ERCIM Innovation

ERCIM
European Research Consortium for Informatics and Mathematics

Launch issue

A new publication for Europe to foster innovation in Information and Communication Technologies

The HEARTBEAT of European ICT R&D

Opinion
Results
Success
Investment
Private sector
Standardisation

Cooperating for Excellence in Research

Building tomorrow's Internet together

Eric Besson, Secretary of State for the Development of Digital Economy, France

ERCIM acts to reinforce links between research, industry, academia, standardisation and investment in favour of innovation. **Eric Besson** explains the key role Europe plays in innovation and Internet

For the past ten years, the Internet has become a strategic infrastructure, with a major economical and social role. The Internet is a powerful driver for worldwide innovation, growth and productivity. Moreover, the Internet also brings opportunities of social well-being's improvement.

Today, more than 1.5 billion people in the world are using it and another billion will join within the next five years. These new users will then discover a very different network and new uses.

The Internet is at a crossroads of its evolution. Mobile Internet and Radio Frequency Identification (RFID), among other key technologies, will soon allow the creation of an « Internet of objects » whose services will weave themselves into users' daily life. Tomorrow's Internet services will expand to various fields like health, education, proximity services and energy management.

Europe possesses enough key assets to become a leader on technologies and services of the future Internet. Indeed, Europe benefits from both a strong unified market for mobile telecommunications and a world-unique cultural and geographical legacy. Combined together, these resources may trigger Internet-related jobs and services in Europe.

However, Civil Liberties and Privacy protection will have to be taken into account so that the future Internet can harmoniously coexist with EU citizens' principles and values. Networks security and stability have also become a major concern for companies and governments. Today, these issues require an enhanced international cooperation.

Time had come, thus, to gather all Internet stakeholders - industrials, policymakers, scientists, non-profit and academic leaders - and promote tomorrow's Internet development in Europe. It was the very purpose of the French EU Presidency conference on "The Internet of the Future" which took place in Nice on October 6.

At the same time, all European Ministers in charge of Digital Economy were invited to participate in the first European ministerial meeting dedicated to the future Internet.The focus was on ultra-high broadband networks deployment, on new services creation, but also on trust, security and governance of the Internet. The French Presidency will present findings on these topics at the EU Telecom Council on 27 November 2008 in Brussels.

Eric Besson
Secretary of State for the Development of Digital Economy

ERCIM Innovation: A new publication to foster Innovation in Europe

Professor Keith G Jeffery
President of ERCIM

ERCIM – the European Research Consortium for Informatics and Mathematics – has been established for almost 20 years and currently represents a force of more than 12,000 scientists and engineers spread over 20 European countries.

During this time the organisation has built great strength and depth in research and in Europe-wide cooperation. It has provided guidance to the ICT Strategy in Europe, successfully managed many European projects, trained numerous postdoctoral fellows, encouraged mobility among member institutions and interacted strongly with industry. ERCIM member institutions act as a node in each country working with both academia and industry. On the innovation aspect, ERCIM member institutions have created more than 100 spin-out companies.

ERCIM strategy development over the last four years has emphasised progressively innovation. The innovation value chain – from research to wealth creation – has several steps. Clearly ERCIM already had excellent research and development capability. Our next move was towards standardisation to ensure a large enough stable market to encourage investment in European industry to develop products and services for that market. Building on the fact that ERCIM hosts W3C (World Wide Web Consortium) in Europe, we formed a strategic partnership also with ETSI (European Telecommunications Standards Institute). A network of innovation offices in each of the ERCIM member institutions – and thus in each of 20 European countries – allows a flow of information on commercial requirements and research product offerings across Europe.

To stimulate industry interest we have initiated in 2008 the first in a series of Strategic Seminars, co-organised by the European Commission, to initiate a dialogue on the requirement in significant ICT areas and to showcase our R&D solutions. The objective is for industry to engage in dialogue about solutions. We are initiating an extension to our fellowships programme to incorporate industrial fellows – again to improve interaction with industry – as pioneered within the CoreGRID network of excellence led by ERCIM.

This Innovation Magazine is the next step on the road. It contains a contribution from the French Presidency of the European Union on Internet as a powerful driver for worldwide innovation. It showcases innovative developments in ERCIM member institutions with a view to finding commercial exploitation partners. It reports on several spin-offs from our member institutes as a string of research results turned into success stories. It covers the importance of standardisation and the venture capital aspect of innovation with ETSI and EBAN, respectively. It includes views on innovation from Alcatel-Lucent Labs, Amadeus and IBM Europe. And last but not least, it explains how higher education institutions such as the Norwegian University of Science and Technology (NTNU) encourage an innovation-oriented mindset in their courses.

With the launch of the Innovation Magazine ERCIM continues its contribution to the European knowledge society as defined in the Lisbon agenda.

I hope you find this publication useful and interesting.

ERCIM
European Research Consortium for Informatics and Mathematics

Hot areas to explore for research and innovation

Staffan Truvé
Chair of the ERCIM Innovation Task Group

Predicting the relevancy and validity of research is a tough game says **Staffan Truvé**, CEO of SICS and Chair of the ERCIM Innovation Task Group. However, despite uncertainties, he believes current work at the ERCIM institutes will stand the test of time

As an applied research institute, we unfortunately seldom get to look further into the future than five-ten years. However, our long-term visions can be extended to a horizon of ten-twenty years. Looking in the rear-view mirror, 20 years takes us back to 1988, when email was already widespread in parts of government and academia. Cell-phones were starting to be common in business, and IBM PCs and Apple Macs were starting to take over our offices but not quite yet our homes. The web was still nowhere in sight, except in the writings of people like Vannevar Bush, Ted Nelson and Douglas Engelbart. The Morris worm (one of the first computer worms distributed via the Internet) alerted us, maybe for the first time, to the risks associated with a global, open network.

