for the position of its Secretary General. Five years on, we talk to Jan, a stable figure amid changes, developments and trends, about the beginnings, lessons learned, the successes and the future.

"I saw the position within ARTEMIS Industry Association (ARTEMIS-IA) as one that suited my competencies and experience. I had been one of the founding fathers of ITEA and was already well versed in the various aspects involved in the running of such programmes. So I thought I had something valuable to offer. It all began in Berlin in the summer of 2007, when the first Presidium and Steering Board were elected and took office, with Kees van Mourik, the first ARTEMIS-IA office director at the time."

But Eindhoven in the Netherlands became your base. Why Eindhoven? ~ "Well, before ARTEMIS-IA started on 17 January 2007, the ITEA office was already in Eindhoven and it had been a decision of the founding fathers of ARTEMIS-IA to construct the association under Dutch law with the objective to share offices with ITEA for cross-fertilisation and cost reduction, and possibly even a merger in due time. My first impressions were that ARTEMIS was a very energetic, highly cooperative environment, and had a very active Presidium, one that has remained so to this very day. Of course, in the beginning, there was a lot of discussion necessary with the relevant bodies and people in Brussels to set up the ARTEMIS Joint Undertaking (JU). The initial work was already done by the Presidium with the help of the WG Governance, chaired by Jan van den Biesen. But still a lot had to be done to get the t's crossed and the i's dotted on the respective documents like the Council Regulation for the establishment of the ARTEMIS-JU. And we were/are indeed fortunate to have Jan van den Biesen in the Industry Association, who is quite an expert on the various legal and funding forms, helping us to cross those t's and dot those i's. However, it came as a surprise to learn at the end of 2007 that the balanced public-private partnership what we had envisaged for the ARTEMIS-JU was to be a Community Body , and therefore basically subject to same rules and regulations as the much larger Commission services. Not the optimum format from our point of view given the obstacles such bureaucracy would present to running a cost-effective, efficient operation. But the conviction we had in our objective was such that we accepted it and got on with the job. The eating of the pudding later would be proof of the success of the recipe."

And how does the pudding taste at this moment? ~ "Pretty good, I must say. I think what we have produced is a good, industry-driven programme with significant industry participation – a higher percentage than in FP7 programmes – and it is certainly living up to the goals that we set out in the initial Strategic Research Agenda 2006. Of course, it has not been without its disappointments. Whereas the EC's funding allocation was for the full term of the six calls, the funding by member states is on a year-to-year basis. As such, financial crisis, political volatility and various shortcomings in the national co-funding mechanism, including the selection process, which does not give member states exclusive influence over the results, have meant a shortfall by half of the expected funding of 2.7 billion euros for the total programme. Nonetheless, despite the lack of financial leverage, the actual results of those few calls that have already run their term have been very promising and we are now asking for an extension to the programme under the banner of Horizon 2020, the new FP8. While the first calls under the new framework programme could, in principle, begin in 2014, there will be many meetings with all stakeholders and drafting a lot of documents."

Quotes on the 5th anniversary of the ARTEMIS Industry Association

by Yrjö Neuvo

The first President of ARTEMIS Industry Association, established at the beginning of 2007, was Yrjö Neuvo, Professor and former Chief Technology Officer of NOKIA Corporation, Finland. Yrjö is one of the pioneers who started the European Technology Platform for Embedded Systems back in 2004. The Platform is the precursor of the ARTEMIS Industry Association.

In July 2004 the objectives of the ARTEMIS European Technology Platform were set up in the 'Building ARTEMIS' document signed by the CEOs of a number of major European companies. It is interesting to note that the early high-level objectives are still extremely pertinent today.

Setting up the first generation Joint Technology Initiative (JTI) was a complex and time-consuming exercise. Creating a system that would simultaneously commit the companies and public authorities to reach the ambitious joint top-level objectives is not so easy.

Over the years the importance of Embedded Systems has been increasing and there is no doubt that this trend will continue. Embedded Systems will play a central role in addressing the global challenges like energy and climate change as well as provide energy efficiency and reduced emissions at machine or unit level. Recent developments in wireless networks and the Internet allow the performance of complex and large embedded systems networks to be optimised.

We are now entering the Internet of Things era where computations and communications are the key elements of future large-scale systems. Connected embedded systems will form the critical infrastructures of future society.

I want to congratulate ARTEMIS Industry Association on the very tangible progress that has been made in the tools, education and standardisation areas of Embedded Systems as well as in establishing the ARTEMIS Centres of Innovation Excellence. ■

How convincing do you think the results achieved by the ARTEMIS JU are? ~ "It is a little early to make a full assessment of the programme given that it is only now that the projects from the first call have been completed or are reaching completion. However, what is clearly evident is the cumulative impact of the initial results. By this I mean that subsequent projects are building on the results of the first projects. The cross-fertilisation is strong. We see this in the ARTEMIS Technology Conferences and Co-Summits we organise. In this highly contagious networking environment, we see how exciting projects nourish new projects and even lead to the creation of new initiatives, research, cooperation and partnership. We take this through to education, technology development platforms, standardisation, and centres of innovation excellence – to lift our community to the level of a major ecosystem."

Is Embedded Systems visible enough as a key enabling technology to get the focus it needs in Horizon 2020? ~ "The hardware manufacturers of technology – like integrated circuits – have been able to generate quite some attention in Europe and more or less hijacked the already long existing acronym KET (key enabling technology) for their type

of industry, which was well appreciated by the Commission. Yet in our meetings with the Commission and Member States we have been able to convince them that ICT and embedded systems also belong to the category of key enabling technologies, although not emblazoned with the KET acronym.

"Once again, looking back on the past five years, can you see a difference in European industry competitiveness as a result of the ARTEMIS programme? ~ "If we look at the higher-level products – in the field of transportation for example – you can see that Europe has a very high level of sophistication and the presence of embedded systems in such products is continuing to increase. All the knowledge that we have helped to accumulate is being fed into the products of the future and will ensure that European industry can maintain its lead, especially in key areas like health, mobility, energy and the built environment, through embedded systems. What is important to realise is that in the future all these products will be interconnected – stand-alone will be a thing of the past. Two focal areas prevalent in ARTEMIS projects are interoperability and standardisation. We have already made great strides in the pursuit of these tangible holy grails and it is vital that this quest is continued since the interconnected environment is the future and interconnected embedded systems the neural system of society. The complexity of such a future should also be obvious. Since no one company or institution has the knowledge, expertise or resources to go it alone in such an environment, the role of ARTEMIS can be pivotal in bringing together all these players in an Embedded Systems ecosystem. And this, in turn, will boost European industry competitiveness."

And what of your own future? Will you still be sitting here in a couple of years? ~ "I'd certainly like to continue for a while. I'm still contracted till the end of 2013. After that, it remains to be seen. But I will still be here until the construction phase of the next period. I hope that my knowledge can be useful and be used in that next phase." ■

Quotes on the 5th anniversary of the ARTEMIS Industry Association

by Klaus Grimm

We celebrated the fifth anniversary of the ARTEMIS Industry Association at last Spring Event in Nuremberg, Germany. During the ARTEMIS Grand Dinner the members were entertained with a surprise artistic act and were offered a special anniversary cake as a dessert. In the General Assembly an audio-video trailer developed for the birthday was shown.

If we talk about the first five years of the Association we see an increase to more than 200 members and expansion of the ARTEMIS community with all the partners involved in the ARTEMIS(-JU) projects. If we talk about ARTEMIS projects, we see projects with a large footprint, rich content and addressing important societal needs, in the areas of safety & reliability, electric vehicles, low-power multi-cores, energy efficiency, e-health, manufacturing and 'things of the internet'.

We updated the ARTEMIS Strategic Research Agenda last year and we are busy getting the stakeholders together to build consortia and draft proposals for this year's ARTEMIS-JU Call 2012, now extended with ARTEMIS Innovation Pilot Projects. I want to express that I am proud to be President of such an enthusiastic and active Industry Association whose vision, mission and strategy is really industry driven.

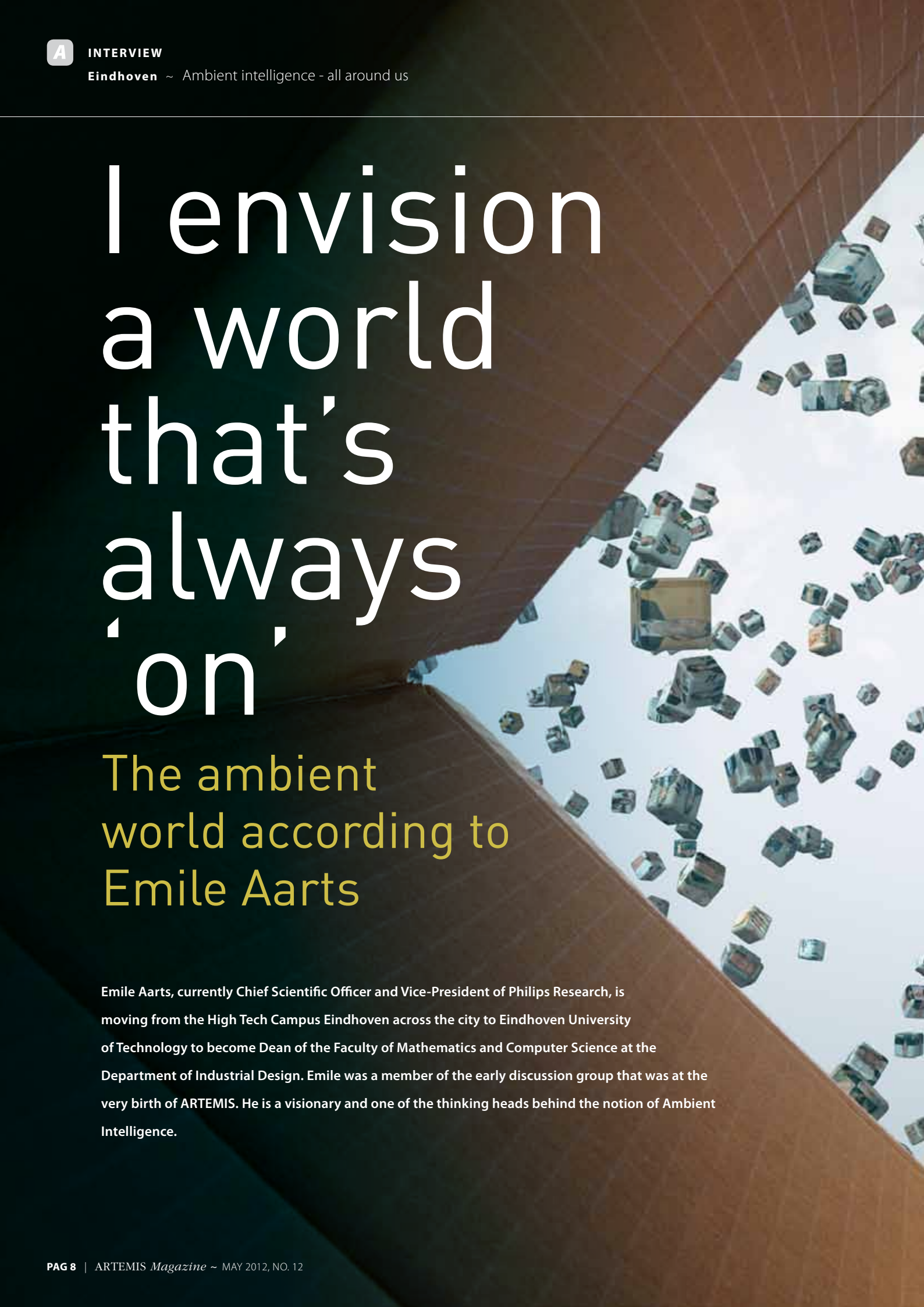
Embedded systems are incorporated in many (sub)systems of complex products and services. Very often the manufacturers of these products and services rely on suppliers that are co-responsible for the innovation of these (sub)systems. In the automotive industry for example, 80% of all product innovation comes from the development of embedded systems. ARTEMIS is involved in all aspects of pre-competitive research and development as well as in the search to find commonalities in approaches for cross-fertilisation between the various areas of application.

We, the ARTEMIS Industry Association, are in discussion with the Commission and Member States for a follow-up programme/initiative that should organise a call for projects from 2014 onwards. We see a successor programme as essential if Europe is to achieve the level of competitiveness needed to keep it ahead in the global race for ICT-based solutions to societal challenges as targeted by the European Digital Agenda.

