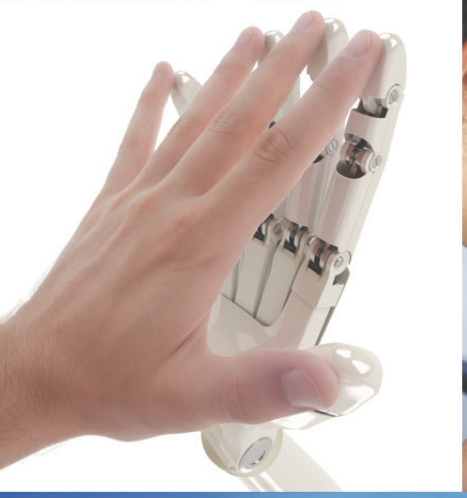
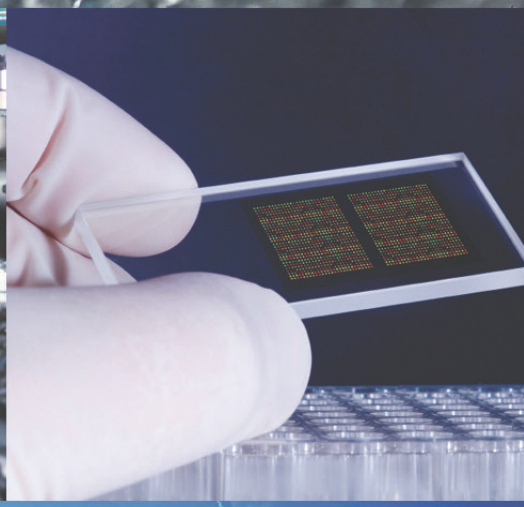
THE EUROPEAN FILES

Science and Innovation in Europe:





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EDITORIAL

At the beginning of the 21st century, in the face of the major challenges with which we are confronted, it is becoming increasingly clear that massive investment in science and innovation is a crucial requirement for Europe's future. Indeed, exhaustion of natural resources, population ageing, energy supply difficulties and climate change are amongst the many problems affecting Europe, which greatly contribute to the deterioration of our competitiveness. The will to avoid remaining passive in the face of these problems should make it possible to put the Horizon 2020 programme in place for the 2014-2020 period. The elaboration and implementation of this programme constitutes a major part of the Innovation Union, one of the 7 flagship initiatives of the Europe 2020 Strategy, following the observed failure of the Lisbon Strategy, set out in 2000, which aimed to make Europe into the most competitive economy in the world by 2010. Two years after the latter date, the facts are harsh: not only has our backwardness increased in relation to the United States, but the emerging powers, in particular China, Brazil and India, have caught up with us. With a required budget of 80 billion euros, Horizon 2020 is intended to make it possible to simplify the financing of research, by means of increased coordination between the various programmes and means of organisation that already exist. This programme is above all aimed at improving the effectiveness of research and of the application of its results in industry by means of the innovation process, an aspect which has been neglected too often in the past. It is based upon programmes and social challenges, instead of projects, and aims to establish better coordination and coherence with national and regional programmes, a fact that sets it apart from its predecessors.

It seems clear that cooperation between Europeans, itself based upon increased mutual trust, is the most decisive factor with regard to the effectiveness of investment in research and innovation: cooperation between the EU Member States; cooperation between the actors engaged in innovation, between research institutes, Universities and companies; and, finally, cooperation on a larger scale at the world level, since certain challenges transcend borders and need to be resolved by humanity as a whole. Cooperation at various levels is the essential precondition for concentrating means and talents and thus boosting theoretical and applied research, in order to stimulate Europe's competitiveness. Indeed, individual initiatives appear quite fruitless for resolving global challenges, such as the exhaustion of natural resources for example. Significant progress has also been made with regard to transatlantic cooperation by means of the Transatlantic Economic Council, in the fields of electro-mobility and smart grids in particular.

However, the key problem for this ambitious attempt at consolidating European policy on research and innovation is that of its financing. In the current period of crisis and corresponding budgetary restrictions, there is a strong risk of the means allocated proving insufficient in relation to the issues involved. Thus, only 4% of the EU budget is devoted to "the fight against climate change and the promotion of effective use of resources and raw materials". It is therefore clear that the stimulation of research and innovation cannot be left to governments alone, and that measures encouraging the private sector to invest are indispensable, in order for Europe to re-establish competitiveness and economic growth on a permanent basis.

Laurent Ulmann
Editor-in-chief, The European Files

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Science and innovation, an essential factor for competitiveness and growth in Europe

José Manuel BARROSO

President of the European Commission

Europe needs innovation more than ever before to support sustainable growth and create new jobs, to replace those lost in the crisis. To keep up with growing global competition, we must leave the comfort zone of business-as-usual. Building on Europe's assets – the skills and energy of its people, the innovative potential of its businesses, the huge scope for getting more out of the Single Market – the European Union and its Member States need to accelerate the necessary reforms to deliver on our common Europe 2020 agenda.

History shows that there is no sustainable path to growth and prosperity outside the research-innovation-education triangle. With an ageing population and strong competitive pressures from globalisation, Europe's future economic growth and jobs will have to come from innovation in products, services and business models.

This is a lesson to remember as the European Union economy is going through the most challenging time in its history and as we try to restore confidence and fiscal sustainability.

We need smart, growth-friendly, fiscal consolidation. Currently, there is too much fragmentation across Europe, too much duplicated work, not enough competition and too many barriers preventing knowledge and researchers from circulating freely.

Our Innovation Union flagship initiative, a key pillar of our growth and jobs strategy, is about building bridges and pooling resources between European and national research and innovation systems, between public and private sectors, between the world of science and the world of business, between Europe and our international partners. It is about doing more, better and faster by removing the bottlenecks for innovative ideas to be turned into products and services that create growth and jobs. It is also about promoting excellence by training, attracting and retaining the best and the brightest from Europe and from outside Europe.