The ERCIM institutes are today conducting research in a large number of areas, which we believe will still be valid in 20 years. Let me just highlight a few I think are particularly important:

Infrastructure

The entire infrastructure of the information society must be taken to a new level as society becomes increasingly reliant on it for all aspects of life. The future Internet will share a lot of properties with the net we have today, but must have significantly increased reliability, predictability, and manageability. It must support a new paradigm of networking of information, rather than networking of nodes. Future platforms must be distributed, redundant, scalable, and reliable. Computing infrastructure will have to change, to cater to the needs of completely new and complex life-cycles of computations that are enormous, both in resource demand and in number of participants.

Software tools

To harbour the complexity of ever-larger software systems, on increasingly complex computing platforms, new tools and methods need to be put in the hands of software and system developers.

Services

The distinction between 'professional' and 'private' services will be completely blurred as information technology continues to erase the boundaries between 'working life' and 'the rest of life'. The proliferation of new services and ubiquitous information systems will force us to put increased emphasis on questions regarding privacy, integrity, identity, authenticity, and accountability.

Virtualisation

With ever-increasing performance and the linking of all the planet's computing resources, simulation of very large and complex systems such as complete biological organisms, physical and chemical reactions, and global weather systems will change the way much of science and engineering is done.

Sensors

New, networked sensors of all kinds will create a whole new dimension of situation awareness, all the way from an individual's health to an entire factory, transportation system, or battlefield. Questions about privacy and integrity will again be important, as well as mechanisms for efficient information analysis and exploitation.

Social sciences

Just as the natural sciences are undergoing a revolution based on computer modelling and simulation, so will the social sciences – with yet to be understood consequences for society.

All these areas contain both deep scientific questions and substantial potential for innovation and commercialisation of research results. The ERCIM members, together with their academic and industrial partners, will continue to be at the forefront of this research.

Global markets need global standards in place

Walter Weigel
Director-General of ETSI

Telecommunications is a sector of crucial importance to the future of the European economy and global standards must be developed if Europe is to maintain and build upon its strength in this area, says ETSI Director-General **Dr. Walter Weigel**

It has become increasingly clear over the last few years that standardisation in the ICT sector is the key to market access and wider commercial success. Companies with non-standardised products are already finding it difficult to attract customers, a trend that Dr. Walter Weigel, the Director-General of ETSI (European Telecommunications Standards Institute), says is being driven by the demands of the global market. "Look at some of the examples that we have helped develop within ETSI," he says. "Our major success story is GSM, there are more than 3 billion end customers worldwide using GSM phones, while other organisations have also played a part in this process. For example, laptop computers with a wireless LAN built in are also based on a worldwide standard, which comes from an American standardisation organisation called IEEE-SA. My point is that if you do not feed your research results into global standardisation then you will end up with a proprietary technology, and you will either be unable to address any market at all, or you will end up with a very small geographical segment. You cannot achieve global success without global standardisation."

It was with this context very much in mind that ETSI established, in conjunction with ERCIM, the Infinity Initiative, a partnership to exploit synergies between the research and standardisation sectors. With ERCIM researchers keen to see their work find practical applications, and ETSI keen to establish robust standards, the benefits of the collaboration are clear. "We discuss the latest technology and work together on emerging topics, such as quantum computing, Bio-ICT or security", outlines Weigel, while expanding on the latter. "The internet of the future will be based – whether it's computer communications or telecommunications – on IT-based architectures and protocols, which will pose significant challenges in terms of ensuring security for users. While security was not a major issue to the initial developers of IT-based technologies, we all have an interest in ensuring that telephone-bills are accurate, that nobody misuses your number and that you don't have to pay bills for calls you have not made. Similarly, if you pay for something over the internet then you want to be sure that it is authorised, that it is not being misused. We need to advance research in this area to develop improved security mechanisms for standards of the future."

Achieving interoperability

With more than 700 organisations coming under the ETSI umbrella, achieving a consensus on the best way to approach this goal is no easy task. Nevertheless, Weigel says the institute has been able to establish broad agreement on the route forward. "We have created a new kind of standardisation activity which we call the Industry Specification Group (ISG). This is a very fast, simple to set up activity with a group including both members and non-members of ETSI, which is a kind of consortium under the ETSI umbrella, looking at infrastructure, distribution lists and language," he explains.

This kind of in-depth technical knowledge is enormously relevant in terms of the wider goal of enabling interoperability. While there are number of significant obstacles to negotiate before this can be achieved, it is a goal that Weigel says ETSI is nevertheless determined to pursue. "If you do not aim for a global standard, then it will be very difficult at a later stage to create real, worldwide interoperability," he warns. "At the initial development stage people saw a need for interoperability and standards, but they never aimed at global standards. Today we have global markets, so we have to aim for global standards."

