© Simon Pugh Photography

Horizon 2020 Projects attends the sixth ARTEMIS-ITEA Co-Summit in Stockholm and carries the opening comments from ARTEMIS Industry Association president **Professor Dr Heinrich Daembkes** and ITEA chairman **Professor Dr Rudolf Haggenmüller**

Co-Summit 2013

Innovation in electronics and embedded systems are essential to helping Europe maintain its international competitiveness and a position at the forefront of the global industrial landscape. The European Commission has identified the sector as 'underpinning productivity innovation across the whole of the economy' in addition to helping address Horizon 2020's Societal Challenges.

Taking place in Stockholm, Sweden, and attended by Horizon 2020 Projects, the 2013 Co-Summit focused on the role that software and software innovation can play in boosting the prospects for high-tech employment and industry in Europe. The event, now in its sixth edition, was organised by the ARTEMIS Joint Undertaking on embedded systems and ITEA, the EUREKA Cluster on software-intensive systems and services.

Welcoming 700 delegates to the opening plenary of the conference entitled 'Software innovation: boosting high-tech employment and industry', Professor Dr Rudolf Haggenmüller, chairman of ITEA, described the event as a crucial time in the history of the two organisations.

"For both programmes, ARTEMIS and ITEA, this is a very special moment – they both are coming to the end of one phase, and beginning the start of another. For ITEA, it is the end of ITEA 2 and the start of ITEA 3; we enter this new phase with a refreshed body and soul. ITEA 3 will be an organisation that looks at the changes ahead of us.

"With ITEA 3, the time from idea to project will be ten months. A lot of work is ahead. ITEA 3 in a nutshell stands for fostering innovation and facing the high ground. This is our ambition; this is our spirit."

ITEA

ITEA 2 (Information Technology for European Advancement) stimulates and supports innovative and precompetitive R&D projects that contribute research excellence to Europe's competitive Software-Intensive Systems and Services (SiSS) sector. SiSS is considered a vital growth engine for Europe's economy and a key driver of innovation in the continent's most competitive industries, including automotive, aerospace, communications, healthcare and consumer electronics.

As a EUREKA Cluster programme, the ITEA approach is intergovernmental, bottom-up, market-oriented and industry-driven. Following the EUREKA structure, each ITEA 2 project partner can apply for national funding in their own country, allowing a project idea to attract

© Simon Pugh Photography

money from all participating countries. ITEA 2 is open to large industrial companies and SMEs, as well as research institutes and universities.

The current set of more than 150 projects (ITEA and ITEA 2) includes more than 1,000 partners from 30 countries and has established a solid basis for further development. Many of these projects have led to the creation of completely new businesses and from 2014, ITEA 2 will be succeeded by ITEA 3.

Innovation

Also speaking to attendees at the opening session was Professor Dr Heinrich Daembkes, president of the ARTEMIS Industry Association, who defined the word 'innovation' as key to current times.

"We are here for the word 'innovation', which means change and getting results – making them transferrable and ready for application which is driving us. Yet we are also here to prepare the next steps for our future.

"You will see achievements in the exhibitions, and they are ready for use, ready for application. We are preparing the future in the many details that are shown in this exhibition, but it is also a co-operative event and has many workshops where we are preparing roadmaps and evaluating opportunities for growth."

ARTEMIS (Advanced R&D on Embedded Intelligent Systems) aims to tackle the research and structural challenges faced by European industry by defining and implementing a coherent strategic research agenda for embedded computing systems. Its ambition is to help European industry consolidate and reinforce its world leadership in embedded computing technologies.

Research and innovation is considered critical for creating new jobs and sustainable economic growth in order to improve the quality of life and to increase Europe's international competitiveness. Joint Technology Initiatives (JTIs), a form of public private partnership, were introduced as part of FP7 and will be expended under Horizon 2020.

As a collaboration between EU member states, industry and the European Commission, the JTI is widely considered one of the most effective ways of boosting Europe's electronics design and manufacturing capabilities in economic sectors such as transport modes, medical equipment, home appliances, energy networks and security systems.