President Barroso visits the Ispra Joint Research Centre

The 2011 Innovation Union Scoreboard shows that Member States that traditionally invested more in research and innovation weathered the economic turmoil better.

We are making good progress. In 2011, we presented regulatory proposals which will bring a step change for innovative business across Europe:

- to create a unified patent, cutting the costs of patenting in Europe by 80%;

- to modernise and accelerate standard-setting, which is so important to create the markets of the future;

- to create a single market for venture capital funds, so that funds can raise capital more easily across Europe and better invest in innovative European enterprises;

- to use the power of public spending by including in the revision of the EU procurement directives, concrete innovation-friendly measures.

In addition to these legislative measures, we have also launched initiatives to accelerate the transfer of research and innovation to market, for example through European Innovation Partnerships. We started in the area of Active and Healthy Ageing with the very concrete objective to enable people to live longer in good health.

Another good example is the European Institute of Innovation and Technology launched in 2008. I am happy to say that it has successfully reached its objective of bringing together higher education institutions, research organisations and businesses, in partnerships operating so far in three areas: sustainable energy, climate change and Information and Communications Technologies.

In February of this year, we also celebrated the fifth anniversary of the European Research Council, which has become a remarkable success story for Europe. Being focused on excellence in research, it has played a key role in stimulating competitiveness and growth, as well as societal developments, for example by tackling the biggest diseases of our times, such as cancer or Alzheimer.

Last but not least, the Joint Research Center, which I recently visited, has now become a multi-disciplinary European scientific reference centre with seven institutes located in five Member States, a unique bridge between European Union policy and European society as a whole.

My appointment of a Chief Scientific Adviser, Professor Anne Glover, is also a signal of the importance placed in having a sound scientific basis to all our policies across the board.

Finally, looking ahead, Horizon 2020, the €80 billion investment programme for research and innovation after 2014, proposed by the European Commission at the end of last year, together with the new cohesion policy, will provide a further push to strengthen our Innovation Union.

The crisis is a test of our willingness to act together. I believe we are on the right track but must maintain our efforts. Innovation is nothing less than our capacity to create the future we aspire to. Together we can make it happen.

Horizon 2020 and the challenges of globalisation

Máire GEOGHEGAN-QUINN

European Commissioner for Research, Innovation and Science

Research and innovation in the era of globalisation is about cooperation and competition. Closer international cooperation on research means better, quicker results, helping us to tackle serious common challenges such as climate change and food security. At the same time, the global marketplace is defined by competition and comparative advantage. Innovation gives our companies in Europe an edge, and that means growth and jobs. Horizon 2020 is the Commission's proposal to make EU research funding simpler, smarter and more innovative.

Our 2012 Innovation Union Scoreboard showed that growth in Europe's innovation performance is slowing down. We are still not closing the gap with global innovation leaders the United States, Japan and South Korea. Although we retain a clear lead over emerging economies, China above all is improving its innovation performance and is quickly catching up. So we need to invest more in innovation and we need to create better conditions for our innovators.

The Commission has proposed to increase EU-level investment in research and innovation in support of our pro-growth and competitiveness agenda. Horizon 2020, with a proposed €80 billion budget over seven years, will bring together all existing EU research and innovation funding. It will provide support in a seamless way from idea to market, with streamlined funding and less red tape.

Horizon 2020 embodies many of the specific commitments made under our Innovation Union flagship initiative. It focuses on societal challenges like climate change or health. It devotes significant funding to SMEs, financial instruments, supporting public procurement of innovation, facilitating collaboration, and supporting research on public sector and social innovation. The Commission will also seek to close the innovation divide in Europe by developing the synergies between Cohesion policy funding and Horizon 2020. We are very focused on making sure that excellence and innovation can flourish in all regions of Europe.

Horizon 2020 is structured around three distinct but mutually re-enforcing pillars.

The first pillar is aimed at boosting excellence in Europe's science base. A proposed investment of over €24 billion will enable the most talented scientists to carry out cutting edge research of the highest quality. This includes more than €13 billion for the very successful European Research Council, securing the best fundamental research that leads to the greatest innovations.

Commissionner Geoghegan-Quinn in a research laboratory

Commissioner Geoghegan-Quinn and President Barroso visit the Ispra Joint Research Centre

The second pillar on 'Industrial Leadership' aims to make Europe a more attractive location to invest in research and innovation, by funding actions where businesses set the agenda. A dedicated budget of nearly €18 billion over the seven years will include major investment in key technologies, greater access to capital for innovative companies and specific support for SMEs.

The third pillar on 'Societal Challenges' has a proposed budget of nearly €32 billion to help address major concerns shared by all Europeans, and indeed worldwide. These include climate change, making renewable energy more affordable, ensuring food safety and security, better healthcare and coping with the challenge of an ageing population.

These three pillars will help to make Europe more competitive internationally. However, cooperation with international partners also features strongly on the European Union's research and innovation agenda. It makes sense to bring the world's best researchers together, where possible, in order to tackle our common challenges such as climate change, health, energy and food security or our ageing population. In an ever-more inter-connected world, scientific breakthroughs or the innovative applications of new technologies rarely come about by working in isolation.

Horizon 2020, like the current framework programme, will be the most open publicly-funded research programme in the world. It will offer researchers and innovators from third countries many opportunities to work with their European counterparts, to make the discoveries and breakthroughs that will improve our economies and our day to day lives.

Europe is rightly focusing huge efforts on fiscal consolidation, but we must ensure that this is smart fiscal consolidation, with measures that will produce jobs, growth and competitiveness today and tomorrow. Cutting spending in areas such as education, research and innovation would be exactly the wrong thing to do. Horizon 2020 is the Commission's response at the European level, and should be seen as an economic policy measure as much as a research policy instrument. We need the support of policymakers and stakeholders across Europe for Horizon 2020, and for our other initiatives under Innovation Union. Then the best ideas can be used in a way that makes a real difference across our continent, and beyond.