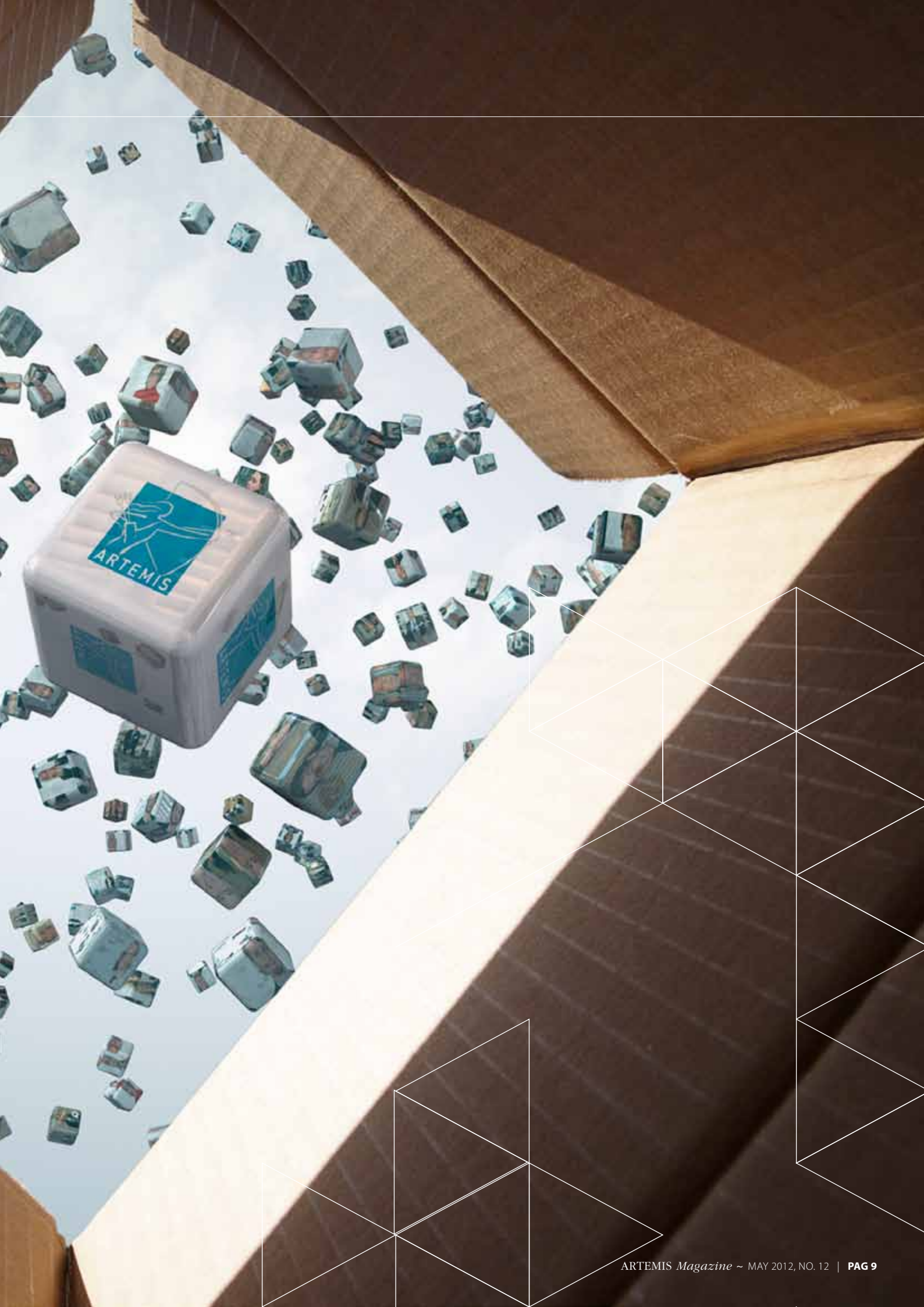
I want to take this opportunity to congratulate all the members on our fifth anniversary. At the same time I want to invite Small and Medium Sized Enterprises, Universities, Research Organisations and Large Enterprises that are not yet a member to become one soon. It is especially essential in this phase that new members step up to the plate with us. For as many ARTEMIS-IA members as possible to join together to convince the Commission and Member States that a follow-up programme is needed to keep Europe at the forefront of Embedded Systems. EMBEDDED SYSTEMS technology is a key enabling technology and crucial for Europe's industrial and societal future. ■

I envision a world that's always 'on'

The ambient world according to Emile Aarts



Emile Aarts, currently Chief Scientific Officer and Vice-President of Philips Research, is moving from the High Tech Campus Eindhoven across the city to Eindhoven University of Technology to become Dean of the Faculty of Mathematics and Computer Science at the Department of Industrial Design. Emile was a member of the early discussion group that was at the very birth of ARTEMIS. He is a visionary and one of the thinking heads behind the notion of Ambient Intelligence.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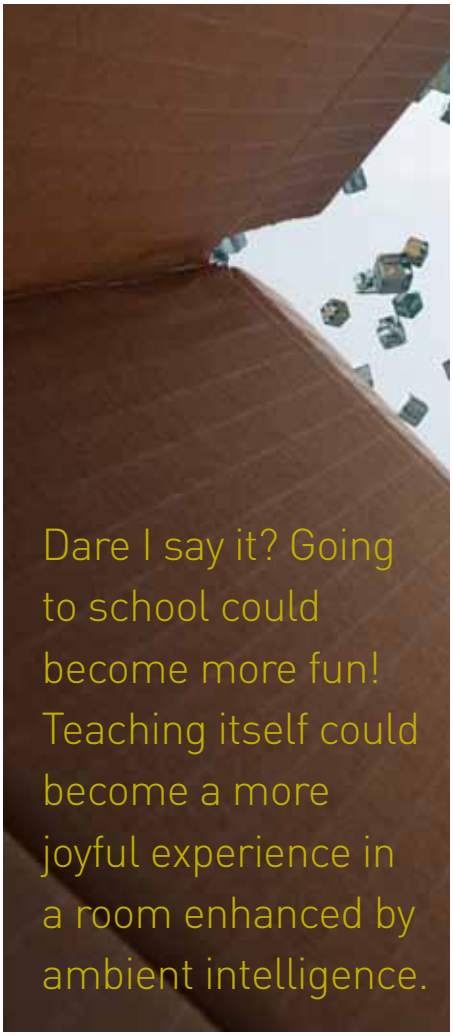
I notice that the acronym for ambient intelligence is AmI – intentionally friendly?
"Well, if we go back to the point when we coined the notion of ambient intelligence some fifteen years ago, we were also looking for a handy, catchy acronym, of course. AI? No, that was already familiar. AmBi? There was possible confusion with a product range with that in the name. So we opted for AmI. Quite simple but also appropriate, of course, given the connotation of the French word for 'friend'. After all, we are talking about environments that should act on your behalf."

So how was it that the notion arose in the first place?
"For me the seminal moment was a meeting that took place, I think it was 1996 in the US, on the fiftieth anniversary of ACM (Association of Computing Machinery). All the computer scientists who were there were invited to answer one question: What is the future of ICT systems? The response was astonishing in that everyone gave the same answer: It will become massively distributed. What is plain obvious now was a very new concept at that time. And we realised that if electronics became so small that you could integrate it into the fabric of people, their background or whatever, that the human intelligence should move to the foreground, and that notion spawned the term 'ambient intelligence'. At first we targeted consumer electronics with the convergence of television, media and the internet. Now we have devices that are mobile, are personal, are interconnected and are always on. So the convergence of all kinds of ITC elements with embedding in the background of people and the quest to come up with something meaningful have been the key drivers for the ambient intelligence vision for more than ten years now."

And where have these drivers led? Are there tangible applications you can point to?
"Most certainly, yes. In global terms, yo*u* have products like the iPad, which moves personal computing into the area of ubiquitous access to information. Ambient



intelligence has really taken off in other domains, too. The automotive domain, for one. A car has become a kind of computer with four wheels and an engine. It know where it is, can diagnose itself, and knows when it needs to come in for a service. There are cars out there that have an online connection that's on all the time. Smart environments, too, such as the smart window screens pioneered by Philips and smart surroundings for medical equipment, which is quite a success story for Philips. Primarily we are looking to put the patient at ease in what is, let's face it, a none too welcoming environment."

Such as?
"The first thing we did was to create the ambient experience for children. When children have to undergo a scan they can suffer from a lot of stress, often to the extent that the examination has to be prematurely terminated. Given the type of equipment, when this happens you have to restart the whole process, and that is both costly and aggravates the stress. In fact, Philips got a request from a radiologist in Chicago, Dr Anastos, who posed the question: can't you do something to put the child in my equipment at ease with all this ambient intelligence? So we built an environment where the scanner is seen as a kind of cave in which the children can have their own drawings projected onto the interior of the scanner. So instead of being fearful of the equipment, the children are keen to go in and see their drawings – in the meantime the examination is done. The success has been phenomenal, with throughput having been increased by a factor of two.

"Another example from the medical sector is a room for the treatment of stroke sufferers. We know from experience and observation that such patients must be subjected to a very low level of stimuli in the beginning while after a number of days such stimuli must be increased. So we designed an ambient intelligence room that really meets these needs. So the wake-up call, the opening of the curtains, the ceiling lighting and even the colour of the lighting – everything is automated, adjusted to the particular patient."

So you are actually creating a personalised ambience?
"Absolutely. In the future you could walk into any cubicle and the ambience – your personal ambience – will make that space your own. And, going back to our stroke patient, this personalised ambience can help to reduce the recovery time needed, by up to several days. Just think of the economic aspect of this, especially nowadays when the skyrocketing cost of healthcare makes it vital to optimise efficiency in recovery processes. And even the personnel find it much more fun to work in such an environment."

Prof. Emile Aarts

Last month Prof. dr. Emile Aarts stepped down as Vice President and Senior Scientific Officer at Philips Research to become Dean of the Faculty of Mathematics and Computer Science at the Department of Industrial Design Eindhoven University of Technology. He holds a MSc. and PhD. degree in physics. For more than twenty-five years he has been active as a research scientist in computing science. He serves on numerous scientific and governmental advisory boards at national and European level. He is the co-author of more than fifteen books and more than two hundred scientific papers on a diversity of subjects in the field of Information and Communication Technologies. He has been involved in the launch of the concept of Ambient Intelligence and in the foundation of Philips' ExperienceLab. His current research interests focus on computational intelligence and interaction design.

A boost to the quality of work?

"And productivity, too, for that matter. Take education. We know that lighting can have an important effect on productivity in classrooms. We also know that lighting can stimulate play. Another colour, a different frequency, different way of presenting the light. Dare I say it? Going to school could become more fun! Teaching itself could become a more joyful experience in a room enhanced by ambient intelligence.

"Considering the influence of the environment on the way we act and behave is a new insight. And we are now inclined to see the relationship, even economically, between putting people at ease and recovery time or productivity or wellbeing in general. That is a major breakthrough, certainly in the western world."

Would it be true, then, to say that it is this insight that can help push the technology to the next level?

"Without doubt. There are some that say that the value of patents will be counterbalanced by a value for insight. Knowing exactly what is at play in the stroke patient's environment, for example, is just as important as the access to the technology. And in this respect, the multistakeholder concept plays a role. Just think about our stroke patient again. You have the doctors, nurses, family friends, even the cleaners – all have a different perspective of the patient, and how they treat the space. If you want to come up with the right solution, then all these stakeholders should benefit. This is where we went wrong in the past. Now we have to look at the process from every angle. If we can do this, then the reduced recovery time that results, as well as more effective recovery, will pay off in all kinds of ways. As I already suggested, in terms of work satisfaction, on an emotional level, financially. Everyone wins."

Would it be right to suggest that 'embedded' is not just in the matter but also in the mind?

"The notion of 'embedded' when it was coined for 'embedded systems' has undergone a very interesting evolution. First of all, we can now make the electronics so small that we can embed them in virtually any physical object and make it smart and connected. Secondly, the fact that there is software running on these embedded systems, not only to control them but also to flavour them with smartness, it get embedded, as it were, into your mind. And that brings us to the next step: what kind of future do we envision?"

Which is?

"Very simply put, I envision a society that is always 'on'. All these objects in which we incorporate electronics and run smart algorithms and collect data can either provide immediate feedback or the data can be uploaded into the cloud where the raw data are processed into meaningful semantic information and then fed back. Let me give you a very tangible example. Philips has introduced a small device that uses lasers to break down a product under the skin, which then recovers and brings back the elasticity to the skin. In other words, you rejuvenate your skin. That can be used for wrinkle reduction. These systems contain sensors that can analyse what is happening, inspect the skin, and give you feedback on properly administering the treatment. This information is uploaded to the cloud where the progress of the treatment is compared with the target. This can provide you with an early progress report so that even when the progress may not be apparent on the outside – i.e., the wrinkles have not disappeared – you know that treatment is actually progressing well. This is just one very simple, down-to-earth example of being always 'on' to monitor and coach behaviour.

