EUREKA NEWS M!

Shaping tomorrow's innovations today

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80

The quarterly magazine of the EUREKA Initiative

Living longer

Innovative research to fight age-related diseases, relieve pressure on European healthcare services and improve lives

EUREKA is a European network for market-oriented R&D. Its aim is to strengthen European competitiveness by promoting market-driven collaborative research and technological development. The EUREKA Initiative enables industry, universities and research institutes from 37 member countries and the EU to collaborate in a 'bottom-up' approach to developing and exploiting innovative technologies.

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Contributing to a new era

With both Slovenia's Chairmanship of EUREKA and our EU presidency progressing so well, this edition of EUREKA News is an excellent opportunity to review achievements and think about future goals. Ambition and enthusiasm have been the driving force for our country in the past and have certainly played a key role during the EUREKA Chairmanship year. Since joining the euro-zone in January 2007, Slovenia has rapidly developed and strengthened its international position, recording positive economic results. We were delighted to take over the helm of EUREKA at such an exciting time in the network's history, participating, last October, in the announcement of EUREKA's Eurostars Programme for research-performing small and medium-sized enterprises (SMEs).

Slovenia wishes to be recognised as a knowledge-based society and is conscious of the great importance and value of knowledge. Science is one of the areas in which it excels, competing equally in international research projects with other countries. Today, it dedicates around 1.6 % of its GDP to science, research and technological development, which represents almost 500 million euro spent on R&D, in a country of just 2 million people. The Chairmanship is helping to increase EUREKA visibility in our country and boost project generation. In the past, the value of EUREKA was not always sufficiently communicated nationally or exploited to make being part of it more attractive to business.

Our ambition is to combine the advantages of the EUREKA Chairmanship and the Slovenian EU Presidency. Both have the common goal to further define and make a significant contribution to the European Research Area (ERA). Building an internal market for researchers will significantly contribute to making Europe the most competitive knowledge-based economy. With its wide network and experience, EUREKA already represents an important player in the field of research and has the potential to further increase European competitiveness, becoming a key player within the ERA. In September 2007, EUREKA and the Slovenian Chair team communicated a response to the European Commission's Green Paper on the ERA, emphasising the central role of business in R&D as a knowledge generator and user. They also focused on the importance of greater interaction with intergovernmental initiatives and the necessity of fostering public-private partnerships.

Joint Technology Initiatives (JTIs) provide an opportunity to forge new partnerships among public and private-funded research institutions, contributing to the goals of the Lisbon strategy. The Slovenian Presidency is actively addressing the proposal for

> Editorial

Mojca Kucler Dolinar
Slovenian Minister for Higher Education, Science and Technology.

creating fuel cells and hydrogen JTIs, with the view of seeing them adopted by the end of our Presidency. In the same way, it wishes to reach an early consensus with the European Parliament on Article 169 initiatives particulary the Eurostars Programme.

Eurostars will reinforce relations EUREKA has already established with the European institutions. By harmonising and synchronising procedures, this niche market of SMEs will gain faster access to funding and will be provided with even stronger support, giving them the clear structure they need to develop close-to-market technology. Responding to the needs of this target group is clearly the way forward if Europe wants to maintain its worldwide position.

Experience shows the effectiveness of bringing education and research innovation together. Providing a better transfer of knowledge from research into profitable innovations, harmonising working conditions for researchers and increasing their mobility is key to managing Europe's highly-specialised researchers. Moreover, creating favourable conditions for pursuing a career in science and making such careers attractive to young men and women is one of our strong priorities. Unlocking the scientific potential of the Western Balkan countries is one of the key priorities of both the Slovenian Presidency and EUREKA Chairmanship.

With all these challenges in mind, together with the active continuation of work on JTIs and Eurostars, Slovenia is proud, with the experience it has, to contribute to building a more integrated and coherent future for the European research sector. Our common goal is to bring Europe closer to the Lisbon goals and create even greater opportunities for industry and citizens alike, making innovation and science part of everyday life.

Mojca Kucler Dolinar
Slovenian Minister for Higher Education, Science and Technology.

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Welcome to EUREKA News 80

In this issue, we focus on health matters and the growing need for innovative medical care. Europe's population is aging faster than any other continent. Life expectancy has increased from 45 years at the beginning of the 20th century to almost 80 years. With people living longer, there are more and more age-related diseases, putting a heavy strain on European healthcare services.

Our main feature looks at how research developed through EUREKA projects relieves some of these pressures while improving lives (pages 8-11). In the back-page viewpoint, we speak to Dr Stephen Minger, director of King's College London's Stem Cell Biology Laboratory at the Wolfson Centre for Age-related Diseases. His group was awarded one of the first licences for the derivation of human embryonic stem cells in the UK, that went on to generate the first human embryonic stem (ES) cell line and become one of the first to deposit human ES cells into the UK Stem Cell Bank.

In the regular project showcase, we turn to two biotechnology projects. Franco-Spanish project Σ!3626 RAW has designed a new process for controlling the level of alcohol during wine production. It is an environmentally-friendly process that also provides sugar recycling (page 7). Σ!3686 HIPER HARVESTEC (page 14) has developed a high-performance grain-harvesting system which hopes to better Europe's harvesting procedures.

The New Year saw the start of MEDEA+ follow-up programme CATRENE. Now the new Cluster is up and running, we find out how it is taking up the challenge of boosting Europe's strength in micro- and nanoelectronics (pages 12-13). Last but not least, catch a glimpse of what is in store at this year's Ministerial Conference in Slovenia and read about the latest news in the following pages. We hope you enjoy this issue. Your questions and comments are welcome at eureka.news@es.eureka.be.