Between 2008 and 2012, the ARTEMIS JTI undertook 52 projects worth €935m, with public funding of €448m from the Commission and EU member states. The projects involved more than 720 organisations (with more than 1,200 project participations) of which around 39% are SMEs, 33% large enterprises and 28% research organisations.

Horizon 2020

Daembkes continued by outlining to delegates the changes ahead: "We are at a very important transition. While for ITEA it is from phase two to phase three, we are in the phase where we experience the phasing out of FP7 and the entrance of Horizon 2020, which is the new name of FP8, and also indicating that it is not just more of the same; it really is something new.

"With the expiring of the FP7, certain instruments are phasing out and coming to an end. With Horizon 2020 we get new instruments to hand, we are getting new opportunities to co-operate. For ARTEMIS in the first phase, we had only individual isolated projects where we prepared specific elements of new and priority certain research results. Then we learned to cluster, to build and bring together the strengths that we have found in the cluster approaches; that was phase two."

Under the new research and innovation framework programme, the ARTEMIS and ENIAC (European Nanoelectronics Initiative Advisory Council) JTIs with EPoSS (European Technology Platform on Smart Systems Integration) will join forces and merge into one new JTI. The new PPP, entitled ECSEL (Electronic Components and Systems for European Leadership), will receive total funding worth €4.8bn, comprising €1.2bn from Horizon 2020, €1.2bn from EU member states and €2.4bn from industry.

Co-operation

The president of the ARTEMIS Industry Association highlighted the increasing importance of industry co-operation in order to tackle the challenges facing society, as well as generating more formative results.

"The last phase, especially starting two years ago, is combining all the elements that we are getting from earlier phases and also recognising that working together is really important. Working together is something that is helping us to master the complex changes of society. There are the so-called 'large ARTEMIS Innovation Pilot Projects' and they are helping us to cross, or at least start to cross, this valley of death, where there are beautiful results. Yet what we really need is application. We need to have an impact on the economy and therefore we really need to bring them into application."

Innovation pilot projects encourages the development of an innovation environment through aligning RDI priorities for Embedded Systems, sharing industrial resources, linking efficiency with cross-domain synergies and creating new business-innovating ecosystems. Examples include Arrowhead (focused on addressing the technical and applicative challenges associated to co-operative automation) and Crystal (which aims to establish an Interoperability Specification and a Reference Technology Platform as a European standard for safety-critical systems.

"The ARTEMIS Innovation Pilot Project results are not yet available at the exhibition because they only started recently – you can only see the concepts and first approaches, however we are now preparing results. One achievement has already been made, and we can see that through your presence. This enhanced co-operation has strengthened the ITEA co-operation. We are building new ecosystems. We are creating instruments, methods and tools that are easing the co-operation in complex environments.


© Simon Pugh Photography

"This will be a very important advantage for the European industry. Compact systems need to be mastered by working together in a co-ordinated way. ARTEMIS needs to know how to work, and it should not have many trials and errors to work together, therefore, we need to have the seamless integration of various contributions. That is what we have prepared, this is what we are building into projects, and we are fully supporting interoperability."

Daembkes concluded his speech by drawing attention to the wide-ranging benefits ARTEMIS was bringing to the European economy and looked to the future developments of the JTI.

"This is enhancing efficiency and this is enabling us to make significant progress for the welfare of the economy. The next phase that we are preparing for – we are merging together with the hardware part, we are working together with smart systems and the emphasis is on enhanced communication and collaboration on smart systems.

"So that is preparing the future, where we are benefitting from all the technical systems, collaboration, co-operation, and it is up to us to prepare the ground and all the elements that are required to make this is happen. We are preparing very impressive results, but we are also preparing for the future."

HORIZON 2020

BROWSE www.artemis-ju.eu
www.artemis-ia.eu
www.itea2.org

© Simon Pugh Photography

Backed by industry and public authorities, and with support from ARTEMIS and EUREKA, chairman **Professor Dr Rudolf Haggenmüller** speaks to **Horizon 2020 Projects** about the development of ITEA 3

The next level of innovation

Under discussion at the Co-summit in Stockholm, Sweden, the new ITEA 3 cluster offers a more dynamic approach to co-operative European research on software-intensive systems and services. Described as a 'living organisation' with a living roadmap, the cluster will aim to dramatically shorten the period from idea to project as well as take a more global approach to research co-operation. It will also exploit strong relationships with other clusters, including ARTEMIS, EUREKA Clusters, EIT ICT Labs and other national groupings.