So the new direction in which we are heading is of a society that is always on, always connected and driven by the context of social innovation. Not in any Aldous Huxley 'Brave New World' vision of an individual subservient to his environment but in the sense that you are served by the environment, are always conscious of the choices you have and are not controlled by it. In our vision of ambient intelligence, in the always on society, there is a symbiotic relationship between the individual and his environment whereby this ambient intelligence enhances the life of the individual." ■

Thank you, Emile Aarts

We take our commitment and collaboration very seriously

Infineon UK and ARTEMIS Industry Association – the benefits are widespread

Dr. Helen Finch is one of the 60 or so engineers at Infineon's Bristol branch in the UK. Infineon Technologies AG, was founded in 1999 as a spin-off of Siemens' semiconductor operations, and is now one of Europe's leading chip companies with over 25,000 employees worldwide and annual sales of around €4 billion. A few years ago Helen was invited to investigate the possibilities of public funding for some of the R&D work being done at Infineon UK in Bristol. It quickly became apparent that the opportunity of participating in programmes and projects facilitated by ARTEMIS offered benefits that went much further than funding.

CARTE BLANCHE ~ Helen's background is in chip design and project management but a few years ago her focus switched to the public funding domain. "Fortunately I was given carte blanche in this respect," Helen gratefully acknowledges. "It became a full-time commitment and I think the scope I was allowed is one of the reasons why we've been very successful in terms of acquiring and being involved in funded projects." While Helen looked at various funding options, from local to EU, the latter seemed to offer the best choice. There was plenty of experience within the German parent company in project funding and while Helen liaised with her headquarters in Munich, she took on the role with drive and personal determination to acquire the necessary experience and exposure within the EU funding arena. "There were certainly challenges I faced with the freedom I was given. I had to be pretty organised, particularly in defining the priorities and focusing on specific choices. I suppose I was driven by the need to get some momentum and to produce results pretty quickly."

He was convinced that I had to get myself over to Europe if I wanted to play a role there. I haven't looked back since.

How did ARTEMIS come into your picture? "Infineon was already a member of the Industry Association before I got involved. As for me, I became aware during an information day in London that I attended in 2009 as part of my information-gathering phase. Listening to the presentations and learning about how the scheme worked, it became apparent to me that this would provide a number of opportunities. And speaking about it with our national contact point for ICT, Pete Walters, I was encouraged to attend that year's brokerage event in Brussels.

"RECOMP caught my eye first. While it's not specifically automotive based, as we are, it does concern safety-critical embedded systems. So this was of interest and an opportunity for us to get into something more generic to which we could bring an automotive focus. And that was our first

ARTEMIS project and indeed the first funded project that Infineon UK got involved with."

Did that then lead to more projects or project collaboration?

"As we got involved in the RECOMP project my colleagues in Munich became aware of what I was doing – they were themselves working on a proposal that same year, POLLUX, but were not able to participate in it for various reasons. So they suggested that Infineon UK take it on instead so that Infineon as whole remained involved in this important electric vehicle project. We were fortunate in that these two projects to which we had signed up got funded. So in our first year of participating, we had already achieved some degree of success."

And now you're involved in five projects

"Yes, that's right. In 2010 we became involved in the Internet of Energy project. Even though our involvement is at a fairly low level compared to the previous two projects, because IoE is an extension of the POLLUX related work, we felt it strategic to remain involved. And last year we sat down in Bristol and talked about what we should do in 2012. We were all very happy with the collaboration. Perhaps it was time to coordinate a project. So we looked at the kinds of project that would benefit from pan-European collaboration and that might like to steer. This was VeTeSS and I took a few slides with me to the brokerage event in Barcelona and was met with incredible enthusiasm. I remember there being queues of people wanting to talk to me about it. So it was obvious that this was an idea that appealed to many people and I began to build a consortium and put a proposal together. Now the project is approved and we are looking forward to the kickoff meeting in Oxford next month. Also, very late in the day for the 2011 call, we were invited to participate in another project called CRAFTERS.

"With five projects on the go at the same time, I'm bracing myself for the coming year. And, of course, thinking about what we might like to be involved in next year. But I think we have to pace ourselves a bit because it's no use being involved but not being able to meet commitments. It's vital to participate in a meaningful way."

Dr Helen Finch

Dr. Helen Finch is R&D Funding & Collaborations Manager at Infineon UK She is responsible for the identification, development and coordination of collaborative R&D projects. She has worked in the semiconductor industry for more than 20 years and has been with Infineon since it started in the UK in 1999.

"Infineon UK designs microcontroller and multi-core technology for real-time embedded systems, principally for automotive applications. We see close alignment between the aims of ARTEMIS and our R&D activities: the ARTEMIS Summer Camp for example is a great opportunity to inform and shape both the future of ARTEMIS and our own strategic thinking. Collaborative R&D is quite new for Infineon UK so we are keen to learn and to get more involved. This collaborative approach also helps to raise our profile."

What kind of relationships make for a successful consortium?

"I think it is important for the relationships within the consortium to be based not on size or type of organisation but on the technical links between the partners. We have found this type of synergy also in POLLUX, a project that involves very many partners of all degrees and sizes, from SMEs to large enterprises and research organisations. The relationships are based on a common thread of technical interest and capability. In our VeTeSS consortium, for example, we have a fairly high proportion of SMEs selected for their specific capabilities. We have also invited Oxford University to participate because we know that they have particular research competencies and that interests are appropriate to the project."

How do you see the relationship between industry and academia?

"I think it is important for industry and academia to be well aligned so that not only the output – the graduates – are ready to take their place in industry but also to give input to universities on the kind of research that is needed by industry."

What would you say are the secrets of your success?

"Both I and my colleagues at Infineon UK who are involved in these funded projects take them seriously. We focus strongly on the cooperation and collaboration opportunities, and strive to deliver what we commit. The benefit we get from these projects is not just financial; it goes much further. There's an incentive in working with the other partners, and that helps the projects run successfully. As for getting the projects funded, it helps that I have the bandwidth to spend time on them, and not just do them as a kind of sideline." ■

EICOSE

Strategic R&D alignment in the domain of safety critical systems engineering for transportation

by Franziska Boede

COOPERATION IS KEY ~ Embedded systems are an essential part of today's transportation, be it cars, trains or airplanes, as well as in the supporting infrastructure (traffic management systems, road and rail-side sensors, signals, etc.). Although the exact details vary between automotive, aerospace and rail applications, there are a lot of common, cross-domain problems and challenges caused by ever increasing systems complexity and traffic density. EICOSE, the European Institute for Complex Safety Critical Systems Engineering, collaborates with European experts to identify and help overcome these problems.

EICOSE was founded in January 2007, building on strong cooperation between the two French clusters (Pôles de Compétitivité) Aerospace Valley and Systematic, and the German competence cluster SafeTRANS.

Five years later, EICOSE has become a dynamic institution with two associated partners – ARTEMIS Austria and the Spanish organisation Tecnalia – and a multitude of associated experts organised in E²GEST, the EICOSE Experts Group on Embedded Systems in Transportation. Within the frame of EICOSE, a true innovation eco-system has been established to foster cross-domain R&D through harmonised roadmapping and project incubation.

EICOSE ACTIVITIES AND IMPACT ~ Two correlated activities of EICOSE are roadmapping and project incubation, performed by experts from E²GEST within three Working Groups (WGs), aligned to the respective ARTEMIS sub-programmes (ASPs):

> WG 1: Methods and Processes for Safety Relevant Embedded Systems (ASP 1)
> WG 2: Computing Environments for Embedded Systems (ASP 5)
> WG 3: Human-Centred Design of Embedded Systems (ASP 8)

The EICOSE activities are structured in three phases :

> Working Groups identify and agree on R&D topics and their prioritisation, which are harmonised between the automotive, aerospace and rail domains, and updated annually.
> The harmonised R&D topics then feed the roadmaps of European funding programmes, such as the ARTEMIS Strategic Research Agenda 2006 and 2011, and other European (ITEA 2, FP7) and national funding programmes.
> Building on these strategic roadmaps, aligned projects are incubated, again taking into account the results from the WGs.

ARTEMIS projects incubated by EICOSE include CESAR, MBAT and D3CoS.

Each of the clusters harbours an ecosystem covering the whole range from research to industrial applications, within a stimulating environment that facilitates and encourages interaction, and with knowledge exchange between the clusters especially regarding SME contacts and matchmaking. These ecosystems feed and are fed by the roadmapping and project incubation activities done on a European level.

EICOSE also fosters a strong commitment to ARTEMIS and contributes to numerous ARTEMIS-IA Working Groups, such as Tool Platforms, Centres of Innovation Excellence, and Standardisation.

In the domain of European Tool Platforms, EICOSE promotes and advances plans for a Reference Technology Platform for the development of embedded systems in the transportation domain, with collected input from CESAR, MBAT and many other projects and initiatives.

Recognising the very substantial contribution to building up ARTEMIS and installing a European innovation ecosystem, the ARTEMIS-IA Steering Board awarded EICOSE the Centre of Innovation Excellence label in 2007. Following a successful evaluation in 2011, the CoIE label has been renewed.

INSIDE EICOSE ~ The cooperation of all partners in EICOSE can be characterised as friendly and motivated. In the pre-competitive domain of the development of methods, processes and tools for embedded systems, all stakeholders (OEMs, suppliers, tool vendors, research organisations and universities) pull together to pro-actively stimulate the development of new components, tools and design methodologies supporting embedded systems.

The benefits for partners active in EICOSE are first and foremost to be part of a community that enables cross-domain cooperation and harmonisation of research topics, exchanges best practices and solutions across domains and national borders, fosters the exchange of tools, technology and knowhow and supports, and shapes European as well as national R&D projects.

Europe is thus benefiting from a productive R&D community generating aligned projects with efficient use of resources and accelerated innovation processes. EICOSE partners are all aware that strategically aligned R&D activities enable the effective use of resources, avoid fragmentation and facilitate deployment. EICOSE is an example of how an innovation-friendly ecosystem can be built at European level.

PARTICIPATION ~ EICOSE welcomes experts who are interested in working on the R&D topics of the EICOSE working groups. E²GEST participation is not dependent on EICOSE membership, but is open to all ARTEMIS-IA partners. To apply, please visit: www.eicose.eu

The next step is to align R&D and innovation

By Laila Gide

Laila Gide
Laila Gide is Technical Director THALES, Steering Board member of ARTEMIS-IA and co-Chair of the SRA Working Group.

The importance of a technology is not always visible at first glance, and this is especially true for the appropriately termed Embedded Systems! Virtually invisible to users, Embedded Systems have now become the neural system of our modern society: hiding the complexity, offering better and easier use, and connecting the cyber to physical world.

Responding to the ever growing needs of users for performance, miniaturisation, autonomy, connectivity, safety and security are just few of the answers that embedded systems are simply and naturally expected to provide. Imagine the world without embedded systems! We would have never reached today's high safety standards in the transportation domain, for example, nor would we have seen such engine efficiency or associated innovative services. Technologically speaking, we have made tremendous advances and are pushing the boundaries forward, increasing the functionalities and the processing power while reducing the size of products and their energy consumption requirement, increasing interconnectivity and interoperability while guaranteeing a minimum level of safety and security. To master this ever growing complexity, better industrial processes are needed, and more efficient methods and tools for the design, validation, and verification, delivery and servicing are essential. The gauntlet laid down by such a challenge is taken up in ARTEMIS Innovation Pilot Project number 4 – Production and Energy Systems Automation (see following article).
The European Embedded Systems community has the chance to shape this evolution by using its diversity to strengthen the cooperation and through ARTEMIS (Advanced Research & Technology for EMbedded Intelligence & Systems) consolidate the leading positions of European players and cluster their R&D resources. Solo efforts cannot be successful in the complex and globally connected world.

Now, after ARTEMIS annual calls for proposals begun in 2007, an active community coordinating research activity has been established around a successful portfolio of projects yielding good results, and making a real difference. Cooperation and competition in technological development are enhanced, fragmentation is avoided, and deployment is facilitated. In call 2012, we will take a step further to fulfilling the ARTEMIS vision of a coherent innovation environment in which the 'think big' approach is notched up a gear to 'think even bigger'. Besides the regular ARTEMIS Sub-Programmes (ASP), the Annual Work Programme (AWP) calls for ARTEMIS Innovation Pilot Projects (AIPPs). This double approach of regular ASPs and additional AIPPs will enable the strategic alignment of research with innovation described in ARTEMIS SRA to take a firm step further in achieving its objectives. I warmly invite you to participate…. ■

This article is a by-placement with the courtesy of SafeTRANS

ARTEMIS Innovation Pilot Project: how come?

By Roberto Zafalon

In June 2011, the European Commission High-Level Expert Group (HLG) reported on Key Enabling Technologies (KET) and introduced the 'Valley of Death' concept for the first time in the European R&D community imagination. This is a metaphor to describe the project life cycle as a bridge that helps cross that valley. Technology Readiness Levels, a measure used by some United States government agencies and many of the world's major companies (and agencies) to assess the maturity of evolving technologies (materials, components, devices, etc.) prior to incorporating that technology into a system or subsystem, were grouped into three pillars that sustain the bridge over the metaphorical 'Valley of Death'. Those three pillars are essential in this strategy, but it is the second one that is object of this article.