ETSI
World Class Standards

Monolix – the new software solution for the pharmaceutical world

Conventional software tools have not always proven up to the task within the pharmaceutical field. **Marc Lavielle** and **David Monteau** from INRIA explain their Institute's work in developing the Monolix software which addresses the usual shortcomings

Developed within the INRIA research institute, the Monolix software provides a clear example of the way close inter-disciplinary scientific collaboration can bring tangible benefits on a practical level. The pharmaceutical field is an area where conventional software tools have often been found to lack the power necessary to deal with emerging problems, an issue that INRIA researchers have been working to address. "Monolix is a piece of software developed by INRIA researchers from the fields of applied mathematics and statistics, through a fruitful collaboration with Paris-Diderot University and other academic partners," explains David Monteau, head of innovation at INRIA's department for technology transfer.

Marc Lavielle, the scientific leader of the Monolix project, continues: "The software is dedicated to solving industrial problems, and it has proved particularly relevant to the needs of the pharmaceutical industry. For example, pharmaceutical companies typically perform statistical studies on a given population for their clinical trials. They usually do some Pharmacokinetics-pharmacodynamics (PK/PD) modelling and reach some conclusions about the way a drug is acting within the population. However, during such trials you might find that there is a high level of variability between the subjects. The statistical tools that have been developed within the Monolix software are exactly the kind of powerful methodologies that are needed to address this kind of variability."

Having started out initially just as a modest piece of code, Monolix has developed significantly over the years in the process of acquiring these attributes. As such it is now widely used both by people in academic research as well as those in the pharmaceutical industry itself, and Lavielle is keen to stress that it brings tangible benefits to both, the latter in particular. "The Monolix prototype was rigorously tested at the research and development stage, and this has allowed it to bring real benefits to the industry. The industry is using it and has already found it to be a very powerful tool. In particular it allows the industry to solve some of the most complicated problems and models they face, such as complex viral dynamics modelling, issues that they can't solve with the usual tools that they use," he says. "We have set up an organisation where the research team have committed themselves to going forward with the development of the software. The industry participates in a kind of guidance committee, where they define the specifications, their requirements, their needs and their particular interests in terms of how the software should work. And, being part of this committee, they also sponsor the project, so they contribute financially to the development, "Monteau adds.

Dedicated to world-class research

Such partnerships are a crucial element in INRIA's overall mission: that of performing world-class research, and of transferring technology and research to industry. Similarly, the pursuance of these goals demands that the research undertaken should be relevant to the needs of industry, something of which Lavielle is well aware. "The kind of methodology that is used within the software can have many different applications," he says. "For example, there are some applications in other fields like neurosciences, geophysics, agronomy or animal genetics, essentially those which involve public researchers. There have been other applications, but what has come out of our research is that the tool is particularly efficient in terms of the kind of data that the pharmaceutical industry is dealing with, so for the moment we have decided to focus on this kind of problem."

www.monolix.org

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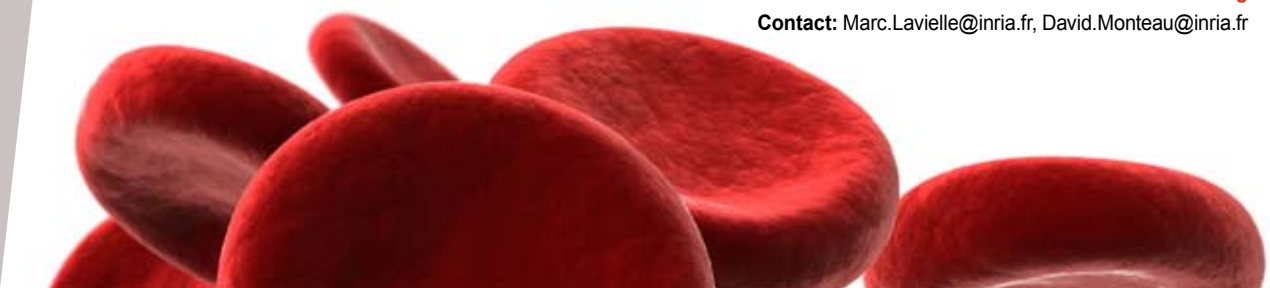