Underpinning ITEA 3 will be a living roadmap – something that will enable the programme in being radically different to previous ICT research and innovation programmes. This living roadmap embraces the bottom up approach favoured by EUREKA, and will support the innovation process – providing a baseline for the evaluation of project success. It will help in steering and evaluating the progress of the cluster – helping ITEA 3 to respond to evolving societal challenges and technological process.

In a world of change and rising competition, ITEA 3 will help address key societal issues such as health, energy, transportation, knowledge and education as well as support European industry towards the provision of solutions, including both products and services. The programme also aims to address the challenge of 'massive scalability', help Europe remain competitive with ICT-based innovations and address the need for greater sustainability in using scarce resources.

Professor Dr Rudolf Haggenmüller

Speaking on the fringes of the conference hall to Horizon 2020 Projects in December 2013, chairman Professor Dr Rudolf Haggenmüller outlined the background development to ITEA 2's successor, the benefits of working with ARTEMIS and EUREKA and the importance of available funding.

What is the background to ITEA 3 and how do you envisage it helping to take this sector forward when considering software innovation in Europe?

EUREKA Clusters developed in phases – firstly ITEA 1, then ITEA 2. For the whole duration of ITEA 2, we observed a growing expectation by companies and public authorities over the last eight years. It was decided that when we prepared for ITEA 3, we would have to do something completely different. This is why we

Rudolph Haggenmüller (right) with the President of the ARTEMIS-IA Heinrich Daembkes

have now set up ITEA 3 as an organisation where we have to explicitly decide our processes and we are measuring all our processes so as to check where the environment may have changed from ITEA 2, or maybe because our performance indicators are not what we wanted. We are now an organisation that is managed by processes.

From 2014, we have defined our improvement areas such as bringing back the time from project idea to project start to just ten months. We also changed from a roadmap that we publish every three or four years to a living roadmap where we envisage advances in our domain. This means that we now have a state-of-the-art database with public deliverables from ITEA projects. The Living Roadmap has also been extended with information about projects, societal and economic challenges and people as well as the links between them. The database is permanently updated.

What benefits does the EUREKA network provide to ITEA?

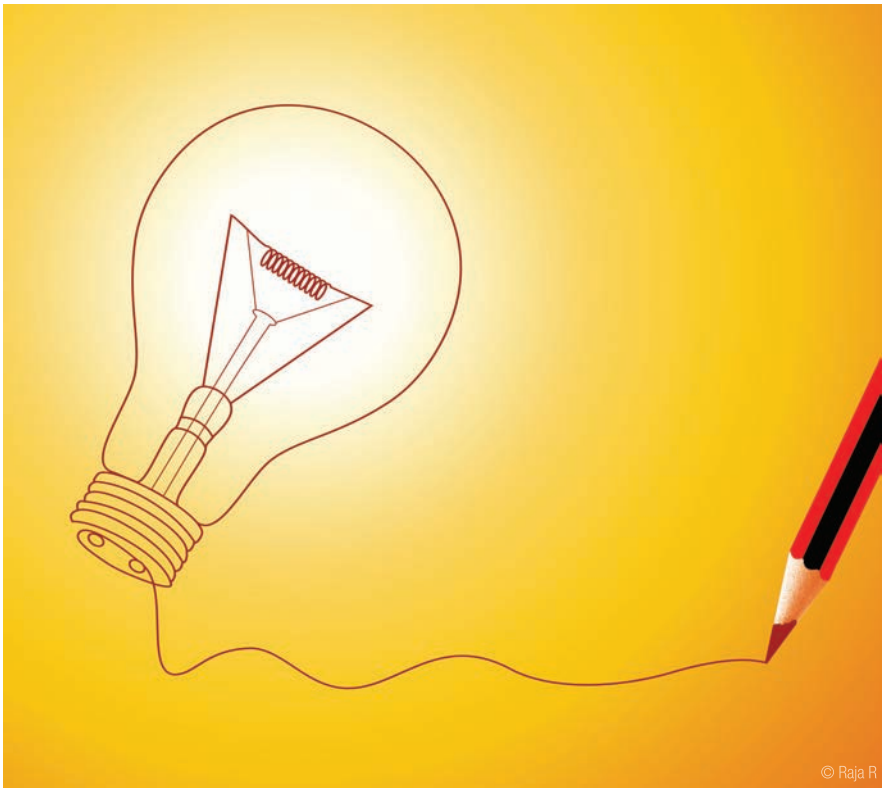
Its main benefit is to the countries. We take care of proposals that we label as very promising in terms of business impact. When we label a project, we expect a concrete outcome. During their lifetime, we have three reviews with the project, and that means that we check during the middle and at the end to see expectations are met. After the first year, we have a very careful intermediate check – 'where are you now?', 'what are your expectations?' We advise and guide the project, focus on innovation and concrete impact and expectations. We do this for the countries to ensure funding is invested in the best possible way.