EUREKA Slovenian Chairmanship

Discussing EUREKA's role within the ERA

At the dawn of Slovenia's EU Presidency in December 2007, EUREKA and its Slovenian Chairmanship team, in collaboration with the Slovenian Permanent Representation in Brussels and the Slovenian Business and Research Association, organised an interactive discussion on its contribution to the European Research Area (ERA).

'Among its Chairmanship objectives, Slovenia wants to strengthen EUREKA's position within the ERA and increase support for small and medium-sized enterprises (SMEs). The joint EU-EUREKA Eurostars Programme responds to this ambitious niche market,' says Aleš Mihelič, High Level Group Chairman who heads Slovenia's Chairmanship team.

Speakers included Deputy Permanent Representative Mary Veronica Tovšak, director of Slovenian Business and Research Association Boris Czelj and project participant Martin Kopač from Alpina, d.d. Žiri.

www.eureka-chair.si
www.sbra.be

European affairs

Mini-hearing at the European Parliament

Slovenian minister for Higher Education, Science and Technology Mojca Kucler Dolinar was in Brussels on 24 January to address the European Parliament Committee for Industry, Research and Energy (ITRE) and present the Slovenian Presidency priorities in the field of science, technology and information.

At the invitation of Austrian MEP Dr Paul Rübig, Ms Kucler Dolinar later gave a more detailed presentation of the Eurostars Programme before the committee. Joining her was European Commissioner for Science and Research Janez Potočnik. He stated that 'including SMEs is a key component to increasing European competitivity. Thanks to Eurostars, R&D-performing SMEs can bring new products to the market; they are literally the stars of tomorrow'. Luuk Borg, Head of the EUREKA Secretariat, gave the latest news on the programme and confirmed that first results show Eurostars has been successful in attracting participants.

'Europe has entered a period of new opportunities, which have to be used efficiently to achieve sustainable progress in strategic areas such as upgrading research infrastructure, establishing the European Institute of Innovation and Technology and the Joint Technology Initiatives,' emphasised the minister, co-president of the EU Competitiveness Council. In the field of science and technology, the Slovenian Presidency will endeavour to conclude the adoption procedure regarding the Eurostars Programme for research-performing SMEs. Other priorities are to enhance the European Research Area (ERA), effectively integrating Western Balkan countries and strengthening the role of women in science.

www.eu2008.si

CIP Business Support Network launch

The CIP Business Support Network was launched at Tours & Taxis in Brussels on 6 and 7 February. Participants included members of the European Parliament and other European institutions, high-level representatives from Member States and European business organisations. Inaugurated by a gala dinner headed by Vice-President of the European Commission Günter Verheugen, discussions focused on the role of DG Enterprise and Industry, the Executive Agency and the priorities of other Commission services and how they will fit into this new network.

This European network provides services in support of business and innovation and is one of the main instruments to help European SMEs in their competitiveness and innovation efforts as foreseen in the Competitiveness Innovation Programme (CIP) 2007/2013. Gathering over 500 business organisations, grouped into around 75 consortia, covering the EU territory and several third countries, it will replace the current Euro Info Centres and Innovation Relay Centres. It provides a wide range of services through a single access point, including business cooperation, transfer of technology and access to FP7.

ec.europa.eu/cip

Past events

Green technology showcased at EBS 2008

The sixth edition of the European Business Summit (EBS) turned over a new leaf this year by focusing on greening the economy and looking at how Europe can turn the carbon challenge into a business opportunity while giving new energy to growth and jobs. EUREKA was ready to rise to the challenge by contributing its experience to a conference session on the future of renewable energy. 'EUREKA is helping drive the changes needed to develop green technologies close to the market while focusing on SMEs,' said Gabriel Marquette, Chairman of EUROGIA, EUREKA's Cluster focusing on energy.

'Climate change and energy are the hot topics today, at political level and in corporate boardrooms,' said Conference Director Wytze Russchen, adding that the EBS sought to respond to the interests of the European business community. The event is organised by BUSINESSEUROPE and the Federation of Enterprises in Belgium (FEB), in close cooperation with the European Commission and the Slovenian EU Presidency.

www.ebsummit.org

Clusters

Finland welcomes a successful Celtic Forum 2008

Helsinki hosted the third edition of the CELTIC forum, which took place on 27 and 28 February. The event was co-organised by TEKES, the Finnish funding agency for technology and innovation. 'The scope of the conference brought together key players from industry, research, public authorities, and politics to present and discuss the current evolution of CELTIC and its running projects,' explains Cluster Chairman José Jimenez. 'Several high-level presentations showed future evolution scenarios in next generation telecommunications networks, services and systems. We also discussed current achievements and future perspectives of CELTIC at its mid-term status.'

Topics under discussion included the impact of next-generation Internet on telecommunications, EUREKA's new strategies and new dimensions in the Finnish innovation policy and strategic centres for science, technology and innovation. An exhibition highlighting a selected number of important CELTIC projects and additional Finnish projects was also open to visitors. The information day on 26 February also gave invitees a chance to network with key players in European telecommunications.

For the first time, six projects received the CELTIC Excellence Award, for their outstanding achievement in innovation. The award candidates were selected from the outcome of the mid-term and final reviews, where ten of the most successful projects had been identified. Winners included FIDELITY, which achieved excellent results in federated identity management based on LIBERTY standards.