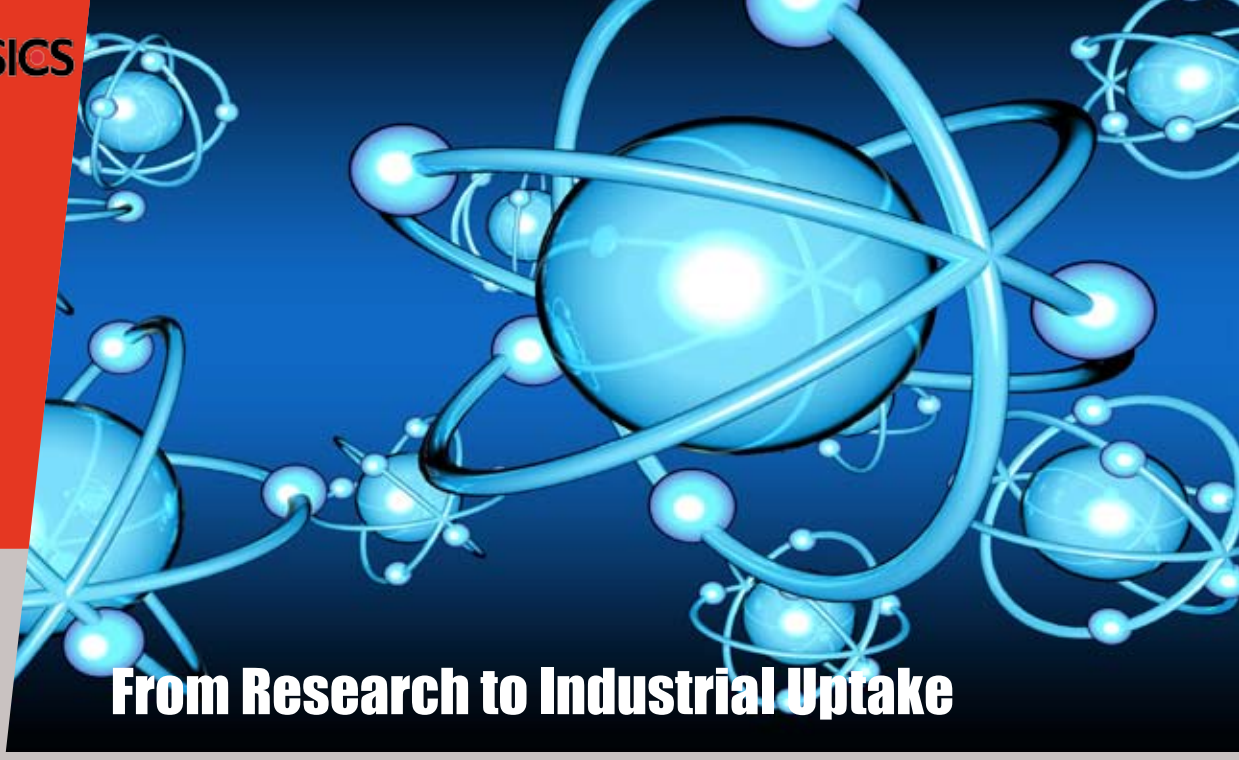

From Research to Industrial Uptake

Research into sensor networks at the Swedish Institute of Computer Science results in both seminal academic achievements and industrial alliances. **Adam Dunkels** of SICS explains how these impressive results have been achieved

Sensor networks are tiny computers with radio communication devices that are embedded in everyday objects and industrial equipment. The sensors bridge the physical world with the virtual world by transmitting conditions from the environment, such as temperature, light, motion, and health status. Sensor networks are used today in many different areas, from building automation that enable energy-efficient homes and office buildings, industrial automation and asset management to hospital patient monitoring and safety and compliance assurance.

SICS have worked in the area of sensor networks since 2000 and the research has resulted in both prominent academic achievements and major industrial uptake of the research results. Programming abstractions and research software systems developed at SICS are part of the curriculum at several major universities. Software developed as part of research projects at SICS is used by hundreds of companies in products ranging from car engine measurement systems and oil bore hole inspection devices to satellites and airplanes.

In September 2008, a group of leading technology vendors and SICS formed the IP for Smart Objects (IPSO) Alliance, to promote the Internet Protocol (IP) as the networking technology for sensor networks. SICS researcher, Adam Dunkels, is part of the technical advisory board of the alliance and has authored the first technical white paper of the alliance. In October 2008, Cisco, Atmel and SICS announced the uIPv6, the world's smallest open-source, IPv6-ready protocol stack developed for SICS' Contiki operating system. uIPv6 can enable every device, no matter how limited by power or memory, to have an Internet Protocol address.

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Award winner

Named after ERCIM's first President, the Cor Bayeen award honours a most promising young researcher in computer science and applied mathematics in Europe. 2008 winner Adam Dunkels received the award for his work on Networked Embedded Systems.

Photo by: Fredrik Olsson

Data warehousing = business benefits

Customer databases have long been a part of company operations, but only recently has the idea that they are used for competitive advantage taken root. Professor **Martin Kersten** and **Dick Broekhuis** of the Centrum Wiskunde & Informatica (CWI) explain the work of MonetDB

A new trend is emerging in the database field. The idea that data warehousing support and business intelligence can bring real commercial benefits is gaining ground, as it is increasingly recognised that companies with a large database of relevant customer information have their prospects both of retaining existing customers and also attracting new ones greatly enhanced. This is a trend to which a number of innovative young companies have responded; however, many of their more well-established counterparts, by contrast, are yet to adapt. "The technology in many current databases is unable to grind customer information to generate useful data," explains Martin Kersten, Head of department Information Systems at the CWI Institute and CEO of MonetDB, a CWI spin-off company working to develop an open-source database system for high-performance applications in data mining.

Established to capitalise on the technical expertise within CWI, MonetDB represents one of the new breed of database developers. These developers see databases as being more than just a basic business necessity, and increasingly as a means by which companies can gain a competitive advantage over their rivals. "A new line of database engines is coming onto the market," explains Kersten. "These database engines are geared to analysing data warehouses for business opportunities. This is an emerging market where you will find, in the open-source arena, that MonetDB is the most mature system around. To put it in context, we have been developing MonetDB for about 15 years and it's now available in the open-source market. We are also encouraging greater take-up through the MonetDB company, that's our main goal."

Overall accessibility

The overall accessibility of the MonetDB system is enormously relevant in terms of this latter objective. Not only do application bindings for MonetDB/SQL (the database application language) make integration in existing web-service developments an easy process, but it also runs on nearly any platform, ranging from UNIX, Linux and Mac OS X right through to Windows. This has been achieved through a long-term focus on development. "We started redefining the architecture in 1993, and we had the first prototype system up and running by 1995, which we then used to start up a data mining company," says Kersten. "We retained ownership of the code-base, which we moved into the open-source market in 2003, and then we extended it with all the extra products which were needed to address a broader market. Take-up is such now that we have to support the market with extra consultancy in that area and to help people co-develop new products."