With more global competition, we try to give concrete support so our companies can get access to a global market.

Considering the potential that software innovation has for the European economy in terms of growth and job creation, can you outline some of the figures and trends that you anticipate and the potential that you feel you can drive forward in this area?

Firstly, we have a very concrete promise that within ten years we will create eight calls and 44,000 jobs in Europe. In other cases like digital cinema from Barco, we have 350 people that are working on a project compared to when it started. Of course, there are also examples of where you cannot measure job creation so easily.

One successful example is the MODELISAR project, which assists in the design and prototyping of cars. The project is allowing designers to simulate the complete design of a car. Because of this it is expected that dramatic cost savings in the speed up of the design process of newer models can be achieved. Thanks to this, Daimler is using software-in-the-loop simulations to speed the development of gearbox projects.



What benefits are there in organising this Co-summit with ARTEMIS and how do you feel this helps to push forward ITEA's work?

In my opinion, together we are a stronger community and we underline that software innovation is important for countries; it is important for EUREKA and it's important for the European Commission. Through this partnership, we have a good argument that together we can say ARTEMIS, as a Commission instrument, is important; a different way of working. As a EUREKA instrument, we are very bottom-up and very concerned with company interest; it is complementary. In the partnership, we can demonstrate in a convincing way that this is important.

Do you feel that there are enough resources being made available, not just from public sources but also private finance, towards software innovation in Europe?

The short answer is 'no'. The longer answer is that we have published a call to action, to double investment and centre action for both industry and public authorities. It makes no sense if only one of the two partners increased resource allocation. Now, if a national public authority were to say to me: 'increase our funding' but industry is not willing to invest, then it would not work. We are also not only talking about money, we are talking about big firms, or also some SMEs, that express concrete needs.

As Daimler said: "We have to challenge, and we have the wish to speed up our production process by 40%. Now come in, and if you can contribute, you are welcome."

Recently I was in Moscow at an open innovation forum. The planned Skolkovo 'innovation city' near the capital has received a lot of money from the Russian Government. They are creating techno-parks all over Russia. They have start-ups, they have talented SMEs, talented software engineers. Yet what is missing is that somebody gives them a chance and tells them: "Look, this is the problem. Please solve it and if you can, then we have a benefit to our economy."

To what extent are you trying to foster co-operation in European ICT?

This is central to our work. An example is the PARMA project. This project is about high-performance computing in the area of simulation. We brought together three groups of partners: the Bull company; the Jülich Research Centre (a research institute that can parallelise existing simulation tools); and small companies. There is RECOM which is active in combustion simulation – the burning of gas and oil and there is MAGMA, which is active in all aspects of iron casting and metal forming.

These companies brought their research results to the market. They applied the combustion simulation of concrete plants in Germany and their simulation was reduced from 13 hours down to 1.5 hours. In the case of iron casting, they sell their products and their simulation software to 51 countries. So this project strengthened German industry and it contributed to the success of iron casting.

Yet the real forces who brought it to reality were the SMEs. Jülich provides, and still offers, this platform and provides the super computer. But there are clear benefits for the customers, the iron casters and the 100,000 people working in this area alone in Germany. As for the nature of these organisations, SMEs in our projects are usually well established – they're small, niche and can help deliver innovative solutions, in partnership with large firms.