> News in brief

BANITS (Broadband Access Networks Integrated Telecommunication System) developed a number of new products, patents in a variety of sectors. GANDALF that focuses on monitoring and self-tuning RRM parameters in a multi-system network. BUGYO (building security assurance in open infrastructures) was mainly granted the award because of its expected high-return in investment opportunities for future business and its recognition of security infrastructures. WINGTV has had on important impact on the mobile TV business and developed new prototypes of DVB-H receivers and modulators. The results have improved the position of companies to increase revenues from their DVB-H equipment. Finally , the MADEIRA project (Network Management based on distributed paradigms) achieved good results in the study and the implementation of an application for autonomous distributed secure network management to real telecommunication scenarios.

www.celtic-initiative.org

Forthcoming events

EUREKA Ministerial conference in Ljubljana

Slovenian minister for Higher Education, Science and Technology Mojca Kucler Dolinar has invited ministers from 37 EUREKA member countries and EU Commissioner Janez Potočnik to attend EUREKA's Ministerial Conference, taking place at the beginning of June at the Hotel Union in Ljubljana.

The biennial event gives key political decision-makers the opportunity to debate topics affecting EUREKA and the future of innovation in Europe. The conference will be the final event organised by the Slovenian Chairmanship: Portugal will take over from July 2008. 'The Ministerial Conference is an opportunity to look back at what we have achieved over the last year but also look forward and plan, with the incoming Chairmanship, the best route for the future,' says Aleš Mihelič, High Level Group Chairman. The announcement of the Lynx and Lillehammer award winners will also take place at a gala dinner preceeding this important event on the EUREKA calendar.

www.eureka-chair.si

ESOF 2008 basks under the Spanish sun

Strengthening the link between science and society is what is hoping to be achieved at this year's Euroscience Open Forum (ESOF), taking place at the Fira de Barcelona from 18 to 22 July. Already in its fourth edition, ESOF is promoted by Euroscience, a European association of independent scientists from more than 40 countries. EUREKA will participate in the research and innovation exhibition, showcasing many of its innovative projects.

Hosted by the Catalan Foundation for Research and Innovation (FCRI), ESOF provides an open platform for debate and communication on science and technology. More than 5000 participants are expected to attend including Nobel laureates, eminent scientists and key business decision-makers. The event is made up of workshops, presentations and outreach activities engaging everyone in science and technology issues.

www.esof2008.org

> Project **showcase**

Σ!3626 RAW (Reduced Alcohol Wine). An innovative process for controlling the level of alcohol in wine

When wine gets too heady

Some wine producers find their vintages increasingly strong. A French-Spanish partnership set out to ensure the alcohol does not drown out the flavour.

Wine is now made in some surprising places. The south of England is winning praise for its sparkling white wines, with good grape harvests the result of hotter British summers attributed to global warming.

The flip side to climate change, though, is that some wine producers in already warm climates are finding vintages increasingly alcoholic as grapes ripen faster and become more sugar-laden. The Australian Wine Research Institute, for example, says the average alcoholic content of the country's red wines rose from 12.3 degrees in 1983 to 13.9 degrees in 2004. Even vineyards in Europe are seeing potent vintages, citing better modern fermentation methods as another factor to explain higher alcohol levels.

'With stricter drink-driving laws and consumers wanting to reduce alcohol intake for health reasons, the industry needs a method to reduce the alcohol level in wine', says Thierry Poudevigne, Chairman and general manager of Imeca, a French company developing solutions and equipment for the food and drink industry.

'When a wine is too alcoholic, the alcohol masks the aromas and tastes of the wine', he says. 'I see very good wine in South America, like the Cabernet Sauvignon in Argentina and Chile, but it's 14 degrees. You can't accompany a meal with such an alcoholic wine.'

Producers have tried different solutions to the problem but Imeca felt most reduced the alcohol content after fermentation, harming wine quality. Imeca engineers Franck Merican and Fabien Pujol hit on the idea of a process using filters to remove sugar before it was fermented into alcohol, reducing the alcohol but not the flavour.

'Removing 10 percent of the sugar, a product which started at 14 degrees can be brought down to 12.5 degrees', says Merican. 'That is particularly important for wine made in hot regions.'

'Bringing a wine's alcohol content down by just two degrees, means the aromas and the tastes of the wine are not marked by an alcoholic character which leaves a taste in your mouth', says Poudevigne.

Imeca convinced Spanish winemaker Heredad Segura Viudas, part of world-famous Cava-maker Freixenet, to help develop the solution for commercial use. EUREKA helped the partners to prepare a confidentiality agreement which allowed the Catalan wine-maker to exclusively use the technique initially in return for offering Imeca world distribution of the method. Machinery to remove sugar from the grape juice has been developed and controlling alcohol levels in whites, roses and reds tested. Poudevigne adds that wine producers can even add the natural sugar back into wine, in a year, if necessary.

Could the technology help to produce alcohol-free wine one day? According to Merican, the response to alcohol-free beer suggests little demand for this product. But, the technology opens up the possibility of new products such as alcoholic fruit juices of about 6 degrees of alcohol.

On the wine side, Freixenet has already used Imeca's technique to produce its first bottles of a new low-alcohol cava which it is calling Sans Soucis, French for no worries or carefree. The company is testing the sparkling wine, which has an alcohol level of 7.5 degrees, on the market and similar products may follow if the customer response is good.

If customers like the taste, they can worry less about having an extra glass or two. 'Directing producers towards less alcoholic wines moves in the direction of the market', says Poudevigne. 'Producers of wines which are too high in alcohol will find it difficult today to find consumers.'

Spearhead against ag

Life expectancy has increased dramatically since the beginning of the 20th century, and so has the incidence of debilitating illnesses associated with getting older, such as osteoporosis, osteoarthritis, stroke and heart disease. EUREKA projects are at the forefront of developing new techniques and products to diagnose these conditions earlier and treat them more effectively, benefiting patients and healthcare services alike.

Europe's population is aging faster than any other continent. Its citizens are living healthy, active lives until well into their 70s and 80s, and increasingly beyond, owing to groundbreaking advances in medical research and better standards of living and public health.