Such success is encouraging CWI to look further at how they can capitalise on the technical expertise within the institute, which in the process provides a real insight into how the relationship between Europe's academic and commercial sectors is changing. While the two were once seen as being completely separate entities, over recent decades strong links have developed, as the example of CWI demonstrates. "Institutes like CWI are judged not only on the quality of their papers – they are also judged in terms of how well they interact with Dutch industry – which is an important part of our mission," says Dick Broekhuis, Controller of CWI and Director of CWI Incubator B.V. "The development of MonetDB has been significantly boosted through externally funded projects where academia and industry work alongside each other. Among these can be counted the recent MultimediaN initiative, a national project where academia and industry work in partnership. ERCIM, and all the institutions that are associated with it, is a kind of European breeding ground for the further development of these technologies and for bringing them to the market, which is such an integral part of ERCIM's mission."

www.multimedian.nl
www.monetdb.cwi.nl

Peerialism and the future of media distribution

SICS

Peerialism represents a true success story bringing both leading research and key people into a commercial environment.

Based on research in the areas of distributed computing and p2p overlay networks at the Swedish Institute for Computer Science (SICS), Peerialism offers content owners and broadband operators solutions for online media distribution and traffic optimisation.

The company was founded in early 2007 following a business development project looking specifically at how SICS could commercialise their p2p research. The business development project involved SICS researchers and external business developers with previous experience in tech start-ups. The project concluded that video distribution over internet would be the right business opportunity, and encouraged by SICS, the external members continued on their own creating a first sales pitch to determine the market's interest. The opportunity proved to be real enough and in late 2006 the first customer signed up well knowing that a commercial product was still some time away.

There were some determining elements in the process between the end of the initial business development project in the spring of 2006 and the actual start of the company almost a year later. The purpose of the business development project was to start a business, not to write a business plan. It was agreed from start that the project individuals, internal to SICS as well as external, would become the founders if a business was established. It was also agreed that the external people would continue to drive the commercialisation efforts, at their own risk and expense, after the initial business development project had finished and that this investment would be compensated for with a larger stake in the future company. However, key behind Peerialism's early commercialisation efforts and successfully signing the first customer was the team's trustworthiness:

- Credibility in front of the customer presenting the product vision thanks to strong ties with a leading research institute
- Key research people joining the new business full time securing product development
- Business development driven by former entrepreneurs ensuring a commercial focus leading up to a product delivery

Peerialism currently employs 14 people with offices in Stockholm and Cairo. It has managed to finance its commercialisation and growth out of its own revenues. The company strives to maintain its strong ties to the academic world and is actively involved in several Swedish and European research projects. Employees can do a PhD whilst being employed by the company.

www.peerialism.com

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Breakthroughs at the Nano scale

Nanochronous Logic

FORTH

Nanochronous Logic is co-located in San Jose, CA and in Heraklion, Greece. The company's 'de-synchronisation' enables for the first time in electronic design automation, the automatic transformation of any conventional ASIC or SoC circuit to a functionally equivalent circuit with embedded variation-sensitive and timing adaptive structures. A de-synchronised device improves integrated circuit implementation in many ways:

- Reduces power by enabling effective, continuous DFVS (Dynamic Frequency Voltage Scaling), effective MSMV (Multi-suppl Multi-voltage), and PSO (Power Shut-Off) Operation
- Enables effective Yield Correction for Power or Performance, by allowing for fabricated die to individually self-diagnose report and even self-tune their speed based on operating conditions and applied voltage
- Increases achievable performance by (i) adapting a circuit's timing to the actual, not the worst-case predicted conditions, and (ii) exploiting a time-borrowing mechanism which can compensate for inter/intra-die variations
- Enables EME (Electromagnetic Emissions) constrained design through clock control mechanisms

www.nanochronous.com

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Science & Technology Facilities Council

SuperCloud™ delivers cloud computing at commercial level

Constellation's SuperCloud™ technology is changing the way both commercial and industrial companies are operating. Offering lower costs and greater efficiency in computing requirements, this rapidly expanding company is at the commercial forefront of both Cloud and Grid technology

CERN (European Organisation for Nuclear Research) is often claimed to be the birthplace of the World Wide Web. Now, it is again at the centre of a new computer technology that has similar global potential – the software that can run a global cloud-computing network. Constellation Technologies, a European spin-out from the Rutherford Appleton Laboratory (RAL) of STFC in the UK, is now providing commercial level services to the middleware that manages the Worldwide LHC (Large Hadron Collider) Computing Grid. The product has been branded the SuperCloud™ and it has the potential to be the next "big thing".

Cloud or Grid computing has been described by some industrial researchers as being one of the most disruptive technologies of the future. The European Particle Physics (run by EGEE project) computer network is one of the largest grid infrastructure networks in the world. The middleware has shown itself to be robust, and reliable and that it works well at a global level. The EGEE infrastructure allows more than 100, 000 jobs to be performed each day on over 50, 000 CPUs located in over 250 globally distributed locations. Constellation is an EGEE Business Associate and is closely connected with the EGEE programme.