Promoting a Competitive Environment for Science in Europe

Laurent WAUQUIEZ

French Minister for Higher Education and Research

Today, the struggle between nations no longer takes place by means of arms races, but through the race for knowledge. Our growth and our jobs are more than ever linked to our research capacity. The intensity of international competition makes major investment necessary in this regard.

European research is endowed with unique assets. With its 1.5 million researchers, the EU ranks second in the world in terms of numbers of research workers and produces more PhD students than the United States. Moreover, it constitutes the world leader in terms of the production of scientific publications subject to peer review.

In order to secure a position on the international stage which corresponds to this leadership, it is imperative to gain the necessary critical mass by gathering the Members States' research capacities together and devoting them to a threefold objective: establishing a knowledge-based society, meeting the great challenges of the early 21st century and consolidating the competitiveness of our economy.

Making Massive Investments in Higher Education and Research

The quality of higher education is an issue which takes priority, since it is the cornerstone on which the system of research is based. In France, the reform of 2007 concerning the autonomy of universities marked a turning point, and was accompanied by an increase of 25% in the financing of our higher education institutions between 2007 and 2012.

Our confidence in the scientific community is given concrete expression through an outlay of 22 billion euros in forward-looking investments. These investments finance projects which are set to make it possible to meet the major challenges of the 21st century: improving healthcare through the development of personalised medicine, innovation in favour of environmentally-friendly agriculture and mobility, providing against climate change etc.

This outlay involves the development of ground-breaking technologies (FET, Future and Emerging Technologies Programme) at the EU level and investment in research infrastructures at the world level.

Consolidating the Attractiveness of Scientific Careers

The European Union also needs to continue investing in the promotion of scientific careers. In 2008, France put forward a "European partnership for researchers" in order to implement the principles of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers. Tools like the European Research Council, which makes it possible to allocate grants on the sole criterion of excellence, need to be consolidated in the next Framework Programme.

Bringing the research policies of the European Union and its Member States closer together

The Member States do not stand a chance in the international struggle for knowledge if each of them works in isolation. The EU therefore needs to support Joint Programming Initiatives (JPI) launched by the Member States and aimed at adopting common strategic research agendas, which correspond to the current major challenges: neurodegenerative diseases, food safety, climate change, antimicrobial resistance, urban issues and the environment.

Developing an Ambitious European Industrial Strategy

Consolidating our capacity to innovate requires support from the industrial and future emerging technology sectors, such as the space and aeronautics, nanotechnology and biotechnology sectors. An "open programme" ("programme blanc") could finance projects promoting the use of these technologies. Support for SMEs also needs to be planned, using an approach that is directly in line with the Eurostars Programme.

Moreover, it is essential to simplify access to the framework programme in order to make it more attractive for researchers and European companies. It is also necessary to create favourable conditions for carrying out high-risk projects, in the tradition of the European patent fund, the European venture capital fund and the unitary patent projects.

In spite of a particularly tight budgetary situation, we are convinced of the necessity of continuing these investments, since this is a sector which holds the keys to our future, our industries and our jobs. More fundamentally, it represents a response to the crisis that Europe is currently going through in terms of ambition and the lack of projects capable of rallying support. Not only are research and innovation our best arms against the crisis but, by taking this course we will be showing the face of the Europe of the 21st century, actively engaged and united behind a real collective ambition. We will thus be upholding a European heritage which gives us faith in science and progress, one of the decisive traits of our common identity.

The vital synergy between science and industry

Annette SCHAVAN

German Federal Minister of Education and Research

It is essential that we enhance cooperation between science and industry in Europe if we are to meet the enormous challenges of the future – climate change, energy supply, demographic change, and globalization. This is the only way to ensure that knowledge and ideas can be developed into new products and innovations quickly, and to create a sustainable world in which Europe can assert itself economically. The transformation of Germany's energy system is a prime example: it has laid the groundwork for Germany to become a global innovation leader in the field of energy supply technologies.

The EU's Innovation Union Scoreboard, which compares innovation performance in Europe and the rest of the world, also illustrates the vital role of science and research for competitiveness and prosperity. According to the data for 2011, almost all EU Member States improved their innovation performance, reflecting the new dynamism created by the European Research Area. Germany is among the leaders in Europe, on par with Finland and surpassed only by Sweden and Denmark. One of the reasons for this is Germany's High-Tech Strategy, launched by the Federal Government in 2006. The strategy rallies all the ministries behind a common purpose. How do we want to live in the future? How can we maintain our prosperity for future generations? The High-Tech Strategy has enabled German companies to increase their R&D spending to record levels in recent years. Significant government research funding acted as an incentive for them to enhance their commitment. As a result, public and private R&D investment in Germany reached the record level of 2.82 per cent of GDP in 2010. The private sector invested €47 billion in research and development, while the Federal Government provided €13 billion, mainly to fund innovation alliances with companies as well as clusters in which businesses, research institutions, and local authorities work together. The research topics range from battery research for electric mobility to energy-efficient lighting to efforts to make the Internet faster.

However, there is only so much that one single country can do. Our aim is to create a European Innovation Union. We need to work together to prepare Europe for the future. We must focus our research efforts more strongly on the great challenges facing Europe as a whole. The most important topics for European research and innovation policy include sustainable energy and raw material supply, mobility in times of dwindling resources, managing demographic change, preventing and treating wide-spread diseases, striking a balance between security and freedom, and securing the supply of safe, high-quality food. We need solutions for a united Europe in the 21st century. The accomplishments of the European Union – peace, rule of law, prosperity – are a matter of course for most young people. However, we should not take these achievements for granted. The European Union and its unique integration model are facing new tests. Understanding European identity in times of global change is a challenge which also requires more attention from the humanities, economics, and social sciences.

Our research activities must be structured in such a way that the results can quickly be applied in practice. This approach requires more strategic, targeted support for key technologies, including nanotechnology and biotechnology. We want to enhance the European Research Area to make Europe even more attractive to talented people from across the world. Germany will make every effort to promote the Innovation Union as a central project of the "Europe 2020" growth strategy. The more we jointly invest in research and innovation, the sooner we will be able to inject new strength into the European Union and emerge from the current crisis stronger than before.