HORIZON 2020

Professor Dr Rudolf Haggenmüller
Chairman
ITEA 2

BROWSE www.itea2.org

Horizon 2020 Projects talks to three top ARTEMIS executives on the joint ARTEMIS-ITEA Vision 2030 documents and the need to return more manufacturing production to Europe

Vision 2030

Vision 2030 is a joint concept on ICT innovation between ARTEMIS and ITEA. The plan sees digital technology as having a major role to play in mastering the changes that are taking place in Europe. The document defines 'digital technology' to encompass the notions of hardware, software, ICT services, internal ICT and embedded software. The roadmap identifies seven core areas of major change, known as 'Grand Challenges', and the need for research and innovation in this field that will lead to economic impact in terms of revenue and jobs. The seven areas are: globalisation and demographic change; management of scarce resources; climate change; urbanisation; mobility; healthcare and digital society.

ARTEMIS and ITEA have built innovation ecosystems of closely interacting companies and research organisations. These ecosystems are key to enabling European organisations, including SMEs, to keep up with the fast changing reality in digital technology, as well as its increasing complexity and to remain at the forefront of innovation.

At Co-Summit 2013, Horizon 2020 Projects spoke to Professor Dr Heinrich Daembkes, president of the ARTEMIS Industry Association; Dr Jan Lohstroh, secretary general of the ARTEMIS Industry Association; and Alun Foster, acting executive director of the ARTEMIS Joint Undertaking, about Vision 2030.

One of the ideas you are pushing forward in the Vision 2030 report is trying to bring back European leadership that has otherwise been lost to countries in Asia. I wonder if you could elaborate more on how you hope to achieve this?

Professor Dr Heinrich Daembkes: We need to see why companies are going to the Asia-Pacific region for production. In many cases, the designs are done here in Europe, and then the production is done in the Far East (though sometimes in the United States).

Yet it turns out, for instance, for some sports article companies, they had the fabrication in the Far East, but would then ship the final products back to Europe; it takes three weeks to get the products back to the main consumer market. That is too long and for me, at least, it was a surprise. Companies say reactivity is not sufficient, so they are trying to find ways to get production back to Europe by a very high degree of automation, so that the labour cost is not really a decisive factor. Automation brings costs down and production-wise, you can easily match the conditions in Asia.

Professor Dr Heinrich Daembkes

One large remaining problem is that these countries in the Asia-Pacific region sometimes, at least in the initial stage, have little care about working conditions and the impact on the environment. If you're just the investor, you don't care and you can save a lot of money not considering the environmental constraints and constrictions and to implement good standards. Regarding all the other elements, we're already very competitive in Europe and this gives us confidence that maybe we can transfer part of the production back to this continent. On the creativity side, I think Europe is still in the leading position.

Considering rising competition over the design stage of hardware and software, given that Asian countries may have relaxed rules when it comes to state aid. Doesn't this place Europe at a disadvantage and is that something that you're concerned about?

Dr Jan Lohstroh: The answer is yes. The level playing field, taking into account all elements to make an industry successful, depends on having an educated population; do we have some subsidy from the local governments for investments, rules about pollution, etc.? Companies have to find those locations in the

Dr Jan Lohstroh

Alun Foster

world where all those factors together make them competitive when working globally. We do have some disadvantages in Europe.

Yet the positive for Europe is funding programmes like this; we can compensate by public money and have strong co-operation where needed. In the past, we had many companies in Europe that were vertically integrated. They made their systems, software, and even their components, in house; examples included Philips and Siemens.

Yet these multinational corporations have now cut the industry into pieces and find out that the close ties they once had between the layers of production are now broken. They have to work as if we were virtually integrated in a very intense way, as we do in the projects in our two initiatives, to compensate for the fact that too many companies have been broken layers. Better integration could be the answer to make us again successful against companies and initiatives in the Far East that otherwise have the advantage of a more level playing field and vertical integration.

Alun Foster: Here's the manufactured device. But where's the value in that device? Is it the hardware? The individuals who are manufacturing these products?