Constellation is already providing commercial level services to industrial companies looking at using the power of the Cloud or Grid computing. Systems have been designed and worked on for customers in the pharmaceutical industry, multinational financial institutions and even a media distribution company; solutions are also possible in many other sectors. All of these customers and other companies with which Constellation is having discussions, are all looking to see whether the power of the Cloud can address some of their computing needs. Demand by industry for computing infrastructure is continuing to increase rapidly as commercial companies perform ever increasingly more detailed modelling analysis in order to develop products with a commercial advantage over their competitors. However, the costs and problems associated with owning and managing these necessarily large infrastructures are becoming prohibitive. These increasing costs and demands are encouraging them to look at ways to reduce their computing costs. Cloud computing is one of the promising new technologies that can address these issues and has many potential advantages to industrial companies such as: lower infrastructure costs, increased business flexibility and access to greater computer power.

Constellation has already raised over €300,000 of development funds, has received its first contract and is in detailed negotiations with companies in a variety of industrial sectors. It has already shown that computing costs can be reduced and value can be added to the end user. Once again technology developed at CERN by an international team is reaching the mainstream, this time through the innovation activity at RAL.

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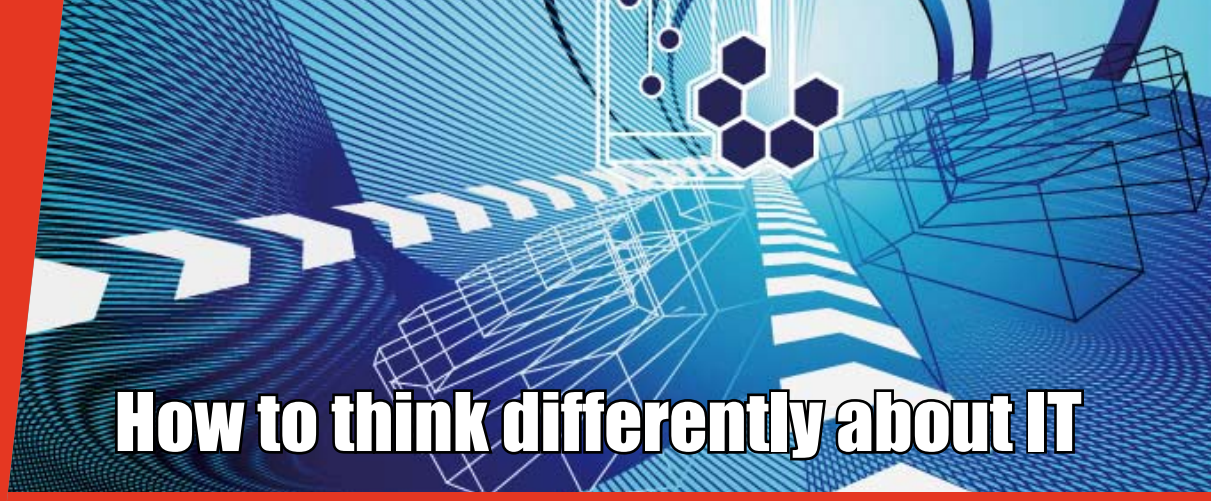
www.constellationtechnologies.com

Constellation Technologies
The SuperCloud



How to think differently about IT

Information technologies have a crucial role to play in enabling further research advances, says **Tore R. Jørgensen** of NTNU, who expands on his University's innovative approach to seminars, one which combines evolution with innovation to create an entirely new term: ITovation

ITovation / eye-toe-vay'-shun/ noun: Innovation involving the exploitation of information technologies (IT); processes for using IT for improvements and change.

The Norwegian University of Science and Technology (NTNU) has developed an approach to seminars so unusual that the organisers have coined a new name for it: ITovation – a combination of evolution and innovation, with a little IT added to spice up the mix. "Evolution happens – but innovation represents the kinds of things that humans use their will to create," says Tore R. Jørgensen, senior adviser to the university's Faculty of Information Technology, Mathematics and Electrical Engineering, and the organiser who created the ITovation definition. "When a lot of people are working on many small and a few larger efforts, good things happen that we can't always predict. These things have their own momentum, they won't stop – they have that quality of evolution, combined with the spirit of innovation."

With their festival feel and provocative blend of brainstorming session and high-tech workshop, the seminars are designed to get people talking – and perhaps to come up with a new business approach or two. It's no accident that among the sponsors is NTNU's Technology Transfer group.

Quarterly programmes

The quarterly programmes offer presentations by industry experts on innovation, along with information about those PhD projects currently underway at NTNU, musical improvisation, electronic art, and creative food and drinks. The first event, in February, 2008, attracted 260 attendees, while another 400 watched the event on the Internet. The most recent session in October 2008 featured NTNU alumni John M. Lervik, corporate vice-president at Microsoft, and CEO of FAST, a Microsoft subsidiary. Microsoft's purchase of FAST early in 2008 for $1.2 billion was the third largest acquisition in the company's history.

The October event also included an awards presentation for an art installation called the Open Wall, a wall-mounted LED installation of 96 circuit boards with 25 orange LED lights each. The wall is 480 cm long and 180 cm high.

Maria Letizia Jaccheri, a professor at NTNU's Department of Computer and Information Science who judged the Open Wall competition, said the art project, like the ITovation seminars themselves, encouraged people to think differently about IT. "I am convinced that a project like this, a combination of IT and art that brings art into the public space, forces people to reflect about IT issues," she said. "It is a source of inspiration and innovation in society."

All ITovation sessions are streamed live and are accessible on the web at www.itovation.org

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NTNU

Innovation, a key to sustained growth

François Laburthe, Director, Operational Research & Innovation, Amadeus SAS

With the economic downturn, companies see their margins squeezed, their costs questioned and even long-established business models challenged. The nagging question of how to adapt keeps coming day after day.