Stimulating Europe's competitiveness by means of research

Morten ØSTERGAARD

Danish Minister for Science, Innovation and Higher Education

The future prosperity of Europe depends on competitive industries that are able to create and maintain jobs. Investing in research, education and new technologies is the best way to get the economy turned around and secure a sustainable pro-growth environment in Europe.

The Europe 2020 Strategy sets a clear benchmark for investments in research and innovation: 3 percent of GDP must be channelled to Research and Development. Reaching this target will potentially create millions of jobs and increase the productivity of European businesses.

Investing in science, education and innovation will help bring Europe out of the current crisis. And we are already on the right path. Creating a climate that encourages innovation while keeping a strong focus on excellent frontier research is the right mixture. We have to forge better links be-tween public and private partners.

Based on the principles of fiscal discipline, governments in Europe must be oriented towards growth while leaving flexibility and creativity to the market place.

In Denmark, we have a long tradition for public-private partnerships, including the strong links between the business community, the labour market and the state interest groups, which are associated with the Scandinavian welfare model.

While it is unlikely to be implemented in full, parts of this model can be adopted and adapted to meet the present economic challenges of the European Union. The right mix of policies is obtained only by a careful division of labour.

In my opinion, the public sector should establish productive and inspiring framework conditions for research and education – along with smart taxation rules, social security and effective use of public procurement and demand-driven innovation.

We need to utilize the public sector as a strong motor of innovation. Education, research, welfare, climate action, legislation and rules can make a substantial difference in tackling the grand challenges of today's society. Thereby turning them into solutions and visions that drive growth in the private sector.

Cutting spending on research and innovation will not help the economy recover. On the contrary, stimulating and creating the best European knowledge environments is one of the most important priorities that will enable the development of a sustainable, smart and inclusive knowledge-based society.

In Denmark, we have taken action to enhance the framework for global science collaborations and commercialisation of research. Since only a fraction of the world's total knowledge is produced within Danish borders, there is a strong urgency for Denmark to orient its knowledge institutions towards internationally leading research and innovation communities.

The Danish Ministry of Science, Innovation and Higher Education has initiated a number of promising bilateral agreements with its global partners in the United States, Brazil, China, India, Japan and Israel. In addition, we have established a number of well-functioning innovation centres in Silicon Valley, Shanghai and Munich, and we have recently established a new centre in Hong Kong and a hub in Sao Paulo. Agreements and centres such as these will facilitate and spur contacts between researchers and high technology companies on a cross-border level.

Denmark is currently the holder of the Presidency of the Council of the European Union. This is a welcome opportunity to prepare for Europe's recovery and future.

A major step forward is the European Commission's proposal for the next framework programme for research and innovation, Horizon 2020. Horizon 2020 will be one of the largest collaborative research programmes in the world. It will be the most important funding instrument to strengthen cross-border cooperation on research and innovation in Europe and towards associated countries.

The emphasis on cross-disciplinary and cross-border collaboration is clearly exemplified by the focus on societal challenges. Horizon 2020 is proposed to focus on six grand challenges: Health, demographic change and wellbeing; Food security, sustainable agriculture, marine research and the bio-economy; Secure, clean and efficient energy; Smart, green and integrated transport; Climate action, resource efficiency and raw materials and Inclusive, innovative and secure societies.

The response to these challenges will demand solutions from all academic disciplines, including the social sciences and humanities.

Breakthrough innovation will come only if we manage to get all disciplines to contribute to the generation of knowledge, solutions and answers. We need to think in detail on climate change, energy systems and smarter transport. But we also need to address the importance of behavioural adaptation and our ability to make sound decisions in a global world.

I am particularly pleased to see the strengthening of the European Research Council (ERC). In my view, the ERC is a distinguished milestone in the building of a truly European incubator of scientific excellence and knowledge.

The initial steps towards establishing the ERC were taken during the previous Danish Presidency of the Council of the European Union in 2002. However, the success and credibility that the ERC enjoys today belongs entirely to the European research community and the political leaders that have supported the creation of the European Research Area.

Europe has the potential to become a key driver of innovation and growth if we promote the successful conditions for the society and business communities to capitalise on the knowledge base.

Holding the EU Presidency we will do our utmost to progress the negotiations on Horizon 2020 as far as possible. We have set the ambitious goal of reaching an agreement on the overall structure of Horizon 2020 before the end of our Presidency.

STOA (Science and Technology Options Assessment): Scientific advice for evidence-based European policy-making

Paul RÜBIG
MEP, Group of the European People's Party (Christian Democrats), European Parliament
Member ITRE, Committee on Industry, Research and Energy
1st Vice-Chairman of STOA

Developments in science and technology have potential implications for many policy areas including environment, transport, agriculture and communication. They have a strong impact on actions to tackle grand societal challenges, such as the ageing society, climate change, sustainable economy and the safety of the new social media environment.

Science and policy making

Policy-makers require scientific evidence and advice to underpin their various decisions. Depending on the nature of the problem or area, the way in which scientific advice is organised can have different characteristics:

- urgent or longer-term,
- science-based or society-based.

For instance, issues such as the SARS[1] outbreak in 2003 and the Fukushima disaster in 2011, required urgent action for which high-level expertise was indispensable. In many areas, policy-makers might feel reassured by receiving advice on options, through which scientific and technological advancements can better serve to underpin their policy-making, without being influenced by the potentially one-sided recommendations of individual scientists or scientific advisers.

To get the full picture, it is important to understand that the relationship between science and policy-makers is two-fold:

- Policy regarding science and technology:

Politicians might consider preparing regulations on how to deal with emerging technologies. For instance, legislation on how far one can go with nanosciences.