The manufacturers are not the ones who are actually making the turnover – the ones who are making the turnover are the ones who are supplying the apps, the ones who want these services, the ones which have enabled this device. As the chief executive of Ericsson said at the conference, this is the way to go. If we want to be able to 'value-ise' this sort of stuff, we have to look at that. We have to make sure that our research enables the deployment of these services. This is how we can build future value on this device. Not on the hardware, but on the software that it's enabled. This is very important and could be a strategic line; it's enabled by the work that we're all doing now.

Daembkes: Coming from big organisations where we went through the deep cycles of all the production – the inventor, the designers, the integrators – this is now all being done on the outside. We are now back to the situation where we found that we are losing a lot of knowledge and competitiveness –we're just outsourcing everywhere. Therefore, you have to look for, and develop, new partnerships.

We also need production in Europe. If you look to the UK economy, where is the production there? Their focus is very much on services, which is why they are very successful. Yet if you look at where the real production capability is, it is very thin.

'Be fast' is the message. Typically, the winner takes it all. In order to be the winner, you have to be fast. We cannot afford to work on products and then find we don't have the tools to co-operate.

HORIZON 2020

BROWSE www.artemis-ju.eu
www.artemis-ia.eu
www.itea2.org

Sweden acknowledges the importance of digital technologies in solving socioeconomic problems. Here, State Secretary to Sweden's Minister for IT and Energy **Daniel Johansson's** address at the Co-Summit 2013 is covered

Swedish digital agenda

Providing a perspective from the Swedish Government at this year's Co-Summit was Daniel Johansson. As State Secretary to Sweden's Minister for IT and Energy, Anna-Karin Hatt, Johansson is intimately involved in developments around IT and the wider ramifications for society and the economy.

Indeed he commented: "For Sweden, ICT has been critical. We have a large part of our society dependent on ICT, both directly and as an integrated part of our society."

Continuing, he said: "Let me say a few words about our digital agenda. We came up with this digital agenda for Sweden in 2011. We addressed four challenges for society. One is obviously changing demographics, meaning that people get older. A large part of our citizens are more than 65 years old. This puts a demand on better solutions, for instance better healthcare in people's homes – that's obviously an ICT-related challenge.

Coming to the issue of education and knowledge, and how important strong achievement in this area is for the Swedish Government, he said: "Obviously ICT is an enabler for the future education system; it's an enabler to be more advanced. It's also an enabler to make more students successful as well. Since these are two challenges, they actually inspire a larger percentage of our students."

While of course interest in ICT often falls on applications in the urban context, Johansson used his speech to underline the wider impact ICT has in the countryside too, saying: "A prospering countryside is a challenge as well. We are one of the most urbanised countries in the world. And obviously with ICT, there are possibilities in the digital infrastructure, so we can work from everywhere; given that we have the right conditions and the right skills. Today I would say that, for instance, a farmer depends on a broadband connection to the rest of the world. It's part of the business.

"Last but not least, environment and climate change. This is one of our time's biggest challenges. How can ICT be used to lessen our carbon footprint? Here, the imagination is the only limit."

Speaking to the gathered technologists, he underlined how the future would see the rise of smart grids, smart cities, smart people, smart customers, and so forth. Speaking directly, he added: "I hope you are good in affecting the energy industry because they are in the middle of a transition. Oil companies in the energy industry; they need a bit more of your business thinking. And they need to put the consumers, the customers at the centre."

Daniel Johansson

After, introducing the priorities, the government leader went on to outline Swedish progress. Indeed, under the 2011 digital agenda, Stockholm pushed the goal of being the best in the world at utilising the opportunities afforded by ICT.

Digital agenda

Inherently the country enjoys a number of advantages, including a history of innovation, bolstered by a tradition of early engagement in emerging digital fields. The digital agenda pushes 22 policy areas with 160 actions. These range from e-health, education, justice, cultural heritage, e-government, broadband and so on.

Johansson stressed the contribution that foreign investment will make in meeting the digital agenda goals, emphasising the continuing impact of globalisation. He said: "We have set up a digital commission to take care of this work and continue this journey. We also encourage all the regions in our country to come up with their own digital agenda and we give them support in that work."

Johansson provided background context on Sweden and ICT: "Our people are active on the internet. We have a general good level of skills. We have a very good infrastructure, although the demand for good infrastructure is rising all the time.