Even companies which deliver products and services that make a difference on the life of their customers need to adapt and ensure that their offer stays relevant and attractive. Growing year after year the business seems to require constant adjustments from the company. So, we know we need to adapt, but how?

To react to market downturn, can we improve productivity? Keeping the company efficiently organised is a must at all times, during good and difficult times. But cutting costs and streamlining processes only may not be enough to prepare the future. Besides efficiency, the other possible answer is innovation. *Innovation: new ideas converted into new or improved products, services or business models that support business success.* Sounds simple, we all want to improve the way we do business, and we hear so many claiming they have the next big idea!

Here is a snapshot of innovation at Amadeus. Founded 20 years ago by four European airlines, Amadeus has grown today into the world leader for the provision of solutions to the travel industry to manage the distribution and selling of travel services. This impressive success, in a very competitive landscape, has relied on partnership with our customers -through long term mutually beneficial relationships- and technology -Amadeus being the first provider of this industry to move from proprietary mainframe systems to open systems. In order to continue the growth story of our company and keep providing the market with successful services, an open innovation initiative was decided, based on the following assumptions:

• every employee should have a chance to propose an idea and be listened to,

• customers are the ones who can tell us best about the business relevance of an idea,

• innovators need to be coached in order to develop their ideas to their full potential.

To this end, a dedicated group was assigned the task of facilitating the emergence of innovative solutions. And Amadeus top management is now sponsoring an innovation programme by which ideas are collected, reviewed, selected and grown: for every proposed attractive innovation, a 360 degree review is made, with commercial, marketing and development experts. In the case where the idea is attractive enough to be selected, the innovator is accompanied to further develop the idea in terms of user experience, business case, technology, …

The Amadeus buildings in Sophia Antipolis

Will it find the next great idea that will drive company growth for the next 10 years? Possible, though not sure. However, it should generate a number of innovation proposals with inventive business models, inventive service packaging or inventive technology. And we'd like to think that among them, it will unveil a number of opportunities, where a latent need from the market can be uniquely matched thanks to the assets of the company.

We are convinced at Amadeus that innovation concerns every one of us. Taking into account ideas from all employees, giving them a chance to fulfill their potential by exposing them to customers is our roadmap to success. Easy markets, tough markets, we know that innovation is our best and only chance to have many more years of success in this industry.

amadeus
Your technology partner

Innovation and Research: Who Leads?

If there is a silver lining to the recent financial turmoil, it is the consensus that we operate in a globally integrated economy. Every twist and turn of business news has reinforced the notion that no single unilateral solution will prevail.

At IBM, we believe a similar principle of integration applies to the Innovation process -- involving laboratory and consumer; academia and business. What used to be separate, is now irrevocably connected.

In the past, debate about innovation focused on reaching an optimal national or corporate level of R&D spend. And that's an important goal. But no level of investment on R&D will yield desired results if research exists immune to the world outside the lab.

Innovation today is more collaborative than ever before. Breakthrough advances now occur at the intersection of previously discrete disciplines -- in the nexus between academia and business; as well as between a business, its partners and clients.

This sort of innovation requires an understanding of complex technology and organisational issues; the ability to understand and integrate data across discrete environments; and systems that can make decisions on their own -- using advanced analytics technology.

At IBM, we spend billions of euros a year on R&D, in areas that include exploratory science and Cloud Computing. But unlike the past, we have consciously increased collaboration between researchers and clients, partners, academics, venture capitalists and government.

This makes the research faster and more productive. It also enables us to innovate in real time to help clients address their pressing issues. For example, by creating traffic management systems in London and Stockholm to improve city environments, and working on Finland's defence infrastructure to improve public safety and rescue capabilities.

So, when academic leaders enquire how to work more closely with industry and government on research that enables them to compete in a globally integrated world – my recommendation is to focus on services. Services that include everything from distribution and tourism, to financial services, communications, transportation and IT services.

Even research is now being delivered as a service. At IBM, we have combined our research and consulting units to bring a wide range of inventions, tools, technology and expertise to clients. Through this On Demand Innovation Services unit we think we've defined a services approach to research.

Worldwide, the export of services as a whole grew by 18 per cent in 2007. But academic research on the creation, processes or management of services is sparse. Fortunately, this is now being rectified, as universities begin to create programs to study this emerging field, increasingly referred to as 'Services Science'.

It is our goal in IBM, to work with other companies, with academia, venture capitalists and with governments to ensure that this new area of research and study receives the attention that it needs, given the growth of its importance to the world economy.

So who takes the lead, innovation or research? I'd argue they have to work hand-in-hand.

Larry Hirst, Chairman, IBM Europe, Middle East, Africa

Companies must not undertake their innovation alone

Eric Perrin-Pelletier, VP and head of Research, Alcatel-Lucent Bell Labs, France

Commercial success is growing increasingly dependent on the ability to translate advanced research into innovative new products, an area in which Alcatel-Lucent has a head start on their rivals. **Eric Perrin-Pelletier** of the Bell Labs explains how they stay ahead of the game

In today's fast-moving commercial landscape what is state-of-the-art one day can be obsolete the next, making the capacity to develop innovative new products crucial to companies from across the industrial spectrum. Of course these circumstances are not without precedent; Bell Labs, the research division of global communications solutions provider Alcatel-Lucent, have a long history of being in the vanguard of technological change. However, it is the pace of modern development which makes the work of the Bell Labs more crucial to the future of the company than ever before. "Bell Labs is the corporate research arm of Alcatel-Lucent. Its mission is to bring disruptive innovation to market through the avenue of new technologies," explains Eric Perrin-Pelletier, the Vice-President and Head of Research at Alcatel-Lucent Bell Labs in France. "Alcatel-Lucent has a strong R & D department because the field we are in is highly technical. We need to understand the technology in real depth if we are to develop the next product and address the challenges that we are likely to face."