- Science and technology for policy:

Policy-makers seek evidence-based advice on options for policy decisions to ensure new scientific and technological developments have a positive impact on society. Examples include evidence-based science and technology options, which might help to move policy measures towards eco-friendly transportation, a more sustainable economy and society, an enhanced democracy via new social media or better health and well-being.

STOA studies assessing options

The role of the Science and Technology Options Assessment body of the European Parliament lies exactly in the latter area, namely 'Science and Technology for Policy'. STOA's mission is to provide - in a neutral and independent way - studies assessing the widest possible range of options to underpin policy decisions. These options should ensure that MEPs are provided with state-of-the-art knowledge to reflect upon when carrying out their policy tasks, whilst at the same time considering other factors, such as their individual political and ethical values.

Based upon the needs expressed by the different parliamentary committees, STOA provides the parliamentary bodies with independent, high-quality and impartial scientific information and studies. This helps them to assess the impact of the introduction or promotion of new technologies, and identify from a technological point of view the best possible options for action.

For example, a recent study tackled how the Internet can contribute to good practices in e-participation in Europe and how public

organisations can profit from opening up their processes to a wider audience. Another study commissioned by STOA investigated the policy implications regarding bio-engineering in the 21st Century. It focussed on the engineering of the human body and brain, and covered the important social and ethical issues surrounding bio-engineering development.

1. Severe Acute Respiratory Syndrome

Securing independency of the scientific advices

Of crucial importance is the independence of the science and technology options. One of the ways to ensure this independence is to affirm that the STOA studies are performed by an external, international scientific network. The independent character of the advice is carefully supervised by STOA Panel members, assisted by the administrators (all qualified scientists) of the STOA Secretariat. In addition, it must also be noted that the scientific reports offered to the committees are accompanied by a concise layman's summary that explains the background and possible impact of the options assessed.

Discussion forums for dialogue between scientists and policy makers

In addition to these studies, STOA also organises discussion forums, where politicians and representatives of the scientific community discuss and compare scientific and technological developments that might be of political relevance for civil society.

STOA in practice

The STOA Panel consists of 15 Members of the European Parliament, namely the Vice-President of the Parliament responsible for STOA, four members of the Committee on Industry, Research and Energy and two members from each of the Committees on Environment, Public Health and Food Safety; Internal Market and Consumer Protection; Employment and Social Affairs; Transport and Tourism; and Agriculture and Rural Development.

Policy-makers and STOA advice

Policy-makers finally make decisions based upon the information about the background and implications of the offered range of options, but also on other - political, ethical - factors, whether to favour one or more options in their policy work.

Various topics are addressed, such as energy, transportation, environment, information and communication technologies, nano-sciences and technologies, life sciences, human well-being, public health, agriculture, food science and biotechnology, as well as science, technology and innovation policy.

As such, STOA ensures that European policy-making is underpinned by sound scientific evidence.

The importance of a framework for action in European research in order to meet the challenges of the future

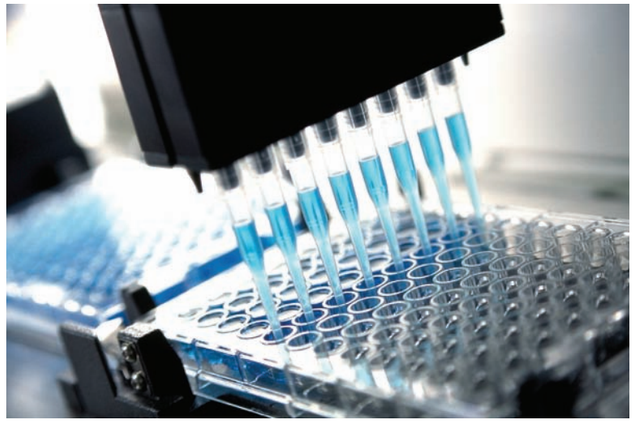
Vittorio PRODI

MEP, Group of the Progressive Alliance of Socialists and Democrats, European Parliament,
Member ITRE, Committee on Industry, Research and Energy

The 21st century has, through the driving forces of 'globalisation' and 'scarcity' bound our societies to a common fate. The path of 'business as usual' promotes a rapidly increasing demand for natural resources which are conversely arriving at the limits of their sustainable supply. This is an intensifying zero-sum competition, heightened by the pressures of climate change, where both hot and cold conflicts are very likely outcomes. 'Peace, progress and prosperity' are no longer a given for Europe as our social and economic models have become obsolete. By recognising that the departmentalised governance structures of the past are unable to deal with the dynamic nature of these challenges, new solutions must be sort for a sustainable and healthy European future.

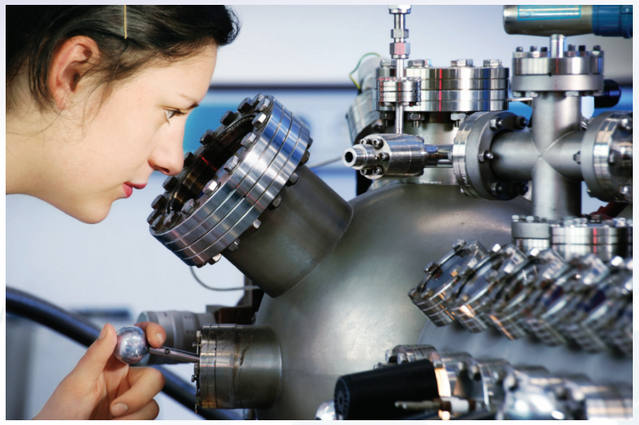
While the enormity of the social, economic and environmental challenges which face us as policy makers can be daunting, designing effective legislation which takes into account the various hurdles and opinions can be even more so. With the pressing issues of today and the ambiguity associated with those of tomorrow, we need a legislative tool which is able to quickly adapt to changing circumstances. With Horizon 2020 we have taken the first step to overcome potential stagnation by proposing a dynamic system focused on placing 'innovation' at the heart of European excellence. By mainstreaming societal concerns across all areas of scientific policy, government led innovation will be the driver of a new sustainable economy which will correct market failures that would otherwise be catastrophic.