The second pillar, (TRL 5-8), dealing with Pilot Projects, was emphasised due to its essential role in bridging the gap between the outcome of technology research and the manufacturing phase previous to mass market commercialisation.

Roberto Zafalon

Roberto Zafalon is European Projects Director R&D and Public Affairs STMicroelectronics in Italy. He is also member of the international committee responsible for defining the next 2007-2012 European Industrial Platforms programme and strategic agenda for Nanotechnology (ENIAC) and Embedded Systems (ARTEMIS).

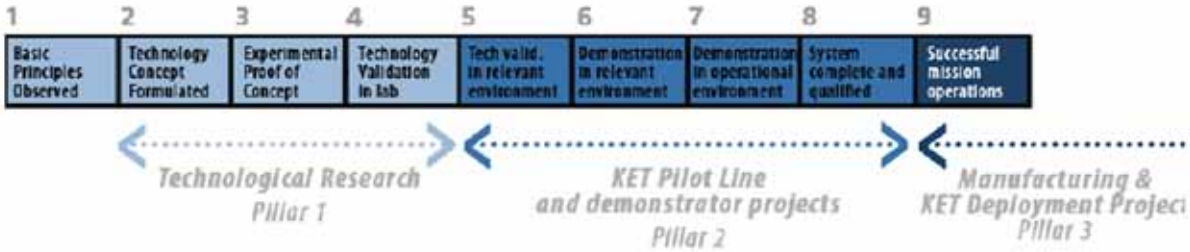
It was the ENIAC Joint Undertaking, created to 'increase and leverage private and public investment in the sector of nanoelectronics in Europe… thus contributing to strengthening Europe's future growth, competitiveness and sustainable development' that was first to react to the HLG report and act as an instrument for implementing KET policies. The story goes that a study, presented to the ENIAC Public Authority Board Working Group on 11 October 2010, confirmed the compatibility of this objective with the ENIAC JU Statutes. And it was in 2011 that a specific call for ENIAC Pilot Projects was successfully launched.

According to the outcomes of the High Level Group on KET, the main driving force behind the development of future innovative goods and services will be Key Enabling Technologies such as nanotechnology and nanoelectronics, including semiconductors. *Not to forget Embedded Systems, as we proudly and loudly proclaim in ARTEMIS!*

Combined funding mechanisms to support Key Enabling Technology in Europe:

Several funding instruments are expected to contribute to the achievement of this goal, in a complementary way:

> The JTI ARTEMIS with focus on the whole product's impact



> Budget from JU residual
> The JTI Eniac with a focus on manufacturing and pilot lines
> Budget from JU residual
> The Framework Programme with a focus on advanced R&D phase.
> EC budget
> Flexible usage of Structural Funds, when available, used by regions to boost regional competitiveness and employment, as well as the 'Capacities' (and its successor in the H2020) could play pivotal roles in supporting industrial manufacturing facilities and European Centres of Excellence

In 2011, ARTEMIS itself started to discuss the possibility to launch Innovation Pilot Projects to foster and sustain the application and the product exploitation of complex embedded systems; The 'Missing KET' in the HLG report, with the following objectives:

> The creation of new business innovating eco-systems,
> Efficient use of Public, Private Partnership in the Embedded Systems arena to overcome the R&D resource deficit and to foster innovation & collaboration in Europe,
> To align R&D&I (Research and Development and Innovation) priorities for Embedded Systems in Europe and turn European "diversity" into a strength,
> To achieve a "European Dimension" by pooling European R&D for future proven application domains and technologies along with resources in key areas, and involving players able to ensure successful valorisation and implementation of the results.
> To establish and sustain a holistic approach to R&D&I by undertaking projects with critical mass, reconciling the market silos/business-efficient approach with cross-domain synergies.
> To share risk by facilitating projects that otherwise would not be undertaken,
> To build upon results from existing and previous projects in order to provide market driven solutions based on prototypes and demonstrations,
> To pool industrial resources and "sharing" (e.g. standards and methods) to foster interoperability and synergies between various environments, thereby keeping leadership in traditional markets and gaining global positions and more market share in new areas.
> To set and share R&D&I infrastructures.

ARTEMIS INNOVATION PILOT PROJECTS AND REAL-LIFE EXPERIMENTs ~ In the context of the Innovation Pilot Projects, ARTEMIS will specifically support the creation of living labs as part of or in addition to the typical R&D projects. The ARTEMIS Innovation Pilot Project concept also embraces real-life experiments by the systematic approach to integrating research and innovation processes into a relevant and visible 'social challenge'.

These will be exploited through the exploration, experimentation and evaluation of innovative ideas, scenarios concepts and related technological artefacts in smart city and living lab environments, among others.

The goal is to maximise the demonstration impact on relevant national sites for all the countries participating in this call and to emphasise the innovation capabilities of the ARTEMIS community, where European industry and RTOs of all shapes and sizes work collaboratively for a sustainable technology-savvy society. ■

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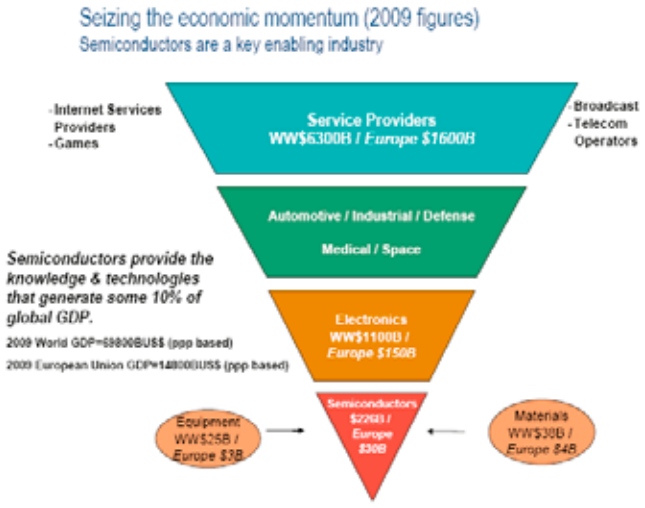
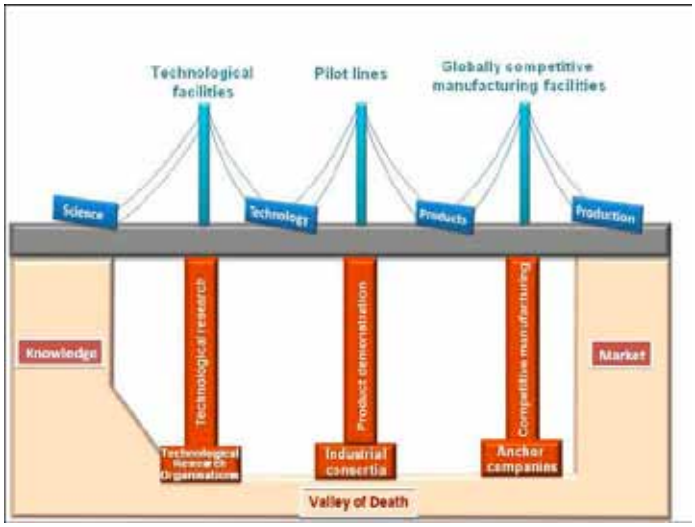




Production and Energy Systems Automation, an idea for an AIPP

by Jerker Delsing

Jerker Delsing, professor in Industrial Electronics at Luleå University of Technology where he is the scientific head of EISLAB, is coordinator of the AIPP 4, Production and Energy Systems Automation. Here he talks about how this new ARTEMIS Innovation Pilot Project (AIPP) approach aims to get to grips with the issues and address the integration and interoperability technologies and requirements on a technology platform so that a powerful technology stepping stone is created.

IMPORTANT SEGMENT ~ Europe's manufacturing, energy, process and logistics industry is a very important segment, by far the largest sector in terms of employment. Productivity improvements in this sector will therefore have a major impact on the European economy, its production and competitiveness. New and tougher challenges are emerging: efficient management of energy consumption, stricter environmental legislation, higher raw material yields, more productive and energy-efficient plants, higher product quality and better production processes, to name but a few. One of the key technologies in addressing these challenges is collaborative automation.

Our AIPP targets automation in the processing and manufacturing industries. It is somewhat distinctive in that we are dealing with run-time and operation rather than development issues. We are more machine-centric than human-centric.

PAN-EUROPEAN DIMENSION ~ Let me briefly take you through the domains where we pilot demonstrations are likely. The first

domain is production, by which I mean processing and manufacturing automation. In this domain there is a strong lean towards the north of Europe, Scandinavian companies especially. Then there is the domain of smart cities, where Spain and Italy are particularly involved. Of course, a central aspect of this is electrical mobility and the question of whether this will be an interesting complication or addition to our energy distribution and production systems. Italy is taking the lead in this area. In terms of buildings and energy, the Netherlands is a country with keen interest in this area. Another focal domain concerns matching energy production and energy demand. France is heavily involved in this. The geographical spread that is apparent from this gives you a good idea of how European companies are lining up to bring things together and drive forward a number of existing projects and programmes that have not yet come to fruition in the market. In fact, the geographical proximity of the companies involved facilitates the management of such a large project involving so many partners.

EDGING CLOSER TO REALITY ~ To ensure that such a wide-ranging and large project like this can be properly managed, we are forming a core team of people that have considerable experience and expertise in projects of this nature. It means that we can then galvanise the efforts and get the automation 'cloud' closer to reality. We can, in fact, already see this reality taking shape, for example in the internet of energy project that is trying to sort out both technology and business bottlenecks as well as establish

standardisation so that interoperability and integration can be achieved. And, of course, to demonstrate that these kinds of things work in real environments. Not just in mock-ups. One of the reasons for opting for an AIPP rather than an ASP project approach is driven by the wish of both large players and SMEs to move the technology closer to the market, to have a showcase window where they can actually demonstrate the actual impact in real life.

Energy is closely related to environmental issues like CO_2, so if production and processing efficiency can be significantly boosted, and thus reduce their dependence on vast quantities of diminishing fossil fuels and raw materials, the impact this will have on a global scale will be considerable. If we can get these common technologies adopted in the market, we're going to see an impact on energy efficiency and utilisation. This is a major argument for taking a cloud approach to collaborative automation.

PAYOFF FOR SMES ~ SMEs have a lot to give and gain from participating in this AIPP. They have specific knowledge and expertise that can be very useful to the larger partners who, in turn, may return the favour, as it were, by entering into co-development with their smaller counterparts. The opportunity to network, to benefit from complementarity and synergies could be considerable. SMEs tend to very clear-sighted about the choices they make and they certainly understand the importance of being part of the automation eco-system.

While we have not really touched an awful lot on the educational aspect of our project, I do think that if we get high visibility for our project research and its results, youngsters could be triggered to think 'hey, I want to find out more about this, this is a technology that fascinates me and where can I study this'. This will then help create a pool of talent that will then feed back into research and industry. What you will have, in essence, is a kind of 'innovation nursery'.

MOMENTUM TOWARDS EXCELLENCE ~ I think that the momentum we are creating does contribute to fostering innovation excellence. We are a big project and companies are coming up to me and saying that this is an interesting programme and asking how they can get on board. Just by creating that momentum, you are driving up the level of innovation. Also, if we can identify the technology gaps, bridge them and actually demonstrate that things work, we can determine what and who is missing. It could be that some consortium players will move into new markets that are not yet here today but that will emerge on the back of the gaps that will be bridged. The demonstration pilots will move the innovation closer and more quickly to the market while the exploitation plans of the industrial partners will have an impact on the market in terms of both quality and opportunity. The involvement of these partners, both large and small, will help drive this momentum and ensure that the project results are translated into benefits for both industry and society. ■

CALL 2012

Step up to big-time innovation networks

by Alun Foster

THE ARTEMIS AIPPS FOR CALL 2012

AIPP 1: Critical Systems Engineering Factories.
AIPP 2: Innovative Integrated Care Cycles.
AIPP 3: Seamless Communication & interoperability - smart environment (the neural system of society).
AIPP 4: Production and Energy System Automation.
AIPP 5: Computing platforms for embedded systems.
AIPP 6: 'Intelligent-Built' environment and urban infrastructure for sustainable and friendly cities.