These circumstances pose real challenges in terms of enabling further development. Of course business has long been keen to position itself at the cutting edge of research, yet the sheer complexity of emerging technologies means that companies cannot stay at the forefront of development without collaborating closely with the other actors in the development chain. This is an environment to which Alcatel-Lucent has adapted. "In terms of innovation we are pursuing three main objectives," outlines Perrin-Pelletier. "We aim to transfer new, user-oriented technologies to the market, as well as to create a new market through internal ventures that are focused more on current technology. Finally, we also work to assess more long-term prospects, which involves looking at emerging market trends and new technologies, with a view to addressing the grand challenges of the future. With each of these three axes we collaborate with a range of different actors, including SMEs, industries and other labs – both internally and externally."

Key research direction

Of course, this growing technological complexity brings with it problems for end-users too. Although the public at large is growing more and more familiar with communications technologies, we are not yet at a stage where everybody is capable of using what are often extremely sophisticated tools to their maximum, circumstances to which researchers must respond. "Simplification is a key research direction," acknowledges Perrin-Pelletier. "We, as users, have more and more access to information; at virtually any time we want and at whatever speed we want, but still some questions remain. How do we sort out all this information so as to ensure that the information is targeted effectively at the specific needs of users themselves? For the operators, the management of the networks is becoming more expensive than ever – how do we make it simpler? How do we cope with the fact that ongoing evolution will lead to constraints in the network?"

With such weighty issues to be addressed it is clear that much room remains for further development. However, if innovation is to be further encouraged then Perrin-Pelletier says it is crucial that such development should involve broad-based collaboration. "We aim to mix cultures, origins and experience, so that together we can develop the environment which is necessary to stimulate innovation," he says, before pointing to another key consideration in developing technologies for which the level of demand is uncertain, something which only serves to further reinforce the need for collaboration. "We definitely need to gather feedback about our ideas as quickly as possible," he stresses. "For that you need to bring different actors together – companies must not undertake their innovation alone."

Alcatel·Lucent

Smart money for European innovators

What are 'business angels' and how do they support innovation in Europe and the commercialisation of new technologies? **Claire Munck**, General Manager of the EBAN, Europe's trade association for the early stage investment market, explains more

Business angels (BA) – affluent individuals who provide capital for business start-ups – have two wings: they bring not only capital to early stage companies, but also their network of contacts and management or entrepreneurial experience. It is this ideal package that makes the difference for young companies when starting-up.

BA invest in the very early stages of companies, when entrepreneurs have a great idea but not much more; when other investors are not willing to invest due to the lack of collateral on the side of the entrepreneurs (banks) or because due diligence costs are too high for the size of the investment and the risk (Venture Capitalists). According to EBAN's latest research on the market, the average amount invested by angels in the first round is €165,000. Indeed, many entrepreneurs just need a little help to get to the next stage of their business or turn a business idea into a great product.

So what do business angels look for in a business plan?

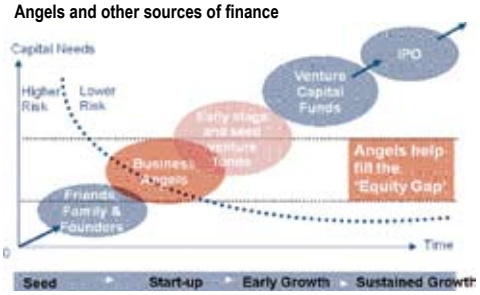
- High growth potential
- Strong innovation (product or business model)
- Scalable business
- Strong intellectual property protection
- A USP-unique selling point
- And more importantly a strong and dedicated management team to run the business.

While business angels have a strong appetite for ICT businesses, they invest in all sectors providing the business-model and the team are right - cleantech and medtech are increasingly popular sectors and a good example of this.

Entrepreneurs looking for early stage venture capital funding should know that:

- Business angels will more often than not take an active role in the business – often taking a seat on the Board of Directors
- In return for their investment and time spent with the company, angels will ask for an equity share of the business
- BA look for a high return on their investment: the exit strategy for the business should be clear.

Angels and other sources of finance



However, the presence of one or several seasoned angels in the business will:

- Facilitate follow-on investments
- Facilitate the attraction of customers
- Raise the profile of the business as a high-growth start-up.

It is important to note that business angels will be appreciative of companies who have "done their homework"; in particular those with a strong R&D focus. There are numerous schemes at national or European level which help companies to achieve a proof of concept stage through support to their R&D expenditure. Angels prefer to come in after public funding support for R&D because this is when they will be able to bring most value to the company through their own funding, and network of contacts to attract first customers.

So how does a start-up find an angel? Angels are often organised in groups or belong to an angel network. These structures act as matchmakers between entrepreneurs and early stage investors. These networks are in turn affiliated to a national federation and/or to EBAN who represent their interests at the European level.

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eban
european business angel network

ERCIM

European Research Consortium
for Informatics and Mathematics

Cooperating for Excellence in Research

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