The legislation has three explicit priorities: Generating excellence in science in order to strengthen the Union's innovative advantage, fostering industrial leadership to support businesses (including a special focus upon small and medium sized enterprises), and innovation in tackling societal challenges. This is a plan to target government funding across the whole innovation cycle, from research to market while satisfying the research needs of a broad spectrum of Union policies. Given the added value the European Union brings to such a project, the widest possible dissemination and use of the knowledge generated by Horizon 2020 will have far reaching benefits far beyond our borders.



The Framework Programme adopts a holistic approach, connecting elements of society previously neglected by scientific research programme. By increasing its simplification, a more organic and dynamic research driven structure is established. It is a sound public investment in basic, knowledge-based and/or long term research which will stimulate downstream incentives for the private sector, and benefits for the wider social environment.

Moreover by increasing the scope of participation a wider variety of actors are involved. This brings different skills to the table and consequently encourages greater innovation throughout the network. Yet we must insure that the resulting governance and funding mechanisms are sound enough to ensure that the hypothesised bridging between the scientific, corporate and wider societal environments will occur, but do so in a way that will not sacrifice scientific excellence.



What will take place is an important balancing act between rigidity and dynamism. On paper, increasing the importance of the European Research Council as the body which provides oversight should mean that the programmes involvement in the wider community will be done in a way which pursues scientific quality and excellence. In practise however, this is a different story as on a daily basis much more potent factors which may shape decision making processes can arise quickly, and without warning. Consensus building, transparency and structural dynamism in the governance structures cannot be overemphasised in this regard if the overarching objectives are to be achieved and stagnation avoided. Striking the right balance between various stakeholders will be fundamental.

One final element which needs to be touched on (as is often the case in legislative formulation) is allocation of funding. The mainstreaming and direct allocation of funding under political titles such as 'inclusive, innovative and secure societies' or 'food security, sustainable agriculture, marine and maritime research...' demonstrates that the Commission has reacted to the criticisms of its' previous framework programmes. Yet if the goal here is to ensure excellence and industrial competitiveness in a 'green economy', the allocation of 4% of the budget towards 'Climate action, resource efficiency and raw materials' raises some concerns about priorities. Overcoming scarcity should be considered of much greater importance that these numbers suggest. The stability of our global community, Europe's prosperity and progress in the face of increasing structural challenges to our global competitiveness, is reliant upon important technological breakthroughs here.

But this should be considered as a case in point. Funding allocation under the 'societal challenge' heading needs to be balanced. Such intervention, especially when it involves end-products coming to market, must recognise the interconnected dynamics which bring challenges to a head. In short, a breakthrough in one area will not necessarily resolve an element of an issue in its entirety. Uniform funding will go a long way in ensuring that underlying interconnected causes are resolved equally and in an incremental way. This balance will be important in developing a holistic and sustainable European industrial base, which promotes global leadership in technology for a better society.

Striking that right balance is always a difficult task and Horizon 2020 is no exception. Ensuring uniformity in funding, and equilibrium between complexity and simplicity will go a long way to ensuring that true 'innovation' is at the heart of resulting societal behaviour. This is a policy which if, conceived and adequately implemented could be the engine room behind the European economy, driving us forward to a brighter future.

A structured approach to maximising the potential of emerging technologies across the EU

Sir John BEDDINGTON

Professor and Chief scientific Adviser to the UK Government Office for Science

Across Europe, politicians stress the imperative for a "Hi-tech" future; exploiting scientific advances to respond to hard-edged growth, employment and economic agendas. Science, at its best, has always driven industrial advances.

The potential for a technology to transform society for the better and its actual impact can, however, be far apart. There is often huge disparity, even orders of magnitude, between the costs of demonstration and scale-up compared to those of initial research. We also see issues around complexity and public fears; people respond to uncertainties around technology in unpredictable ways. As we will see, new technologies flowing from scientific discovery in themselves lead to more uncertainties and more questions for science to answer, and the self-perpetuating cycle goes on. Through the prism of three emerging technologies at very different levels of maturity, we can explore some of these issues.

Firstly, synthetic biology, which was shortlisted as a top three emerging technology set to create a new £billion industry in the next decade[1]. It applies well-honed engineering principles to re-design and create biological components for products as diverse as pharmaceuticals and biofuels. To examine this raw potential for growth, an industry led Working Group in the UK is developing a Roadmap[2] which, by looking big picture and long term in the context of global competitiveness, aims to help place the UK and Europe at the forefront in exploiting this technology.

In a related field, the developing pest resistant and drought tolerant traits of GM crop technologies provide potential tools for addressing unprecedented pressures on the world food system. However, poor communication of the potential benefits has led to weak take-up in Europe. Only one GM crop has been authorised for cultivation for food use in the past 13 years, despite positive European Food Safety Authority scientific risk assessments. It emphasises the need, with any new technology, for effective communication of the benefits, as well as risks, and an ongoing dialogue with a well informed public.

The second of the technologies I wish to highlight, nanotechnology, involves the manipulation of material at the very small scale or nano scale. Materials at this scale frequently exhibit different properties from their bulk counterparts. For example, gold, commonly considered to be unreactive, becomes magnetic and semiconducting and changes colour at the nanoscale. According to some studies[3], the global market in products underpinned by nanotechnology is forecast to grow from $254bn in 2009 to $2.5tn by 2015.