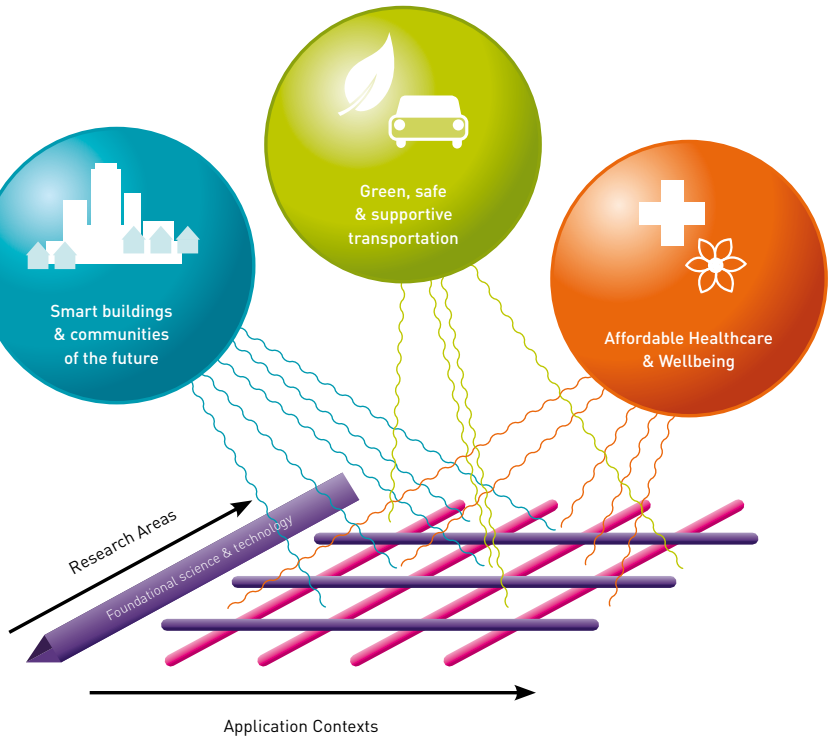
THE 8 ARTEMIS SUB PROGRAMMES:

ASP1 Methods and processes for safety-relevant ES
ASP2 ES for healthcare and wellbeing
ASP3 Embedded systems in smart environments
ASP4 Manufacturing and process automation
ASP5 Computing platforms for ES
ASP6 ES for security and the protection of critical infrastructures
ASP7 ES to support sustainable urban life
ASP8 Human-centred design of ES

The ARTEMIS Call 2012 is special in a number of ways, as those who have attended one of the several promotion and brokerage events that we have organised this year will have discovered. This call, following the half-way mark of the programme, represents a step-up towards the ARTEMIS strategic goal of building "self-sustaining innovation eco-systems", starting from the project clusters and "centres of innovation excellence" that ARTEMIS has already produced. This is reflected in the ARTEMIS Annual Work Programme , which defines the technical content of the Call.

The ARTEMIS Annual Work Programme for 2012 contains two sections – Part A and Part B. Part A addresses the ARTEMIS Sub Programmes, as per the previous calls. The sub-programmes are also the seed of potential innovation eco-systems, or groups of complementary players who establish mutually beneficial, durable collaborations.

Part B formally launches the call to the ARTEMIS community to build major collaborative structures to kick-start Innovation Eco-Systems in one of 6 domains around the themes of the ARTEMIS Strategic Research Agenda 2011 (see box). These "ARTEMIS Innovation Pilot Projects" (AIPPs) are modelled on living labs and pilot lines: techniques that have already proven their worth in supporting high-impact innovations.

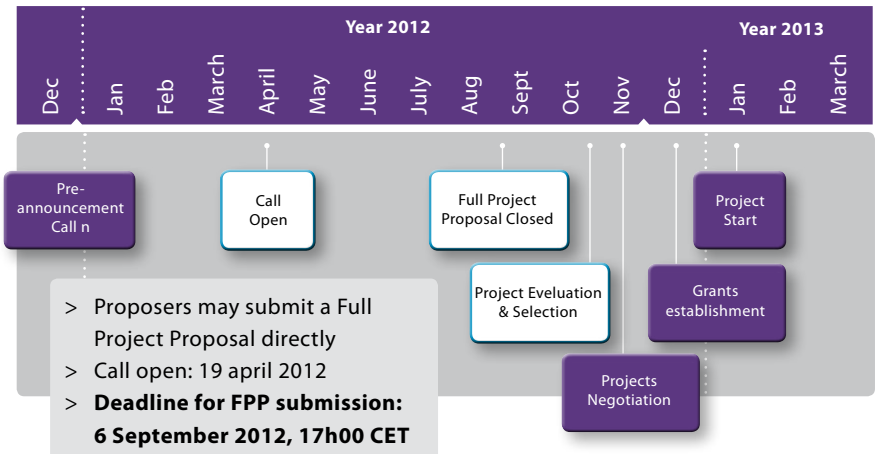


AIPPs are the logical extension of the active clustering of projects that ARTEMIS has promoted from the outset as a means of maximising the impact of the projects' R&D results. They also build on the four leading principles of the ARTEMIS programme, designed to assure significant impact and positive return-on-investment of the public funding used – "Think Big", "Act socio-economic", "Act multi-national (pan-European)" and "Think different". The expectations for these AIPPs are high: to launch large innovation eco-systems (of the order of €100 m over three years) grouping researchers, major players and SMEs, that will survive the duration of the project significantly. The evaluation criteria are correspondingly adapted, and so are the National and JU budgets foreseen – at more than €138 m funding available for ASP and AIPP proposals, this is the largest ARTEMIS call to date.

Setting up the call to accommodate these AIPPs means that the opening of the call is somewhat later than in previous years. To keep the call cycle within this calendar year, the Project Outline phase has been skipped. The call close date is also one week later than previously (did I hear a cheer?): 6 September 2012. As usual, it closes at 17:00 Brussels time exactly – don't miss it!

With all that in mind building an AIPP proposal will not be easy, but the proven strength of the ARTEMIS community led by the excellent project coordinators Europe can boast makes us confident that we'll see some truly excellent and exciting AIPP proposals when the call closes in September. ■

THE STRATEGY IMPLEMENTATION CALL 2012



CHESS

Four pillars for building time-predictable and dependable systems

by Scott Hansen

Increased need for time-predictable, dependable systems for business-critical applications has led to the maturing of several relatively efficient real-time and dependable software infrastructures integrated in protocol stacks, operating systems kernels, middleware systems and software development methods. Nonetheless, the development of real-time and dependable software is still very complex and business demands for more functional value per hardware unit and shorter time to market are making it even more so.

The integration of component-based software engineering with model-driven engineering creates a highly potent combination for mastering complexity, increasing reuse, guaranteeing robustness and quality, and facilitating maintenance while reducing costs and risks of development and deployment. That very combination also creates two important challenges for the development of high-integrity software:

> Developing components that can be individually qualified to industry standards (including certification) for provably guaranteed delivery of the required level of service
> Preserving those guarantees in the assembly of heterogeneous software components on a given target execution platform

CHESS addresses these challenges based on four distinct pillars:

1 Separation between functional and extra-functional concerns via explicit support for design views
2 Centring the use of the functional view on a full-fledged component model and a coherent component-based development method
3 Fostering correctness-by-construction by adopting a declarative approach to the implementation of extra-functional concerns
4 Strict separation between platform-independent and platform-specific modelling.

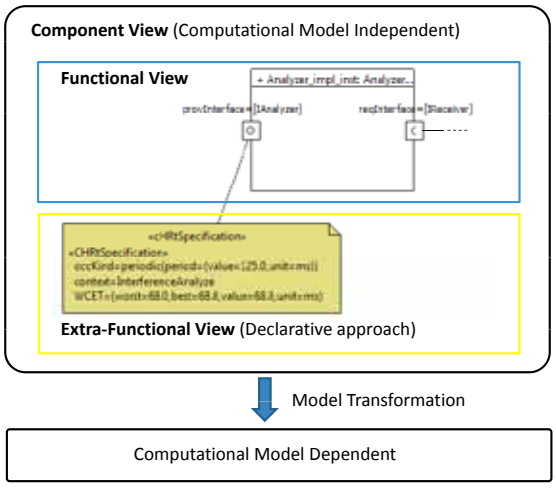
DESIGN VIEWS ~ The CHESS design process is a component-oriented approach for developing embedded real-time software distinguished by the quest for sharp separation of concerns, in particular between functional and extra-functional concerns.

Separation of concerns requires active enforcement during design. A design view is a construct that enables the enforcement of specific visualisation and modification rights over specific elements of the system model. Each design entity "belongs" to a single view – while that entity can be visualised in several views, only one view may contain creation and write permission. This approach results in design views being a very effective means to enforce separation of concerns.

COMPONENT MODEL ~ The CHESS design process prescribes a series of design steps for the modelling of the system and gently pushes the designer through each: from definition of data types and interfaces to definition of component types and component instances, which are eventually decorated with extra-functional attributes. For hardware modelling, the designer can specify processing nodes and devices, and then the interconnections between. The entities resulting from the hardware description are decorated with attributes for the purpose of analysis, communication and code generation. As a final step, component instances are deployed to processing units.

Any extra-functional concern in the predictability (timing, space and communication) and dependability dimension is specified by attribute decoration of components and their interfaces. There is no explicit modelling of extra-functional aspects; these are handled by the CHESS modelling infrastructure automation capabilities. For a model confirmed by analysis, model-to-text transformations will generate source code for the extra-functional part of the system using industry-qualified code patterns and archetypes that probably realise the semantics entailed by the extra-functional attributes. Eventually, the functional code is imported in the model repository for integration with the extra-functional code resulting from automated model-to-text transformation, which completes the implementation process.

DECLARATIVE SPECIFICATION ~ CHESS implements separation of concerns very strictly. Functional information is modelled in the design space using a subset of standard UML constructs. Conversely, the declaration of extra-functional attributes for dependability and time-predictability are performed by setting specialised stereotypes –part of the CHESS profile – on model elements specified in the functional view, without this altering any of those elements. This is one of the key features of the CHESS correct-by-construction and model-driven approach: in fact, we guarantee that all items of a model specification are provided such that there is a direct and proven correspondence with model transformations rules, and formalised by the profile definition with no room for conflicts or inconsistencies in the extra-functional semantics of the model.



Strict Separation between PIM and PSM
In keeping with the principles of model-driven architecture, the platform-independent model (PIM) and the platform-specific model (PSM) are strictly separated. The PSM is automatically generated from the PIM and is read-only for the developer. The PIM is therefore the only design space for editing by the developer. The PIM design space is organised into views and the information that guides the generation of the PSM results from the assignment of extra-functional attributes on elements of the functional model and the setting of specific values on them. Declarative specification in the extra-functional view in CHESS is kept as abstract as possible to ease the task of conveying the intended meaning and expressed in an ensemble of predefined patterns and archetypes that the transformation engine retrieves, matches to the developer setting and instantiates in the PSM.

IMPACT ~ Separation of concerns provided by CHESS provides important benefits:

> Each designer can focus exclusively on their concerns of pertinence, without needing unnecessarily to have to master all of them
> Separation between functional concerns and extra-functional concerns enable full reuse of components (essentially functional/sequential code) under different extra-functional requirements

Reuse then becomes just a matter of changing the setting of extra-functional attributes, repeating model-based analysis to confirm that all extra-functional requirements are met in the new specification, and then let the transformation engine generate the new extra-functional code.

CHESS has pushed forward the state-of-the-art and the state-of-practice of reliable embedded systems for business-critical applications. The CHESS team is sharing the acquired know-how and the developed technologies in multiple forms, including algorithms, tools and methodologies. ■

FOR MORE INFORMATION

SilviaMazzini
Coordinator of the CHESS project,
Email: silvia.mazzini@intect.it
The project website is: www.chess-project.org

PRESTO

Fostering analysis on industrial embedded systems development process

by Michel Bourdellès

PRESTO (development process improvements of industrial real-time embedded systems) is an ARTEMIS JU project of the 2010 call involving 13 organisations from five European member states and representing industry (large companies and SMEs) as well as the research and academic communities. Having started in April 2011, it has a duration of 36 months and a budget of 8.6 million euros.