"People get more and more used to using the internet with digitalisation, so there is striving for our infrastructure to be better. And we are pretty good at using services. We have more to do actually on the government's behalf, something we are working at. That means e-government, actually meeting people's demands to be able to have service on that instead of contacting local offices.

"The ICT sector in Sweden is growing. Alone, 192,000 people are working in the ICT sector. That doesn't include all the people who are working with ICT, including in traditional companies."

This means that the number of jobs dependant on digital technologies is much higher in reality.

Continuing, he added: "They have steadily increased – the number of people who work within the sector, so it's crucial for Sweden's resilience economically. As you might know, Sweden's actually been one of the few countries who have been rather unaffected by the economic crisis and this is part of the reason."

The presence of innovative and leading companies in Sweden is also a boon to developments in IT. Moreover, Johansson spoke of the impact that engagement with IT trends is having on traditional sectors, such as the automotive and manufacturing sectors."

Underlining the importance of supporting infrastructure in this domain he added: "The government has a broadband strategy. The goal is 90% of the people should have access to 100 megabit by 2020. Today we are at 53% so this is fairly small proportion.

Coming back to the importance of considering rural developments, he said: "It is about survival in the countryside, it's about getting the children to learn properly; so it's not an option."

Not only IT

Not only dealing with IT in his day job, Johansson is intimately involved in issues pertaining to energy. Fusing both areas are developments around smart grids. Such integration of digital systems into energy networks will drive positive developments, increasing control for consumers and helping to raise efforts to curb climate change.

Stressing the importance of this he said: "What is hoped, is that we combine interdisciplinarity between different kind of sectors, find new business models, new joint ventures, new applications. This will happen sooner or later. We're taking proactive steps from our government to form a co-ordination council between authorities and companies."

Labelling knowledge-based industry as the glue connecting and driving developments in the Swedish private sector, he underlined the importance of the areas in which ITEA and ARTEMIS are intimately engaged. At the heart of supporting efforts coming from Stockholm is the national digital strategy.

© Simon Pugh Photography

In closing, the state secretary said how the strategy was helping: "We looked into how to improve competitiveness and create jobs in a globally-based economy. We also looked into how we can deliver public services with a better policy and efficiency. Then, again, we have the demographic challenges, we have challenges within education, healthcare and also services.

"ICT and innovation is essential for Sweden and for Europe – all parts of society – for jobs, growth, prosperity. I'd like to finish off by congratulating you actually because you are in an envious position because you are all part of the solution going forward. And I actually envy you for that."

Concluding, he said: "I would like to ask, please make the progress that we need, because you are actually enabling a number of societal changes that improve quality of life in a number of areas. I can't even imagine all the areas, so I want to congratulate you for that."

Finally he added: "We need science, but we need good science that actually enables some societal challenges. This seems to me to be one of the better approaches I have seen for the challenges of society."

HORIZON 2020

BROWSE www.government.se/sb/d/2067

With ARTEMIS and the European Commission both devoting efforts to building smart cities, **Horizon 2020 Projects** speaks to Arrowhead project lead **Professor Jerker Delsing** on implementing collaborative automation technology

Targeting smart cities

Given the challenges facing the urban environment in Europe today (from energy provision, service delivery and transport networks), policy makers are looking to innovative technologies as a means of making European cities more efficient and liveable. As such, the smart cities concept continues to gain traction. By developing innovative solutions, it is hoped that air quality can be improved, road congestion reduced and the consumption of energy lowered.

The European Commission is looking to advance the subject under the European Innovation Platform of Smart Cities and Communities (EIP-SCC) – recently launching a strategic implementation plan. The plan, implemented from January as part of Horizon 2020, includes a focus on sustainable urban mobility, sustainable districts and the built environment, and integrated infrastructures and processes across energy, ICT and transport.

Receiving funding as an ARTEMIS Innovation Pilot Project, Arrowhead also aims to contribute to overcoming these societal challenges that cities face. Launched during March 2013 for a duration of four years, it seeks to enable collaborative automation for five application verticals, namely production (manufacturing, process, energy), smart buildings and infrastructures, electromobility and virtual market of energy.

What are the ambitions of the Arrowhead project and its progress so far?