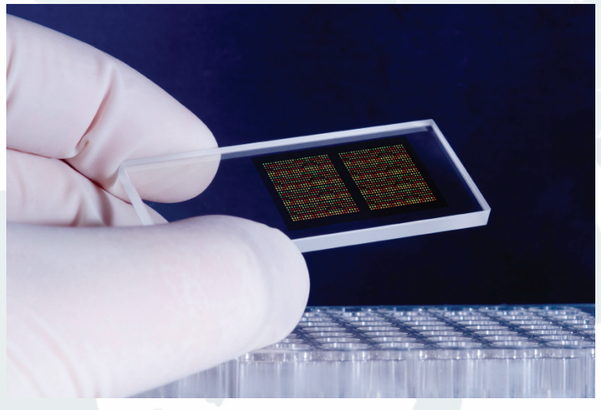
Because of their mysterious qualities, questions are often raised about the ways in which nanomaterials interact with humans, animals and the environment, their safety and the level of caution that should be exercised when they are placed on the market within products. Objects of fear for some, having been the subject of fictional "end of the world scenarios" involving "Grey Goo" in novels by Drexler and Crichton, nanotechnologies are in fact already safely employed in practically every industry, from food to healthcare to manufacturing.

Yet nanotechnology is not really a discrete technology at all. It covers a vast range of disparate technologies whose only common factor is that they concern the very small. Accordingly it is not regulated under a single legislative framework, but under many sector or product-specific sets of regulations, both at a European level and nationally within member states. Several countries are considering either mandatory or voluntary reporting schemes for nanotechnology products. .It is thought this may help underpin public engagement and risk assessment and regulatory purposes. To avoid regulation stifling the proper deployment of the technology, we need decisions that are transparent and consider competing risks, including the potential costs of not exploiting exciting new avenues of research. Most critically, it should be scientific evidence which informs such decisions.

Finally, the development of new "advanced materials" shows the integral link between core science and engineering developments and economic growth in sectors as diverse as aerospace and energy generation. A simple example lies in the field of advanced composites, such as carbon fibre. The extreme high strength to weight ratio of carbon fibre composites allows them to replace metals in many structural applications, most notably transport, where weight saving directly reduces fuel consumption.

Even here, however, a material's novelty can give rise to new risks. Characteristics such as long-term fatigue resistance can only be verified with long-term trials. One solution may lie in so-called "smart materials". These advanced composites detect and report damage with embedded internal sensors and transmitters, or visibly display damage on the surface of the material. Some can even repair themselves using special resins that temporarily liquefy on contact with air.

The potential for some of the technologies highlighted is remarkable. We need to continue to support the cycle; science leading to technology, and greater science to greater technology, By taking decisions based on the best evidence, we can create an environment that is not only safe for all, but also nurtures our greatest minds. Our progress will be limited only by our skills and imagination.



1. Technology Strategy Board, UK, "Innovation and Research Strategy for Growth" from the UK Department of Business, Innovation and Skills, available at http://www.bis.gov.uk/assets/biscore/innovation/docs/i/11-1387-innovation-and-research-strategy-for-growth.pdf

2. "Strategy for UK Life Sciences", available at http://www.bis.gov.uk/assets/biscore/innovation/docs/s/11-1429-strategy-for-uk-life-sciences

3. Summarised in "High Level Expert Group on Key Enabling Technologies", European Commission (June 2011)

The need for greater investment in science and innovation in Europe

Amalia SARTORI

MEP, Group of the European People's Party (Christian Democrats), European Parliament
Chair of the ITRE Committee, Industry, Research and Energy

Together with other important policies we deal with in the committee I have the honour to chair, research and innovation are one of the main drivers of European economy. Excellence is our scope; we must identify which is the right path to reach it.

In the framework of Europe 2020, the strategy aimed to improve competitiveness, growth and sustainability, through specific indicative goals to be reached by 2020 via flagship initiatives that encompass different concrete sector measures, one of the key pillars is research and innovation. The creation of new jobs, the re-launch of European economy and the tackling of the major challenges we have to face in our future are triggered by a strong focus on EU research abilities and capacities.

Europe is experiencing a period of uncertainty due to different constraints it has to face regarding markets volatility, austerity measures and the risk of economic recession. Beyond necessary interventions needed to re-balance the weak economic performance of different countries, we certainly need measures aiming to stimulate growth and employment. The Innovation Scoreboard 2011 showed it clearly: also in innovation, we're risking to be overtaken also by the emerging countries. Therefore we need coherence, ambition and concreteness in the measures we are going to put in place. But as an overarching principle, we need coordination and, where possible, cooperation. European, national and local level must have the same vision and everybody has to work to reach the same targets. Only through the implementation of a well-coordinated research and innovation system we can create the conditions for all the stakeholders to excel and to take the lead in numerous sectors.

Basic research is extremely important, and we have to continue to support the efforts that could lead our brains to be stimulated in doing their activities in our territory. But at the same time, I esteem crucial to pay due attention to the results of those activities. We need concrete ways to prove their effectiveness and tradability, measuring the market uptake of a new product, service or approach and therefore giving innovation the necessary importance, starting from Horizon 2020, the new financial instrument with an envelope of nearly 80 billions € to co-finance activities in these fields.

Within Horizon 2020 we are working to establish a principle: we have to create a stronger and better link between research and innovation dedicated funds and the structural and cohesion funds. This link would allow an easier coordination between priorities and activities among the different levels and by consequence a better balanced attention to the activities we have to focus on to win the global challenges we have in front of us and where Europe has to strengthen its role as leading actor.

If we want to reach our goals, we have to give research and innovation policy the resources needed to improve its effectiveness. Beyond the financial ones, maybe the most important resource we have to grant is people. We have to make sure we don't lose our most talented scientists! In a study ITRE committee requested in the past months one of the most shocking results is that we don't have any comprehensive statistics on top scientists who have left or come to Europe for professional reasons. About our most valuable resource we seem to know very little, and we must change that very quickly! I'm sure that the completion of the European Research Area will be helpful also in this regard.

We have a lot of files on track that we have to discuss and possibly approve in due time. And the new multiannual financial framework will set the limits and create the possibilities for the renewed research policy and programmes. The present economic conjuncture and the existence of 58 specific programmes dedicated to different sectors will certainly make the whole process not easy, and the decisions upon one single programme will certainly affect the configuration of the others. One of the needs the Parliament raised immediately after the Horizon 2020 proposal is an overall budget increase from 80 to at least 100 billions €. Some say impossible, some others very difficult, for many stakeholders and also many MEPs is crucial. The challenge is hard, but it's only one among many others we have to win!