PRESTO AT A GLANCE ~ The PRESTO project aims to improve the development and validation of test-based embedded systems within the constraints of industrial development processes. One the one hand, the main information recovery of the software development flow is the description of the software application as a set of interconnected components and their interfaces, specified using the MARTE profile or domain-specific language supporting software/hardware allocation. On the other hand, test traces are generated from "classical" software test integration of functional behaviours. Presto is based on the integration of:

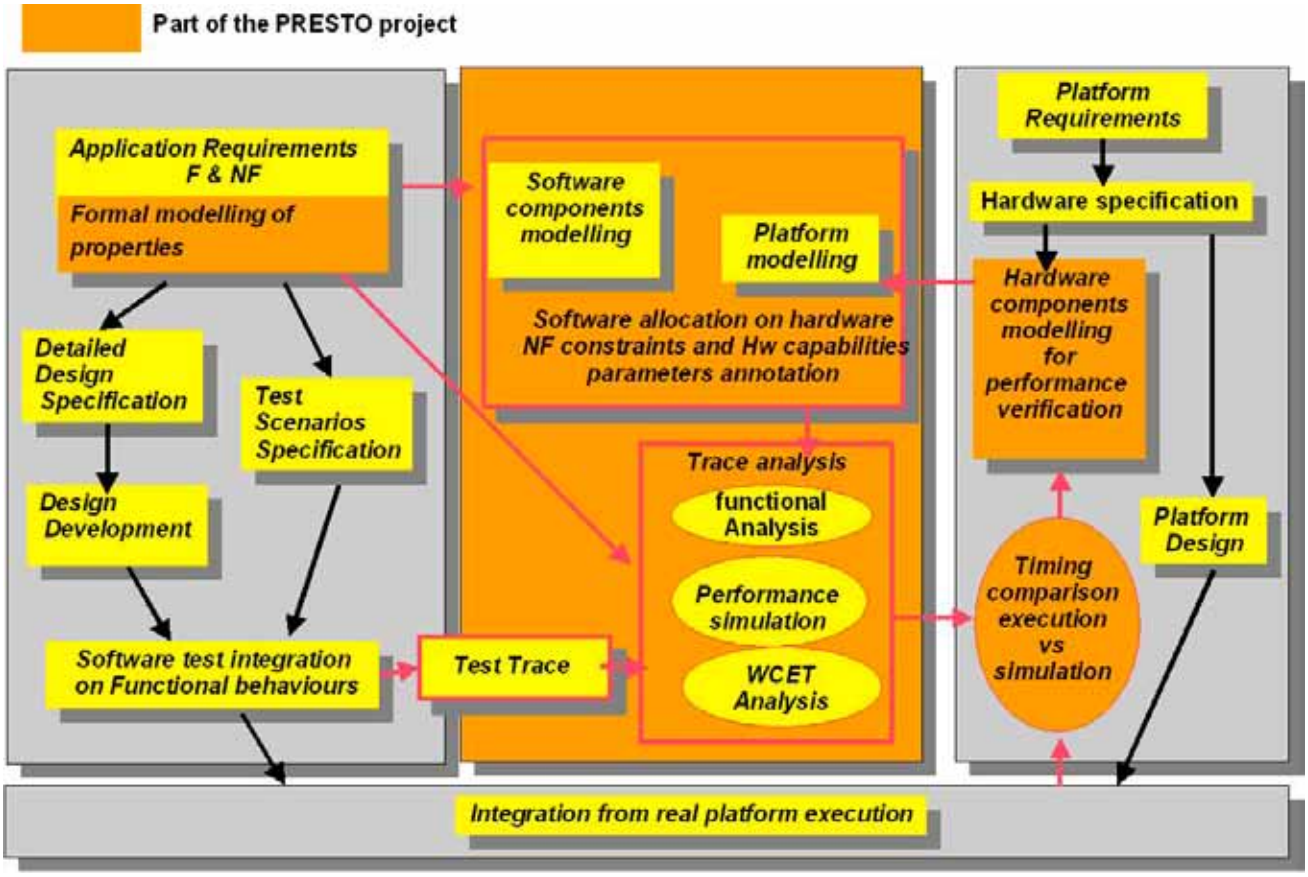
a Test trace exploitation
b Platform models and
c Design space exploration techniques.

The general idea of the PRESTO project is to provide a toolset, using inputs from the current Industrial Design processes, in particular: system requirements allocated to the software and hardware with test execution traces from the software integration.

AS EARLY AS POSSIBLE ~ By nature, Embedded Systems are constrained by the limited amount of resources available (time, power, size). These constraints need to be taken into account in the engineering process. The allocation of application functions on execution platforms and the related consequences of using resources must be carefully addressed, as early as possible, during the design stages. Evolutions in the industrial process developments of real-time and embedded systems are faced by new challenges in their design process. During embedded software design hardware platform parameters should be adjustable and the embedded software design should allow new hardware component parameters to be modified so that software developments benefit and the impact of these functionalities can be evaluated, in term of timings, during the early stages of the design.

EXPECTED RESULT ~ The expected result of the project is to establish functional and performance analysis and platform optimisation at an early stage of design development. Particular attention is given to industrial development constraints, which means: 1) the least possible cost in terms of extra specification time and need for expertise, 2) simple use of the tools, 3) smooth integration in the current design process, 4) a tool framework flexible enough to be adapted to different process methodologies, design languages and integration test frameworks, 5) analysis results validated by comparison with real platform results, and subsequently improved platform modelling for fast prototyping.

THE PRESTO CONCEPT ~ The following project synopsis presents the formerly separated software (i.e. the application part of the system) and hardware (i.e. the Hw, OS and middleware part of the system) design flow parts. PRESTO enriches these flows by adding extra specifications of the software/hardware deployment modelling and captures the deployment information needed to interpret trace generation from host platform to estimate the performance of the modelled targeted platform. Functional analysis from properties is also verified on the traces. The overall concept developed in the PRESTO project is validation non-functional properties, such as performance, at an early stage to result in a better fit of the software components



on the execution platform (hardware and middleware).

The PRESTO flow extensions, related to software and hardware modelling, are explained below.

A - IMPROVEMENT OF THE SOFTWARE DESIGN FLOW

> **Software modelling**, *by any language extension, supporting software and hardware allocation (with the MARTE UML profile, AADL or AUTOSAR standards as potential candidates)*: the software component modelling specification will be done at the same time as the software design specification (Software Requirements Specification, Interface Requirements Specification). The definition of the components and their interface should be sufficient for performance modelling.

> **Formal modelling of properties**: Requirements specified in system specification documents are described in natural language (requirements for functional or timing constraints) and validated only in platform execution. We propose to formally specify the functional and timing constraints to be used by the timing analysis tools in addition to the software/hardware allocation model and an application model. The format and expression of these timing properties are defined jointly by the industrial partners and timing tools analysis providers in the project.

> **Test trace generation and exploitation**: The sequences of actions in traces are expressed as the behavioural representation of the system. The objective of this project is to use these sequences of actions as the entry point for performance analysis tools. As these traces contain a huge quantity of functional information, we propose using them in the project for both functional and non-functional property verification. An information set will be defined in respect of ascertaining the type of property, and the capabilities of the analysis tools. Code instrumentation will be applied on the wrapper code generated in the software modelling specification.

B - IMPROVEMENT OF THE HARDWARE DESIGN FLOW

The main information recovery of the process hardware development flow similarly includes:

> **Hardware modelling**: the description of the hardware platform and its modelling

Michel Bourdellès
Michel Bourdellès acts as the interface between the collaborative project activities and the Software Radio Protocol department, product design, at Thales Communications & Security. Michel Bourdellès is involved particularly in projects related to (1) the improvement of the RTES design process as in the ARTEMIS PRESTO project, protocols intrusion detection security extension, and protocol resource optimisation. Michel Bourdellès gained his PhD degree in Computer Science from the "Ecole des Mines de Paris" in 1999 and joined THALES Communications & Security, Colombes in 2000.

using the dedicated MARTE profile. This modelling should be smoothly integrated into the hardware design flow. At this stage several architectures may be specified and modelled by the prototyping tool and compared with software components and architecture.

> **Comparison between timings analysis and execution**: To validate the timing analysis results, they have to be verified against real platform execution analysis by comparing timing results with the execution (or simulation) of the application on the platform at different gradations (e.g.: single function, full trace,…).

C - IMPROVEMENT OF THE ANALYSIS CAPABILITIES

The results will allow the adaptation of the parameters needed for predicting performance using timing analysis. The transition between functional simulation and execution is typically gradual; it should be possible to quickly verify those parts where the design has proceeded further. Therefore, mixed situations have to be taken into account.

> Fast platform prototyping tool definition: Here we propose to quickly define a platform prototyping tool, based on the MARTE UML profile for embedded systems, or to use existing hardware and software architecture modelling languages to describe the allocation of the software components on the annotated platform. This will provide performance verification, such as WCET analysis in respect of specific software/hardware allocation, scheduling analysis, performance dependence on hardware parameters, best proportion of the hardware components in terms of the performance constraints.

> Use of the test traces as point of entry for designing the property and performance analysis environment: The sequences of actions in traces are expressed as the behavioural representation of the system. The objective of this project is to benefit from these sequences of actions and to use them as the point of entry for performance analysis tools.. The test framework may generate more accurate information, such as message conveyance between components, function calls, host execution timing information and variables assignments. This information is generally used to help debug the system. As these traces contain a huge quantity of functional information, we propose using them in the project for both functional and non-functional property verification, by specifying explicit properties, as available from the formal modelling of requirements, and by inferring properties or sequence patterns from traces.

> Simulation results compared with the real platform execution: As the modelling of the platform is not supposed to be designed by a hardware expert, and should be as fast as possible, key to the top-down analysis from the application to the platform execution is confidence in the fast prototyping tool performance predictions. The solution to validate this modelling is to compare the predicted performance with the real execution on the platform for different classes of systems used as benchmarks, in order to identify the dominant parameters for suitable platform modelling. ■

IN YOUR AGENDA, 2 JULY 2012: THE ECMFA CONFERENCE SATELLITE WORKSHOP EIAC-RTESMA'12
European Industrial & Academic Collaborations on RTES Modelling and Analysis.

The objective of this workshop is to present current ongoing industrial/academic work on the modelling and analysis of real-time and embedded systems, with particular attention given to success stories in the integration and assessment of the exploitation of R&D improvements on industrial designs. Partners from collaborative projects are asked to present industrial experiences of collaborations with tool providers and academics.

ECMFA conference link: http://www2.imm.dtu.dk/conferences/ECMFA-2012/ Specific workshop link http://www.artist-embedded.org/artist/EIAC-RTESMA-12.html

Acknowledgement: the author acknowledges the PRESTO partners for the careful reading and comments of the PRESTO project presentation: TELETEL (project coordinator), INRIA, University of Aquila, Sarokal Solutions, VTT, Miltech, RapitaSystems, Prismtech, MetaCase and PragmaDev.

In pursuit of sustainable interoperability

Finding the right balance

By Bola Rotibi

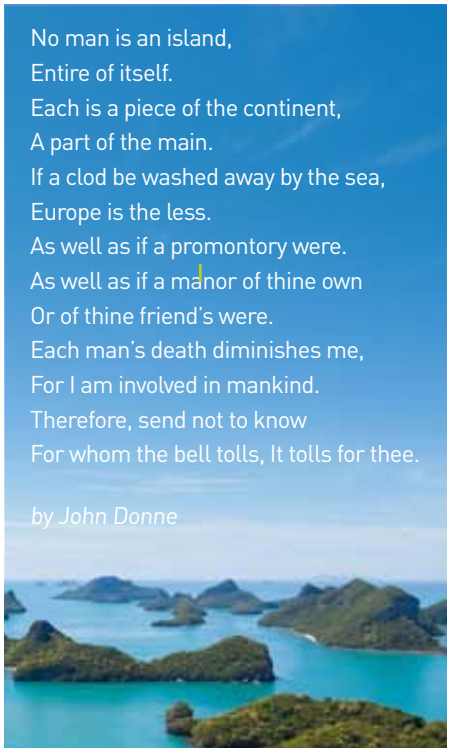
In this article Bola Rotibi, keynote speaker of the ARTEMIS Technology Conference in Nuremberg, looks at the increased drive for better interoperability in the production of software enabled systems and products. Crucially, she outlines focal issues when seeking a more sustainable interoperability specification to ensure many different tools can share and reuse data easily and take part in a wider range of process workflows. This is especially the case for workflows that raise productivity and improve quality and speed of delivery.

IT'S EQUIVALENT IS INTEROPERABILITY ~ The idea of interconnectivity is not a new one. John Donne famously wrote "no man is an island" as far back as 1624 in his seminal poem on Devotions. IT's equivalent is interoperability, a concept that defines the ability of different systems, tools or processes to work together and exchange or reuse information.

On the face of it, the definition appears simple enough. In reality, pursuing a strategy for interoperability can require more complex considerations. Moreover, the concept of interoperability has broad application. In seeking a mandate for interoperability it is, therefore, important for to anchor the focus and identify the goals being sought.

THE RISE OF A MORE INTERCONNECTED WORLD ~ There can be no doubt as to the success of software. Software, with the support of Internet connectivity, mobile communication networks and new business analytical models, is creating a competitive advantage for those companies who can get it right. And by getting it right I mean those that can deliver solutions that use the latest software innovations, technology advances and social practices to improve the experiences and productivity of their customers. But also those that can respond to changing demands and quickly deliver products and systems that meet the expectations of customers without compromising on quality or failing to comply with governing regulations and policies.

Within the complex systems and embedded market, the role of software has grown increasingly in importance and value. Convergence between different physical devices, precipitated by the increasing use of embedded software, is enabling greater connectivity. Within the automotive industry expectations are high that cars will eventually be fitted with cameras, mobile phones and other type of electronic devices embedded into their control and console systems. While they will be connected together by electronic circuit boards, wires and appropriate mechanical parts, it will be the embedded software within the individual systems that will allow higher forms of intelligent integration and application to be achieved. Also one need only compare the cars of today with those of five or ten years ago to see that more of the internal systems (e.g. engine management system, safety and environmental control systems and the entertainment systems) are controlled by a large number of microprocessors within the car.