As life expectancy increases, so does the incidence of age-related illnesses and diseases. So, older people consume considerably more healthcare, increasing the burden on healthcare services resources and family members.

A number of EUREKA projects are carrying out highly innovative research into these conditions, determined to find clues about their underlying causes and progression. Vital work is bringing about earlier diagnosis and products capable of preventing a disease's onset or slowing its advance, enabling more effective and less costly treatment and a better quality of life.

ding the battle ge-related diseases

Keeping bones stronger, longer

Osteoporosis affects an estimated 75 million people in Europe, Japan and the USA. Post-menopausal women and the elderly are particularly at risk. Bones gradually lose their density and become thinner and more fragile as the body becomes less able to replace old, worn bone with healthy new material. A gradual process, the condition often goes undetected until a person falls and fractures a wrist or hip. Recovery can be complicated, requiring long-term hospital and recuperative care, with patients experiencing loss of mobility and independence.

'Preventing osteoporosis is a promising route for research. It is easier than restoring bone density,' says Dr Irene Westbroek of Dutch biotechnology company DNage BV, lead partner in EUREKA project Σ!3883 SCREENOP. 'We set out to find the condition's unique biomarkers so that people at risk of developing it can be identified much earlier. Our other objectives are to create nutritional products to stimulate bone formation and to develop a high through-put assay to cut the cost and speed the process of creating new therapeutic drugs.'

SCREENOP's innovative approach was to study the effect accumulated DNA damage has on bones. 'Current diagnosis methods rely on X-ray analysis or detecting depletion of the hormone oestrogen which occurs at menopause, putting women at a high risk of developing osteoporosis,' explains Dr Westbroek. DNage has a number of proprietary models that demonstrate a clear link between age-related DNA damage, aging and age-related diseases. These allow the in-depth study of the onset and identify progression of the disease, and biomarkers for diagnosis and therapeutic targets in men as well as women.

'The discovery of early biomarkers will enable the diagnosis and treatment of osteoporosis before bone loss has started to set in, with obvious benefits for the quality of life of older people and for healthcare services. And as biomarkers can indicate the progression of the disease, you can tell more quickly whether new treatments are working, which could shorten the timelines and costs of clinical trials considerably. What we are learning could have important applications for age-related diseases other than osteoporosis in which DNA damage may be a factor – diabetes, for example, and neuro-degenerative diseases such as Parkinson's and Alzheimer's.'

> **Soon, we hope to have a product ready, which all hospitals can afford, and which will save lives and improve the quality of life of thousands of stroke victims**
>
> ***Dr Andrius Usinskas, Department of Electronic Systems, Vilnius Gediminas Technical University***

A highly effective treatment for osteoarthritis

One of the most common joint diseases, osteoarthritis is an important cause of immobility and severe pain in the elderly. 25 % of people over 60 suffer from it. Analgesics and non-steroidal anti-inflammatory drugs are the standard forms of treatment, to reduce pain and stiffness and improve mobility. However, side effects are associated with prolonged use, including gastrointestinal and cardiovascular problems and further degradation of cartilage.

Botanical extracts have been used for thousands of years to treat joint diseases, but their efficacy varies according to the source of the plant material, the way extracts are prepared and the amount used. Numico Research BV and Phytocon Gmbh, the Dutch and German partners of project Σ!2765 BIOBOTANICS, set out to identify new plant sources, learn more about the mechanisms involved in →

CARDISCREEN could have a significant impact on the mortality rate of ischemic heart disease and literally save millions of lives

Jerzy Galecka, the Itam Institute of Medical Technology and Equipment

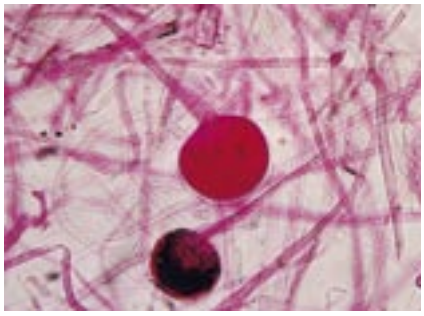
→ relation to osteoarthritis, and to validate and standardise new and existing plant extracts.

'During the project we identified and optimised new anti-inflammatory and disease-modifying components, which tested positively using in vitro assays and in vivo models,' reports Anita Hartog, a scientist at Numico Research. 'These new components are probably safer and might not only relieve symptoms but actively interfere with the cause and progression of the disease, stabilising and possibly retarding it. This would be a tremendous improvement on existing forms of treatment, which mainly focus on relieving symptoms, and greatly enhance a patient's quality of life.'

With project BIOBOTANICS successfully completed, both companies are carrying out further research to define the effects, concentrations and costs of the new compounds which, in the event of a promising market opportunity, will be followed by clinical trials. Given that 10 % of the global population suffer from osteoarthritis, the market potential for their botanical components is impressive.

Screening for heart disease

60 million European men over 50 are at risk of ischemic heart disease, and the condition often goes undiagnosed until a person experiences angina or a life-threatening heart attack. Being able to identify people at risk but not exhibiting symptoms could save many lives by giving them a chance to make lifestyle changes to lessen the likelihood of an attack. Current diagnosis methods are expensive and lengthy, and considered inappropriate for routinely testing at-risk groups. An exercise test on a treadmill or cycle, for example, takes up to 40 minutes and could even trigger an attack.