The vision is to enable collaborative automation to help overcome societal challenges, including the use of energy and environmental issues, e.g. carbon dioxide gases and sustaining water supply, etc. We are going to demonstrate progress in that direction and to fulfil this big vision we need to overcome two challenges.

There are many disparate systems in a city – e.g. water, electricity, sewages, and they are operated independently of each other. For example an energy usage awareness in the pumping of water will lead to reduced electricity cost. How to enable different systems to interact, and by that, create this collaborative automation, that's a grand challenge.

To what extent do you see there being significant competition from the United States and Asia?

Europe is already the leading continent regarding automation, I think we can state with confidence, and this project is further supporting development of that leadership. Another angle is that being as big as we are, we have 78 partners, this enables an initial snowball effect in development. We expect to create momentum so we can say that Europe is taking the lead. We can already see examples of that, since we have already been contacted by organisations and initiatives in the United States and Australia on these types of technologies. There is not yet any clear communication with Asia, but I expect that when we start communicating and there is research coming from Arrowhead, we will see results.

Professor Jerker Delsing

How important do you view standards for pushing forward and implementing the smart cities concept?

You can think of standards as those that are written down and voted for, and those that actually become *de facto*. Already there are many standards related to water distribution, electricity distribution, etc.; all these standards are individual. This is one of the big hurdles – the market saying "we want you to use this particular standard". So one of the issues Arrowhead is addressing is how to integrate with legacy systems. This is an extremely important aspect of creating something that is cross-domain interoperable.

This is part of our efforts and some of the technologies we are addressing are already standardised. Instead of, say, 300 different standards for automation in cities, we need to decrease this to five or ten and then we need to create the capabilities of going inbetween. We need the systems to be able to automatically recognise that we all speak different languages and then translate the communication regardless of whether someone is talking CoAP, DPWs or XMPP, for example; these are just some of the protocols that are around.

How much interest have European cities expressed in your work so far?

There are two cities that are members of the project at present. We are looking at issues that cities have responsibilities for, such as streetlights. Cities are very open and they are owners of big buildings; they face the costs of ownership and energy costs.

A city is an interesting concept…what is a city? Groups of houses, yes, but there's also a governance, politicians, residents, companies producing things there, and there are also subsystems for distribution – water, electricity, sewage systems, and so on. There are so many stakeholders that it's hard to say when the city is saying "yes, we want to participate".

One of the things that we are addressing in the demonstrations is what a city could be like. If you take my city of Luleå in Sweden, there are many tunnels, a transport infrastructure, electricity and water supply, sewage pumping – there is not just one company running all that. There is a multitude of stakeholders and suppliers doing specific tasks which can be described as a mini micro-city structure. Part of the project is addressing these different stakeholders and how they can exchange information in a simple way.

If you consider the stakeholders at the conference today, they have a production system, a planning system, etc., and you can be sure they use the same system and they all configure differently. How do you bring the information between all these stakeholders? Some are buying, some are delivering, and how can we start to say "yes, this is a well-functioning society working together".

How conceivable is the project that it could be scaled down so smaller urban areas across Europe could deploy this technology and reap similar benefits?

The intention is that there should be no limits. We are looking for interoperability among almost any device providing service (though there is probably going to be a scale – there are things which we don't know). If you take the standard system of how you build automation systems today, the largest ones include around 100,000 measuring and activation points. There does seem to be some type of limit on current technology on how the systems can be built, meaning you can handle a small city, but not a big city. However, many of those limits are taken away with the approach that Arrowhead is developing, based on the service-orientated architecture.

I can't answer how big can we go, but certainly we can start from the smaller ones and go bigger, that's for sure. What's the upward limit? There will be a limit for different places, for example, how big a system you can actually manage. Big data is one thing, but what happens if you have ten million units or devices providing 50 million services, how do you manage them 24/7? Many of these systems should run 24/7, 365.

We hope to initiate a way of thinking where as many possible stakeholders say 'ok, this sounds like a good idea', and we then create the *de facto* way of thinking when developing large automation systems.

HORIZON 2020

Professor Jerker Delsing
Co-ordinator
Arrowhead

BROWSE www.arrowhead.eu