Ultimately, in the safety critical embedded systems market, software innovation is driving more flexible and adaptable functionality. All of which sees greater potential for smarter context-aware controls and a broader scope of capabilities.

SOFTWARE'S SUCCESS DEMANDS INTEROPERABILITY.... ~ Within industry and across the market, the call for greater and better interoperability has grown with the rise and importance of software. The calls are widespread owing to the dynamics behind software creation and it being embedded within a product that may also be formed from a framework of interconnected component systems.

Getting rid of walls with the push towards smarter interconnected systems and the promise of the seamless transition of data, information and process raises the stakes for interoperability.

...AND RAISES THE STAKES FOR IMPROVEMENTS WITH THE PRODUCT DELIVERY ~ The overall delivery process of a software enabled product is not without challenges. Both the software and the wider product delivery process have drawbacks. There are delivery challenges with establishing traceability and accurate insight into core management functions such as cost estimation and reporting.

Eliciting requirements, validation and management for all aspects of the entire product lifecycle process can be difficult to maintain. Mindset, workflow dynamics and an inability to look beyond role boundaries often hamper effective communication and collaboration across the silos of working practices. The mix of technologies and disciplines makes cross-platform testing and validation of heterogeneous systems and environments hard to achieve.

The pressure to improve an organisation's competitive edge and commercial advantage without losing quality or failing to comply with governing regulations and policies is driving the focus on improving the overall product delivery process. Cost containment and ensuring speed of delivery are factors that are as important to improving the delivery process as guaranteeing the quality of safety critical systems.

All embedded software players require tools and techniques to help them deliver their products and components efficiently, effectively and to the required levels of quality. But their requirements need to be considered less in terms of the delivery processes related to individual components

and more in the context of the processes that govern the delivery of a set of integrated software components and systems that together form part of a fully functioning product – be that a car, handheld device, industrial machine, consumer appliance or the avionic control system of a plane.

Today, the embedded and safety critical systems market contains a wide variety of providers with myriad interconnections and interactions of varying complexities. There are multiple layers of software engineering involved in the assembly and delivery of today's complex systems. All of this sees a wide spread of supporting tools and the need for greater collaboration and alignment between stakeholder disciplines and their workflow processes and practices.

INTEROPERABILITY: AN AGE OLD DESIRE WITH TANGIBLE BENEFITS ~ The value of interoperability is broad with tangible benefits. It offers access to data and information held in disparate systems. It can support interactions that vary from the sophisticated to the mundane and provide an environment for innovation. Fundamentally, it allows the unification and the seamless transition and exchange of data, information and processes that can be reused in multiple ways and in multiple locations. It can smooth the change management process by providing the capacity for greater automation and allowing for more effective communication and collaboration. The benefits can be substantial, ranging from better traceability through to more unified workflows and governance controls that collectively subscribe to overarching business demands and results.

Given the value and important role software plays in many products, it becomes vital to improve the end-to-end lifecycle management process along with other core practices such as quality management, resolve problems and boost the versatility and speed of delivery. Not having a robust interoperability strategy and specification in place can be significantly detrimental. The quality barriers from disconnected workflows and tools and silos of working practices lead to increased incidence of errors and inefficient processes that create risks and waste resources.

LESS A QUESTION OF NEED, MORE A SEARCH FOR THE RIGHT APPROACH ~ The need for interoperability is not in question. What is required is a strategy for the right interoperability to occur in the in the right way. But it is more than adopting a framework for an open interoperability specification that freely, and without constraints, encourages the widest support and engagement from across the industry and market landscape. It is even more than a specification that leverages proven strategies and architectures for interoperability such as the Open Services for Lifecycle Collaboration (OSLC), which adopts the loose coupling architecture and minimum data exchange strategy of the Internet. The open community support of OSLC with no barriers to participation and its Linked Lifecycle Data architecture present a fresh and more pragmatic approach to enabling different tools and tooling groups to work together. It not only provides support for an ecosystem of integrated workflows but allows them to participate and collaborate at multiple levels, all of which can help to encourage evolution and improvements from multiple angles – process, tooling, skills etc.

No, what is important to any interoperability strategy being undertaken is for those seeking it to be extremely clear as to the value they are looking to achieve. This will require greater contemplation of the reasons for interoperability within the context of the wider business picture. It will also require a focus on the level of interoperability that one is prepared to support since this could have knock-on implications for other dependent processes. There may be restrictions on the sharing of certain information or the exchange of specific data. Some tools may require additional certification or specialist skills. Identifying the goals of interoperability is one thing; understanding one's own internal constraints (organisationally and individually) towards achieving it is another. Assessing where the pitfalls might be will be vital in understanding the level of commitment needed to embark on an interoperability strategy. It will be all the more important for determining the likely adoption success rate and participation support for any proposed interoperability specification. ■

About Creative Intellect Consulting and Bola Rotibi

Creative Intellect Consulting is an analyst research, advisory and consulting firm founded by Bola Rotibi an experienced and widely published expert analyst in the field of software development, delivery and lifecycle management processes, technologies and tools. The company's key areas of analysis are software development, delivery and lifecycle management across the Software and IT spectrum along with its impact on and alignment with the business. Bola Rotibi has 20 years of industry experience spanning engineering, software development and IT analysis. She is a high-profile and highly experienced analyst focused on software development technologies, processes and market trends. In 2008 and 2009 Bola Rotibi was voted one of the top three analysts covering the software development and delivery market and industry by the influential IIAR (Institute of Industry Analyst Relations) group. In 2010 she was invited to join $(ISC)^2$'s Global Application Security Advisory Board (ASAB).

Towards a vision of an interoperability standard for critical embedded systems

ARTEMIS Technology Conference 2012

by Rainer Ersch, Siemens AG & Ingrid Kundner, AVL List GmbH

1 March, 2012, Nuremberg: eleven projects and initiatives from ARTEMIS, ITEA, national funding schemes and open collaboration communities came together to discuss the future of an interoperability standard. This was the ARTEMIS Technology Conference 2012 on Interoperability. The event was hosted by CESAR and co-hosted by iFEST, MBAT and pSAFECER in conjunction with Embedded World 2012 and the ARTEMIS Spring Event 2012. To increase the variety of interoperability approaches presented, a call for contributions had been launched within ARTEMIS, ITEA and national research communities. It resulted in an interesting group of contributing projects and initiatives, each highlighting a specific aspect of interoperability:

CESAR (ARTEMIS) | MBAT (ARTEMIS) | iFEST (ARTEMIS) | OSLC (Open Community) | POLARSYS (Eclipse Industry Working Group)
pSAFECER (ARTEMIS) | SAFE (ITEA) | SMECY (ARTEMIS) | SOFIA (ARTEMS)
R3COP (ARTEMIS) | SPES XT & SPES 2020 (National German)

With most of the engineering environments built years ago, connecting home-grown tools and tools designed by different vendors from different disciplines, the resulting landscape is very heterogeneous and lacks a common concept of interoperability. Current demands are increasing the need for interoperability: faster time to market, reduction of costs, even more distributed teams and an increasing number of external partners to collaborate in a product life cycle. An interoperability concept that is able to support all these demands needs to be based on a technology that has proven its ability to drive such environments and is adequately scalable for future challenges, e.g. web-based services, with a loosely arranged linked data approach.

Such an interoperability concept involving many groups of stakeholders (tools vendors, industrial end users, integrators, software and hardware engineers, project leads, managers, etc.) cannot be driven by a single group. At the ARTEMIS Technology Conference, project presentations, poster sessions and a keynote speech by Bola Rotibi CEng., Research Director at Creative Intellect Consulting Ltd, led to discussions which increased understanding of the challenges, commonalities and differences in the approaches taken by projects and initiatives to interoperability.

An essential question addressed during the ARTEMIS Technology Conference was: "Is it enough to have one interoperability standard – or will we need more than one?" The participants agreed that it might not be sufficient to have one common standard but rather a number of standards leading to a layered approach from general to specific applications.

Among the challenges identified were barriers to quality caused by disconnected workflows and tools. In the past, many teams focused on improving their local work environment, e.g. improving the quality of the requirement process, introducing better testing methods or raising productivity by adopting agile implementation methods. The workflows between teams as well as between disciplines (e.g. HW and SW engineering) are still disconnected. There is a big need for interoperability between the artefacts of the engineering and the product lifecycle. The main goals to achieve are: collaboration, traceability, reporting and automation.

Shedding light on this multiphysics / multidiscipline aspect of Embedded Systems Engineering, the participants recognised the need to consider the interfaces to other disciplines. However, it is seen as too early in the process to include all disciplines and to extend interoperability to the full System Engineering approach. One of the participants remarked in this context, "Let's first clean our house". By contrast, this strategy does not apply to the question of in-house interoperability versus inter-company interoperability, as these have to run in parallel so as to benefit from each other. A close connection to process and method optimisation and adaptation is also necessary.

Optimising the in-house processes might lead to a new role in the development process. In many organisations, the questions "how do I organise the architecture" and "what are the models in the background" cannot sufficiently be answered today. The participants recognised how essential the new role of the "System Engineering Environment Architect" is in answering such questions and the urgent need for education and training to meet this industrial demand.

Although the approaches presented revealed a diversity in terms of scope and level, the is considerable homogeneity in the big picture was recognised in the need for a generic basis to deal with specific applications. An example is the large scope contained in the CESAR Interoperability Specification (IOS), where compatibilities with the iFEST approach were already recognised in the past. Events like this ARTEMIS Technology Conference are a first step in the right direction. It is now up to all stakeholders involved to push the harmonisation of approaches forward and to foster and continuously improve an interoperability concept. Establishing such a concept cannot be done overnight nor can it be forced. It's more like an ongoing journey - and the journey has just begun. ■

ARTEMIS in Poland

ARTEMIS on the fringes of the Future Internet and making it happen

By Irene Lopez de Vallejo and Pauli Kuosmanen

In the context of the Future Internet Assembly (FIA) in Poznan last 26 October 2011 ARTEMIS organised a workshop [1] to discuss the role of Embedded Systems in the Internet of Things and to engage the Future Internet community on a discussion on the technologies that form the neural backbone of our society today.

The workshop was introduced outlining the ARTEMIS vision: mankind benefiting from a major evolution in our society whereby our world is widely supported by intelligent Embedded Systems. This is a world in which all systems, machines and objects become smart, have a presence in cyber space, exploit the digital information and services around them, communicate with each other, with the environment and with people, and manage their resources autonomously.

The ubiquitous presence of the Internet provides the communication infrastructure for smart objects to be connected, leading to the Internet of Things (IoT) concept. Life in our society, along with security and safety, will increasingly depend on Embedded Systems technologies.

ARTEMIS is working on developing the NEURAL BACKBONE of SOCIETY and a rich

set of applications is being built based on this neural backbone. In parallel, some areas of the FP7 ICT programme are stimulating the development of innovative applications that can take advantage of the communication primitives provided by a backbone infrastructure and that can themselves be strategic components for smarter environments, namely for the development of our future cities.

The Workshop programme tried to reflect these realities. The first two presentations were from projects funded under ARTEMIS and the last two from projects directly related to applications and funded in FP7 ICT . The final panel included the four speakers plus two additional experts and there was plenty opportunity to discuss the connections among the different technological and application areas.

The session kicked off with an excellent presentation by Luis Pinho. He introduced the EMMON project, which aims to allow the monitoring of geographical areas using wireless sensor network devices. His talk focused on the scalability of communication and programming abstractions. Pauli Kuosmanen brilliantly followed presenting the SOFIA project, which researches linking embedded information to the Future Internet. His talk focused on the interoperability between devices from different domains and on the opening of embedded information. These two projects are funded by ARTEMIS.

Then, José Manuel Hernandez Muñoz presented the Smart Santander project, which aims to make the smart city paradigm become a reality. His talk focused on the deployment aspects of the WSN infrastructure in the city of Santander. Sylvie Couronée presented the LocON project, which is a solution for controlling and monitoring large infrastructures, with a focus on applying the LocON platform to monitoring people and vehicles in an airport environment.

Irene Lopez de Vallejo is currently ICT Partnerships Director at Tekniker IK4, a private non-profit technology research centre located in the Basque Country, north of Spain. She is also Vice-President of the ARTEMIS industry Association.

Pauli Kuosmanen is CTO of TIVIT Oy. The organisation is a Finnish Strategic Centre for Science, Technology and Innovation (SHOK). TIVIT is committed to ensuring even more rapid development of Finnish ICT know-how. Pauli Kuosmanen is also Vice-President of the ARTEMIS industry Association.