What we are learning from SCREENOP could have important applications for age-related diseases other than osteoporosis in which DNA damage may be a factor, diabetes, for example, and neuro-degenerative diseases such as Parkinson's and Alzheimer's

Dr Irene Westbroek, DNage BV

The goal of the Polish and Slovakian partners of project Σ!3494 CARDISCREEN was to develop a simple, safe and inexpensive test which could be used to monitor at-risk groups on a regular basis. The concept was devised by Professor Fryderyk Prochaczek of the Department of Cardiology at the Medical University of Silesia, as a way of testing patients experiencing chest pain, and who were unable to perform the treadmill test because of a pain related to walking. The CARDISCREEN method uses a non-invasive pacemaker to stimulate heart muscle for 30 seconds, to expose signs of ischemia arising in ECG records, caused by an increase of heart rate.

> Spearheading the battle against age-related diseases

With the project successfully completed, the next step is to develop a prototype and conduct clinical trials of the software and equipment, with a view to having a marketable product by the end of 2009. 'Because CARDISCREEN is so quick, safe and inexpensive, the system can be used widely in hospitals, private clinics and community health centres to detect potential candidates for heart disease,' says Jerzy Galecka of the ITAM Institute of Medical Technology and Equipment, the partner responsible for developing the prototype. 'CARDISCREEN could have a significant impact on the mortality rate of ischemic heart disease and help to save literally millions of lives.'

Automated, accurate stroke diagnosis

People over 65 are at particular risk of a stroke, which is caused when the blood supply to the brain is interrupted. The third most common cause of death in developed countries, strokes cause the deaths of about 575,000 Europeans each year. Prompt diagnosis and accurate assessment is crucial, as the earlier a patient receives treatment the less damage is done to the brain and the lower the degree of ensuing disability.

Ischemic strokes, caused by blood clots, are the most common kind. A patient's status is determined by the location and especially the volume of the stroke. Accurate assessment is problematic because the stroke's boundary is difficult to define on the 'slices' or images of the affected area of the brain taken by a computer tomography (CT) scan, the standard method of diagnosis. Manually calculating the volume is very time-consuming when time is at a premium; semi-automatic methods give approximate results and require expensive software and a powerful computer, which are beyond the budgets of many hospitals, especially in Eastern Europe.

Project Σ!2981 CTBSTROKE's goal was to develop an affordable, fully-automated diagnostic software tool which can be used on a mid-price personal computer.

'Our new components are probably safer and might actively interfere with the cause and progression of osteoarthritis, this would be a tremendous improvement on existing forms of treatment which will greatly enhance a patient's quality of life'

Anita Hartog, Numico Research BV

'The developed innovative software measures stroke volume much more quickly and also provides a 3-D visualisation of the affected region,' explains Dr Andrius Usinskas of the Department of Electronic Systems at the Vilnius Gediminas Technical University. 'The radiologist sees a reconstructed stroke in the patient's skull on the computer screen and can evaluate it

in cubic centimetres. We are now talking to CT vendors, and will incorporate their input into our final fine-tuning of the software. Soon, we hope to have a product ready for the market which all hospitals can afford, and which will save lives and improve the quality of life of thousands of stroke victims.'

CATRENE takes up the MEDEA+ challenge as European nanoelectronics R&D champion

Rocketing research and development (R&D) costs for ever smaller electronics devices and the pressures to get products to market even faster make it essential for European industry, research centres and academia to work together to maintain and increase competitiveness and employment in this key sector. A new EUREKA programme, CATRENE (Cluster for application and technology research in Europe on nanoelectronics), is taking up the challenge of boosting Europe's strength in micro- and nanoelectronics as the highly successful MEDEA+ Cluster for advanced cooperative research and development in microelectronics reaches its conclusion.

'For more than a decade, the EUREKA JESSI, MEDEA and MEDEA+ programmes have made it possible for Europe to reinforce its position in semiconductor process technology, manufacturing and applications, and to become a key supplier to global markets such as telecommunications, consumer electronics and automotive electronics,' explains Enrico Villa, new Chairman of CATRENE.

Enormous opportunities

'Nanoelectronics offer enormous opportunities to those who are the first to master and bring to market new technologies and applications,' he adds. 'While the value of the global electronics market is growing rapidly, R&D costs are rising even faster and very few companies can afford their own R&D in all segments of nanoelectronics, making alliances essential. We believe CATRENE will play a vital role in helping Europe's microelectronics industry to go from strength to strength.'

CATRENE is a four-year programme that started 1 January 2008 and is extendable by another four years. Annual resources required will be 4,000 person-years, equalling about 6 billion euro over eight years. The first call started in March this year.

'The challenge is to increase productivity and reduce time to market,' says Villa. CATRENE is extremely important to create European leadership in security, safety and energy-conscious transport, the growing healthcare market; including both prevention and monitoring; environmental protection, high-quality media and entertainment, and integrated communications for both business and consumers. The new Cluster is structured to meet the tough technological demands, offering a new approach while guarding the high flexibility and efficient organisation found in MEDEA+.

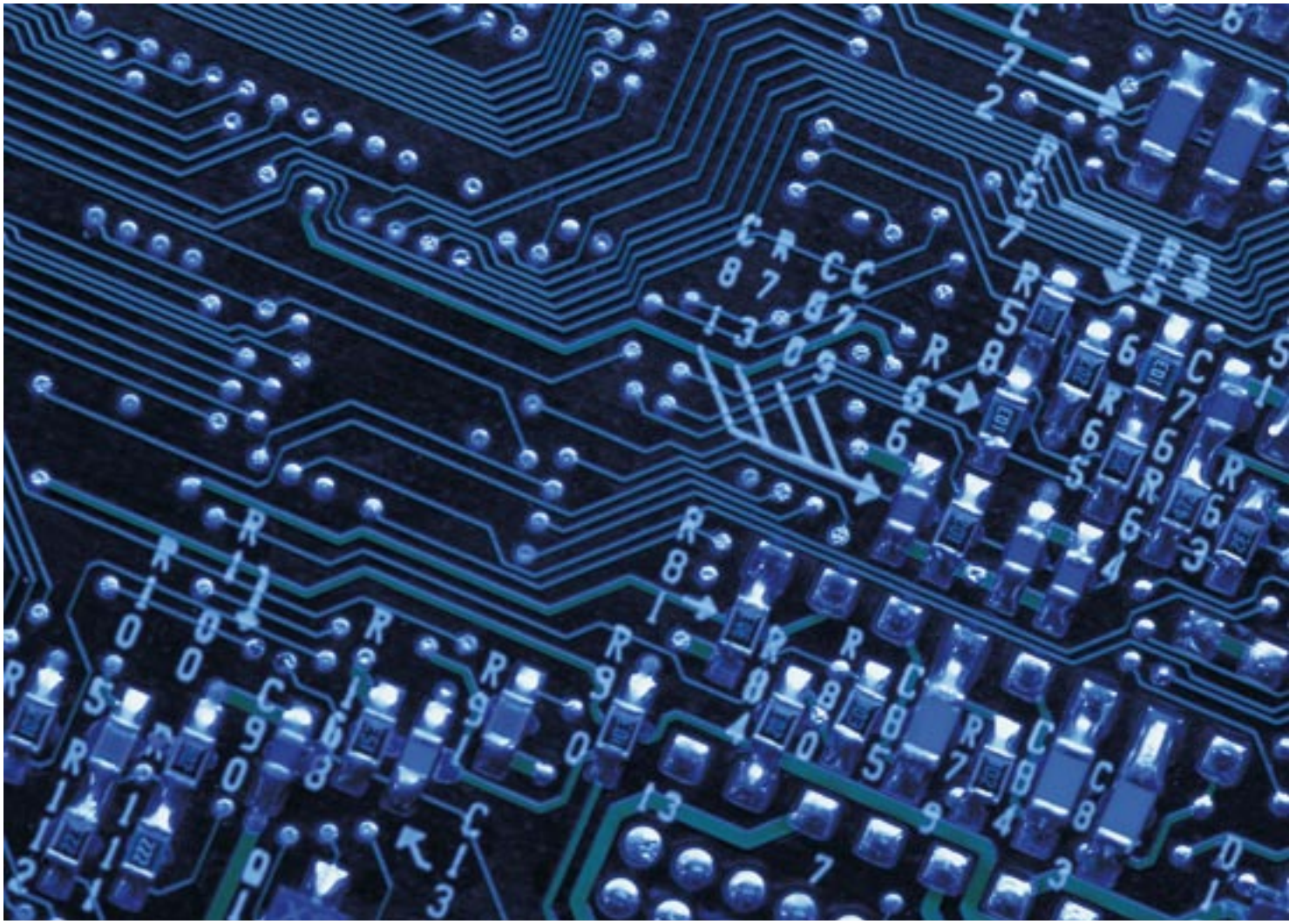
Significant contribution

Since 2001, MEDEA+ has made a significant contribution to establishing and maintaining European leadership in fields ranging from smartcard and image-sensing technologies to automotive electronics. European chipmakers have successfully developed three basic complementary metal oxide semiconductor (CMOS) process generations in line with or even ahead of the global International Technology Roadmap for Semiconductors (ITRS). And CMOS technology continues to dominate manufacture of integrated circuits as the mainstream technology for microprocessors, memory chips and logic circuits.

Including the projects resulting from last year's call, MEDEA+ is and has been supporting 90 projects involving almost 22,000 person-years of effort, with 450 partner organisations from large companies (31 %), SMEs (40 %), institutes and academia (29 %). It delivered important innovations in areas such as automotive safety and traffic control, broadband communications, a more secure society, energy saving and healthcare.

The Cluster helped three European semiconductor companies to rank amongst the world top ten in 2006 and enabled Europe's semiconductor industry to gain 10% of the worldwide market. At the same time, European companies have established a strong global market position as wafer-processing equipment producers, lithography tool and infrastructure manufacturers and substrate and material suppliers. All this in a sector that appeared to be dying on its feet before the first EUREKA microelectronics programme, JESSI, took off in 1989.

> Setting the research agenda



Increasing convergence

While JESSI, MEDEA and MEDEA+ were split into technology and applications sub-programmes, CATRENE recognises the increasing convergence of technology and applications. It is focusing on large identified application markets, from which derive required technologies.

Like MEDEA+, CATRENE will embrace all key actors in the value chain, including applications, technology, materials and equipment suppliers, as well as involving industrial companies of all sizes, universities and other research institutions, supported by the public authorities.

Moreover, CATRENE will increase interaction with other EUREKA Clusters such as EURIPIDES on packaging, ITEA2 on embedded software and CELTIC on telecommunications. And, close cooperation is foreseen with the European Nanoelectronics Initiative Advisory Council (ENIAC) Joint Technology Initiative, due to start also in 2008.

Lighting the way ahead

An important feature of CATRENE is the concept of lighthouse projects which address major socioeconomic needs such as transport, healthcare, security, energy and entertainment through focused R&D programmes. The role of electronics and information systems is set to increase markedly as European society is faced with structural problems such as an ageing population, exploding healthcare costs, transport bottlenecks, rising energy costs and the need to be competitive on a worldwide basis.

These social challenges offer major opportunities for European industry. CATRENE will help European companies to address these new markets and to become worldwide market leaders. The thematic lighthouse projects will serve as a focus for specific technology and applications development projects that address these challenges.

For more information on MEDEA+ and CATRENE visit http://www.medeaplus.org or email medeaplus@medeaplus.org.