From the discussion that followed the presentations, it was concluded that despite all research on Embedded Systems and on WSN, there are still key technical challenges to be solved, including scalability issues, spatial and temporal data issues linked to indoor and outdoor localisation, battery life problems or how to solve the problem of "eternal power", security of systems, privacy of identities and cost of solutions.

But it was also absolutely clear for the panel and the attendees that life in our society, and its security and safety, will increasingly depend on embedded systems technology. These embedded systems, which can be considered the neural backbone for our society environment, undoubtedly enable a rich set of innovative applications today that will become even more important as we enter the 2020s.

POLAND IN ARTEMIS

NEWEST ARTEMIS COUNTRY READY FOR CALL 2012 ~ In ARTEMIS Magazine 11 it was mentioned that Poland's status as a full ARTEMIS Member State is in the pipeline. Now in ARTEMIS Magazine 12 we are happy to announce that Poland is in ARTEMIS and that the Call 2012 is open for Polish companies and knowledge centres.

The awareness generated in Poznan for the Brokerage Event in Prague resulted in participation at the Brokerage event from the Polish leading ICT cluster in Poland, representing over a hundred IT companies in the Gdansk region. This networking event led to the matching of Polish partners for participation in starting consortia for Call 2012.

There are many excellent companies with products and services that provide perfect niche solutions. Although companies know that they have excellent Embedded Systems products, they are often not aware of how powerful these can be since they do not really consider what they are doing as a special area of expertise. An Information & Networking workshop will be organised on 11 May in Gdansk to help Poland make the cultural shift to ARTEMIS working practice. The ARTEMIS community welcomes the Polish partners to the projects! ■

[1] *Rapporteurs/Organisers: Irene Lopez de Vallejo , ICT Partnerships Director, Tekniker IK4, ARTEMIS Industry Association Vice-President (ivallejo@tekniker.es), Augusto Júlio Casaca, Professor at the Instituto Superior Técnico, Lisbon, and Leader of the Research Group in "Network Architecture" at Inesc-ID and Inesc-Inovação in Lisbon (augusto.casaca@inesc-id.pt). CHECK IF INESC IS MEMBER OF ARTEMIS.*

[2] *Speakers: Luis Miguel Pinho, Professor at Instituto Superior de Engenharia do Porto (ISEP); Vice-Director & Research Associate at the CISTER Research Center; Pauli Kuosmanen, Chief Technology Officer at Tivit, Finland; Jose Manuel Hernandez Munoz, Coordinator of Smart Santander, Telefonica I+D; Sylvie Couronée, IIS Fraunhofer Institute, Erlangen, Germany. Other contributors: Walter Buga, Coordinator of Smart Connected World, Huawei Technologies, US.*

COLUMN

BATON BLUE(S)

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

What is your name and what position do you hold? ~ I'm Werner Damm and I am professor for Safety Critical Embedded Systems (ES) at the Carl von Ossietzky University of Oldenburg.

You have a prominent role in the EICOSE cluster Safetrans and you worked actively in the development of the ARTEMIS SRA for Europe. Why did you choose this position? ~ I've been in the Embedded Systems world for fifteen years, starting in a German government funded project investigating new capabilities for cars, like electro-magnetic braking systems. Since then I spent a lot of time at a number of German companies getting to fully understand their development processes for new functionalities in cars or rail applications and looking at how embedded systems can contribute to enhancing the quality of such complex systems. It was therefore a natural step to form the Safetrans not-for-profit organisation that involves many key players. So although I'm an academic, I'm very much engaged in my role as chairman of Safetrans in identifying the key innovations that we need on the Embedded Systems side to make transportation as safe and reliable as it is today in spite of the increased complexity of the electronics and growing density in traffic. It is essential to address these issues at a European level and EICOSE, as the centre of innovation excellence for transportation, has been a fantastic instrument in harmonising the interests of key industrial stakeholders in the transportation sector across many countries. I believe that knowledge transfer in this key cross-cutting field of Embedded Systems is vital to strengthening the competitiveness of European industry in this sector, and EICOSE is a vehicle that can propel the necessary innovations forward. My commitment is spurred on by a wish to maintain a high level of competitiveness and I see ARTEMIS as an excellent instrument to achieve this level of competitiveness. Hence my level of involvement in ARTEMIS.

Apart from EICOSE, as this is the first ARTEMIS CoIE, do you have an active role in the creation of Centres of Innovation Excellence? ~ As a member of the working group chaired by my baton blues predecessor, Professor Daembkes, I contributed to the debate on revitalising CoIE's. So in this sense I was an active participant in generating lessons learned and looking at ways forward, although I can't say I directly played an incubator role for the recent new CoIE's. But in terms of contributing in and to the working group and its results, yes.

What is the big motivating factor in your professional life? ~ My vision is to cope with the growing complexity of embedded systems in industrialised applications. I'm driving this vision by building a complete research pipeline from fundamental through applied research to a spin-off company I've been creating. I'm really impressed by my colleagues in the industry that have managed to build such fantastic products that incorporate embedded systems. I've been infected by their capabilities in trying to gain a deep insight into the

way these things work in industry to see how research efforts can be tuned to such processes and so have an industrial impact. I'm interested in achieving a lasting footprint with all the innovations I've been pushing.

What do you believe is the biggest challenge in the R&D of Embedded Systems? ~ I think I've already used the word 'complexity' a few times. That is our biggest challenge – exponential growth of complexity. This is evident in one of today's key issues, systems of systems. Think of cars, networks of cars, networks of infrastructures, management systems, what have you. The level of interaction is simply of a scale where it takes very elaborate technology to ascertain what is happening in such systems of systems applications. Since society will increasingly come to rely on these systems of systems, our challenge is to find a way of coping with the complexity inherent in such developments.

Heinrich Daembkes handed over the baton to you and he has a particular question to you: What do we need to guarantee sustainable availability of the results that we are going to achieve on the Reference Technology Platform for embedded systems? ~ The RTP has been a real achievement by the flagship project CESAR where there is a convergence on the part of the twenty or so systems companies along with the vendors participating in the project as to what could be the key enabling components for future critical systems engineering that build on embedded systems. One of the industrial dimensions is to achieve open interoperability specifications for this context. To ensure sustainability of this platform, we need to get the buy-in of the key vendors and large companies to enable such a platform to be 'plucked and played', as it were. Now that we are entering a roll-out phase, other projects are now becoming interested and involved, so it is essential that we set up a cross-project organisational structure. In brief, then, convergence and coherence are the two key words in guaranteeing sustainable availability of the results.

To whom do you wish to hand over the column and why? What particular question do you have for this person? ~ If possible I want to hand the baton over to someone who is involved in ARTEMIS, ITEA as well as EIT ICT-Labs. My question to him or her would be: Which of these three instruments would you recommend for which type of project? In other words, what is the relative positioning of ARTEMIS, ITEA and the EIT in terms of projects?

What music goes together with reading of the column? ~ I think I would go for Dave Brubeck 'Take Five'. It has such an inspiring ground beat, moving forward and moving forward, a beat I feel within myself to move forward, pushing innovations in embedded systems. ■

Editorial information

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

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

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

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

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

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Eric Schutz, Jan Lohstroh, Yrjö Neuvo, Klaus Grimm, Emile Aarts, Helen Finch, Franziska Boede, Laila Gide, Roberto Zafalon, Jerker Delsing, Alun Foster, Scott Hansen, Michel Bourdelles, Bola Rotibi, Rainer Ersch, Ingrid Kundner, Irene Lopéz de Vallejo, Pauli Kuosmanen, Werner Damm, Lara Jonkers, Ad ten Berg, Chris Horgan, Else Embregts.

Editorial address:
ARTEMIS Magazine
High Tech Campus 69
5656 AG Eindhoven
the Netherlands

Telephone: +31 88 0036 188
Fax: +31 88 0036 180
Email: communications@artemisia-association.eu

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

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Advanced **R**esearch and **T**echnology for **EM**bedded **I**ntelligence and **S**ystems

Steering Board

On 7 March there was a changing of the Steering Board guard of the ARTEMIS Industry Association, with the following departures:

> Luca Benini, *University of Bologna, Italy*
> Goetz Brasche, *European Microsoft Innovation Center, Germany*
> Diamantino Costa, *Critical Software, Portugal*
> Heinrich Daembkes, *CASSIDIAN, Germany*
> Hannu Hakala, *Finland*
> Wolfgang Klingenberg, *Robert Bosch, Germany*

On behalf of the ARTEMIS Community we would like to thank all of them for their efforts in helping to make ARTEMIS Industry Association a success.

Following elections, the following members have replaced the departing members on the Steering Board:

> Rodrigo Maia, *Critical Software, Portugal*
> Maria Katiuscia Zedda, *Akhela, Italy*
> Estibaliz Delgado, *Tecnalia, Spain*
> Karlheinz Top, *Robert Bosch, Germany*
> Knut Hufeld, *Infineon, Germany*
> Sylvain Prudhomme, *Airbus, France*

The ARTEMIS Industry Association website contains a list of the entire Board. ■

ARTEMIS SUMMER CAMP 2012

"Sustaining the ARTEMIS innovation environment"

On 5 & 6 June 2012, ARTEMIS Industry Association will be holding its annual Summer Camp event. This year's' destination to work on the future directions of the ARTEMIS programme is: Copenhagen, Denmark. Summer Camp 2012 will be held at the campus of the Technical University of Denmark.

To deploy the ARTEMIS SRA the Working Groups of the ARTEMIS Industry Association are essential to "Making it Happen". In the SRA 2011, EIT ICT Labs is mentioned as 'a new dissemination channel in bringing the ARTEMIS results quickly to the curricula of students, to the knowledge of SMEs and to the products of European industry'. During this Summer Camp we will explore options for cooperation together with EIT-ICT Labs and also discuss the leverage of ARTEMIS-JU project results by the Working Groups and vice-versa.

Location ARTEMIS Summer Camp 2012
Technical University of Denmark (DTU)
Anker Engelunds Vej 1
Building 101A
DK-2800 Kgs. Lyngby
Denmark

Calendar

11 MAY 2012
GDANSK POLAND
ARTEMIS CALL 2012 INFORMATION & NETWORKING WORKSHOP POLAND
In cooperation with ETI Gdansk and the ARTEMIS National representative an ARTEMIS Information & Networking Workshop is taking place on 11 May 2012 in Gdansk, Poland. The audience will consist of companies of the biggest Polish ICT Cluster Pomerania Region. The language of communication is English.
Contact: agnieszka.janczulewicz@pomorski-klaster-ict.pl
More information: www.artemis-ia.eu/upcoming_events

22 MAY 2012
BRUSSELS, BELGIUM
6TH SEMI BRUSSELS FORUM - KEEP SEMICONDUCTOR ADVANCED MANUFACTURING IN EUROPE COMPETITIVE
The European Union faces growing and overwhelming global competition from both developed and emerging economies. Although Europe remains in a position of relative strengths, it must strategize to secure the future now, for the next generations to come. SEMI®is the global industry association serving the manufacturing supply chain for the micro- and nano-electronics industries.
Information: http://www.semi.org/eu/BrusselsForum

5 & 6 JUNE
COPENHAGEN, DENMARK
ARTEMIS SUMMER CAMP 2012
The ARTEMIS Summer Camp 2012 is a high level strategic meeting of the ARTEMIS Industry Association. Its member give input on the strategy for the ARTEMIS Research Agenda and the compass for the next ARTEMIS call.
Information and registration: www.artemis-ia.eu

26-27 SEPTEMBER 2012
WARSAW, POLAND
ICT PROPOSERS DAY 2012 EVENT
This is a networking event, where people could easily meet each other and we could pass on further information concerning the challenges and objectives of the Workprogramme, the rules of participation and call submission procedures.

08-10 OCTOBER 2012
IN BRUSSELS, BELGIUM
'MADE IN EUROPE - ICT BUILDING BLOCKS TACKLING SOCIETAL CHALLENGES' EVENT
Organised by the European Commission. How research contributes to real-life health, sustainability and mobility applications.

30 & 31 OCTOBER 2012
PARIS, FRANCE
CO-SUMMIT 2012
The fifth edition of this annual event will take place in Paris, France. The project exhibition, showcasing active projects of ARTEMIS and ITEA, will highlight this event. Interesting key notes, ARTEMIS and ITEA sessions will complete this annual get-together of the European embedded systems community.

ARTEMIS Joint Undertaking

Visiting Address:
White Atrium
Avenue de la Toison d'Or / 56-60 Guldenvlieslaan
B-1060 Bruxelles-Brussel
Belgium

Postal Address:
TO 56 05/23
B-1049 Brussels
Belgium

www.artemis.eu

ARTEMIS Industry Association

High Tech Campus 69
5656 AG Eindhoven
The Netherlands

Tel: +31 88 0036 188
Fax: +31 88 0036 180
communications@artemis-ia.eu

www.artemis.eu