> Project **showcase**

Σ!3686 HIPER HARVESTEC. Developing high-performance grain harvesting with increased-flow and low-loss technology

A faster and cost-efficient harvesting system

A new flailing or threshing system hopes to reduce the flow of excess straw which passes through combine harvesters. Project partners say the new prototype reduces power consumption while increasing harvesting efficiency of grain crops.

'Rising fuel prices and environmental concerns are beginning to have a major impact on the design of agricultural machinery,' explains HIPER HARVESTEC coordinator Wolfgang Oehler of Germany's ESM Entwicklungsleitung. 'That's why we've developed a new system that can save energy during the grain harvest.' The project involves partners from Germany and the UK.

Making a good process better

Under conventional methods, combine harvesters cut stems and then strip them of grain, at which point the stems have to be thrown back out. Moving the stems through the harvester in this way requires an additional and substantial input of power. Under an improved process developed by UK HIPER HARVESTEC partner Shelbourne Reynolds, the grain is simply stripped from the stem, leaving the stem standing in the ground.

'Eliminating the unnecessary movement of straw through the harvester saves energy,' says Oehler, 'but there is still a problem. What happens to the straw left standing in the field?' Currently, farmers tend to burn the remaining stems before recultivation, a process not compatible with today's environmental policies.

'And this is where our project fits in,' says Oehler. 'Under the HIPER HARVESTEC system, the straw is chopped down immediately after the grain stripping process and farmers can then recultivate fields without burning or other processes.' By cutting stems immediately after stripping, he affirms, the efficiency of the entire procedure is significantly increased.

Steady progress

Working together with the University of Applied Sciences in Dusseldorf and ESM Entwicklungsleitung, Shelbourne Reynolds started by identifying the main parameters for their new design. In August 2006, a first prototype was built. Prototype tests carried out in England showed good results and it was subsequently analysed on a test stand by project partners at the University of Applied Sciences.

Using a high-speed camera and torque and rotational speed sensors, they showed initial computer simulations to be very close to reality, and they are now able to calculate the performances of new geometries with confidence and to a high degree of accuracy.

'Based on our initial results and the simulation work done at the university, we were able to modify knife and housing designs to increase cutting efficiency,' says Oehler. 'These changes have led to further improvements in aerodynamic geometry, crop flow, and all-around efficiency. Furthermore, an improved coupler system means easier maintenance and we have also increased blade life.'

Oehler says HIPER HARVESTEC partners are now preparing two new prototypes, one fitted with a specialised rice stripper and another for further testing by the academic partner.

'The project results represent an important step in the field of large farm harvesting techniques in Europe and Asia, which comprise about 30 percent of the world market,' says Oehler. 'The equipment will be suitable for harvesting rice as well as different kinds of grain.' The new technology, he explains, will also form

the basis of further developments in the field of low-energy harvesting.

'We expect to be able to deliver the first units in 2009. In subsequent years, the spare parts business, especially for wearing elements, should provide stability to our core business. Due to the unique modular design, the dispatch and storage of the device will be much easier and more cost beneficial than today's options.'

Success in cooperation

'Being able to share the financial burden of this kind of research and development with our partners has been a key to our success,' says Oehler. 'We have also established a much wider knowledge base, a solid foundation for the future of our company. Meanwhile, the EUREKA programme has provided crucial support, while giving us the opportunity to work independently.'

'This has been a great opportunity for us, making it possible to bring together smaller companies and partners that would not necessarily have known about each other, and to gain experience and market connections.'

Up to now, ESM Entwicklungsleitung has been active mostly in niche markets, says Oehler, such as special crop cutting, underwater cutting and municipal cutting. 'With the HIPER HARVESTEC project, we are now reconnected to the larger conventional farming sector, and this will certainly help us to move forward in the business.'

Championing the potential of stem cells

Stem cell research offers enormous potential for treating spinal cord damage and diseases such as Parkinson's, multiple sclerosis and Type 1 diabetes. Driving scientific progress in this field is demanding, with the size of the scientific challenges equalled by intense ethical arguments. Some of the world's leading stem cell scientists have taken on the role of vocal global champions. Dr Stephen Minger, director of the Stem Cell Biology Laboratory at London's King's College, speaks to EUREKA News about the power of the scientific community in the UK and the need for harmonisation across Europe.

How valuable are stem cells going to be when they reach the clinic?
Stem cells are already there. In the UK, we have been using stem cells for many years for bone marrow transplantations and, more recently, to rebuild the corneas of damaged eyes. A new therapy that involves injecting bone marrow stem cells into damaged hearts is showing some clinical effectiveness. Researchers in the US are also in consultation with the US Food and Drug Administration about using stem cell populations to treat neurodegenerative diseases and spinal cord damage. But you have to remember that this is a new field and it needs time to mature. I think stem cells are going to revolutionise medicine not only in terms of helping people with long-term degenerative diseases but also as tools to develop new drugs and therapies.

What differentiates your research from other work around the world?
Many stem cell groups are focused on cell biology. For us, stem cells are a tool for therapy and we are focused almost exclusively on further developing our work with human embryonic stem cells to find those with therapeutic value. Parkinson's disease is our lead clinical target because we know how to deliver the cells, how many are required and we believe that the subsequent immuno-suppressant regime will only have to be maintained for three to four years, by which time the grafts will be stable. But, can we make the cells needed for long-term sustained clinical improvement? We aim to find an answer. Our other big project is to understand how stem cells that reside in tissues in vivo, like the brain, are maintained and activated following damage. When we understand why, for example, thousands of cells migrate into the region of damage following a stroke we will be closer to being able to manipulate brain stem cells to generate clinical benefit.

How supportive is the UK environment of stem cell research?
I came to the UK from California in 1996. This is a fantastic environment. Turning human embryonic stem cells into defined populations of cells is incredibly difficult but we have made a lot of progress. From the cloning perspective, the big issue has always been the source of eggs. To overcome this hurdle we applied to the government for permission to genetically clone human stem cell lines using non-human eggs. Inadvertently, we opened a huge can of worms! The government wanted to legislate against such 'hybrid' eggs. We were supported by the academic, medical and patient communities, who all agreed that if you use a non-human egg you end up with a human embryo. The experience has shown how dynamic the regulatory process is here and how active and powerful the scientific community can be. It confirmed for me that I am in the right place to do human stem cell research.

How significant is the breakthrough that hit the headlines in 2007 enabling the reprogramming of adult cells to act like stem cells?
The work by teams in the US and Japan on 'reprogramming' ordinary adult cells to make them behave like embryonic stem cells is exciting, but at the moment it is very preliminary. The cells are extensively genetically engineered using viral vectors to deliver the genes that seem responsible for reprogramming the cells back to an embryonic state. While children with no immune system can be cured by bone marrow transplants involving genetically engineered stem cells which 'put back' the missing gene, we are now seeing some of these children developing leukaemia as a result. The challenge is to find out how to turn on these genes themselves and to generate cells with no risk of tumour formation. But I don't think this research negates what we are doing with embryonic stem cells – both need to proceed in parallel and inform one another.

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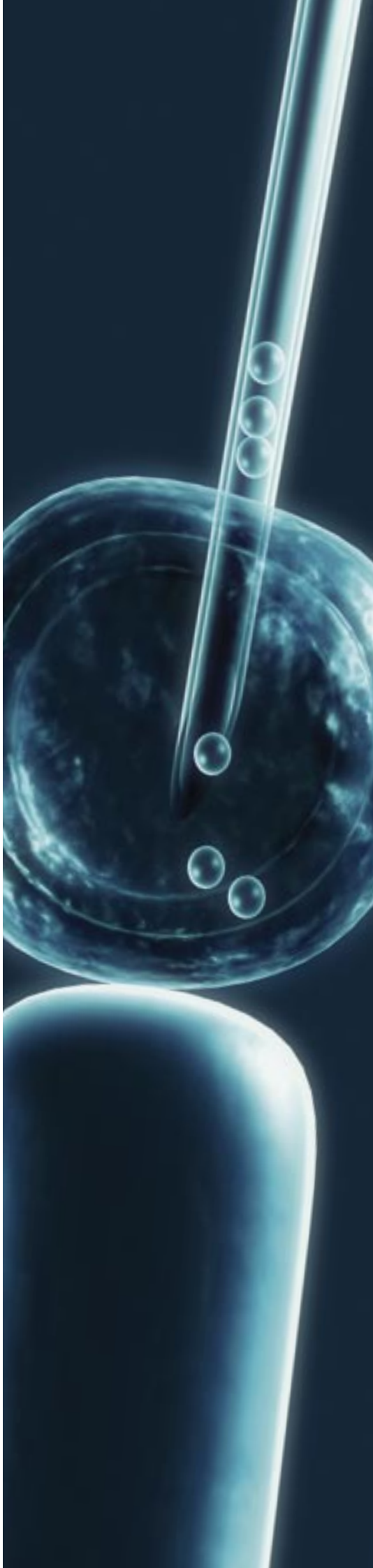
> I want to ask legislators in countries opposed to stem cell research what they are going to do when stem cell based therapies arrive and their citizens want them.
>
> Dr Stephen Minger, King's College, London



What does the global stem cell research landscape look like?

The lack of any overarching bioethical regulation in the US, together with a ban on working with cell lines created after 2001, means that there are not as many federally-funded stem cell researchers as in the UK. In the private sector, though, you can do anything you want. China, on the other hand, is pouring resources into this work. It has a regulatory framework akin to the UK's and faster clinical translation – it's a really dominant player. In some other countries there are unregulated and dangerous clinical stem-cell activities going on that I am vehemently opposed to, as well as cell and tissue trafficking. Europe needs to be collectively strong and make sure this kind of thing doesn't happen here.

What should Europe be doing to secure scientific advantage in this field?

Attitudes and regulations vary from country to country. In liberal countries like Sweden and Finland stem cell research is well funded and has flourished. Spain has policies almost identical to the UK and countries like France are beginning to liberalise. Others remain vehemently opposed. When I was last in Italy, where I work with the very pro-science Radical Party and where stem cells can be imported but not generated (such an activity carries a six-year prison sentence), I made the front page of a newspaper under the headline 'Wanted'.

There is currently a compromise that sort of works – EU money can be used to work with pre-existing human embryonic stem cell lines in countries where this is legal, but there is going to have to be more harmonisation and dialogue across the EU.

There are also two funding issues for Europe to consider. This field is in its infancy: some therapies will come quickly – there could be a treatment for Parkinson's disease within the next five years for example – but many will take much longer. Significant, long-term support is needed. As we move towards clinical translation another issue appears: who will pay for trials? Traditionally this has fallen to the big pharmaceutical firms. Cell-based therapies represent an entirely new arena – and one in which IP may be so little and resources so limited that the private sector may not be willing to carry the cost.

Who is Stephen Minger?

Dr Stephen Minger moved his stem cell research programme from the US to Guy's Hospital in London in 1996. He was appointed lecturer in biomolecular sciences at King's College London in 1998. Over the last 15 years his research group has worked with a wide range of tissue-specific stem cell populations as well as mouse and human embryonic stem (ES) cells. His team was one of the first to be awarded a licence by the UK Human Fertilisation and Embryology Authority for the derivation of human ES cells and subsequently generated the first human ES cell line in the UK. Dr Minger is also the stem cell expert on the UK Gene Therapy Advisory Committee at the Department of Health.