We need a society embracing technological progress!

Anne GLOVER

Chief Scientific Adviser to the President of the European Commission

New technologies offer fantastic avenues for progress: living longer, happier and healthier, securing safe and sustainable energy supplies, organising transport more efficiently, protecting the environment, to mention just a few. Science and technology help us to deal with today's grand challenges.

Europe can be proud of its capacities in research and technology. Europe has been at the forefront of the industrial revolution, it pioneered many scientific and technological developments throughout the 20th century and, still, despite increasing competition from emerging economies, we generate an impressive impact on technological progress: from seemingly «small» inventions like the mp3 format that revolutionised the music market to gigantic marvels of technology like the Airbus A380. We should not be modest; we should celebrate our success in Europe!

But in fact, there is a threat to our competitiveness and it does not come from the US or China. It comes from our own society: do we really embrace technological progress as we should?

Public debate about new technologies such as biotechnology or, more recently, nanotechnology is dominated by the risks associated – or perceived to be associated – with these technologies. Yes, we should discuss risks, but why don't we discuss first the opportunities? Everybody wants to have the newest smartphone and WiFi at home, but when it comes to installing a GSM antenna in the neighbourhood people rather believe in rumours than in scientific facts [in fact, your wireless phone at home emits higher – but equally safe – radiation levels]. Why is it that people think that genetically modified food is more dangerous than conventionally grown food, despite all evidence demonstrating this view to be unfounded?

While acknowledging that there are cultural differences within Europe, it seems that Europeans have a rather prudent attitude vis-à-vis new developments. We like to test the temperature of the water first before jumping into it. The question is whether in a globalised economy with capital being transferred in a matter of milliseconds we can still afford this attitude. For sure risk assessments are needed, but when the evidence is there we cannot wait until the last citizen has been convinced that something is a good idea.

So what can we do to make science heard and have a rational, evidence-based public debate about new technologies?

First, we need scientists who engage with the public to raise their voice when evidence is ignored or distorted and they should do this using a language everybody can understand.

Second, we need policy-makers and politicians who are open to considering scientific evidence. Of course, they may choose to ignore the evidence because of other considerations – socioeconomic, ethical, electoral – but at least when they do so they should say it and why.

Third, we need to train citizens to be open to technological progress and the underpinning scientific evidence. This is done through education, starting already in preschool, but essentially being a process of life-long learning. Being open does not necessarily mean to agree to each argument – science also needs to be challenged – but to be ready to listen.

Fourth, we need to invest more in knowledge production. Europe isn't as rich as other continents when it comes to raw materials. Our primary natural resource is – and always has been – our brain. Hence, investing in brains is investing in our future.

Fifth, we must get from a culture of knowledge transfer to a culture of knowledge exchange, involving science, industry and society. Modern IT tools help to break the barriers.

As recently appointed Chief Scientific Adviser to the President of the European Commission I want to foster this knowledge exchange. In so doing, I will not only challenge policy-makers. I will challenge every single European citizen to participate in an evidence-based dialogue on how new technologies are able to shape our future.

The importance of increased USA-EU transatlantic cooperation

William KENNARD

United States Ambassador to the European Union

Now, more than ever, the European Union and the United States need to show strong leadership and cooperate to address global challenges to ensure that our partnership brings greater prosperity and security to our 800 million citizens. The United States and European Union are the world's two largest economies and its leading innovators. Together, we account for almost 50% of global GDP and more than 60% of global research funding. We are central to the global economy, and are each other's most important markets for our products, services and investments. Transatlantic trade flows exceed $3.5 billion per day. Our Foreign Direct Investment (FDI)—representing over 50 percent of global flows—has created millions of jobs on both sides of the Atlantic, and cemented our research and development relationship. U.S. FDI in the EU—$1.95 trillion as of 2010—was more than twice that in any other region in the world, while EU's FDI of almost $1.5 trillion into the United States is approximately four times the amount from any other region.

The importance of the transatlantic relationship - and our shared goals and interests - requires us to face global challenges together. One of these challenges is protecting the environment while guaranteeing future generations a sustainable energy supply and a clean and reliable transportation system. Science and innovation have always and will continue to play key roles in our success in meeting this challenge and opportunity. Electromobility and smart grids are excellent examples of where we are cooperating to promote a clean and sustainable future while stimulating economic and job growth by harnessing the potential of our best innovators. Electromobility holds great promise for the transatlantic economy and our industry—offering a real opportunity to show citizens on both sides of the Atlantic that we remain global leaders when it comes to cutting-edge technology. Electromobility also has the advantage of being relevant to the average consumer, who, when faced with rising gas prices and the increasing availability of plug-in hybrid and fully electric vehicles, can realize both the environmental and economic benefits of electric mobility directly.

In the United States, President Barack Obama has set the ambitious goal of putting one million electric vehicles on American roads by 2015—a goal that is being backed up not just by U.S. domestic policy, but also in our foreign policy. At the most recent meeting of the Transatlantic Economic Council (TEC), the United States and EU highlighted our cooperation on e-vehicles as a model for future transatlantic collaborative work. The Letter of Intent signed on November 29 by the EU Joint Research Center (JRC) and the United States Department of Energy on the occasion of the TEC in Washington created the basis for the establishment of Electric Vehicle and Smart Grid Interoperability Centers on both sides of the Atlantic. At the TEC, we agreed that the two laboratories—one based in Chicago, Illinois and the other in Ispra, Italy—will develop testing for intero-perability of electric vehicles, smart grids and charging stations.

It is essential that we continue to work together towards compatible approaches if we are to achieve economies of scale in this critical new technology. I am pleased to report that just last week the Commission, my Mission, and over 50 private sector stake-holders met to identify steps in achieving and advancing transatlantic cooperation in research, standards, and regulations for the full electromobility value chain - everything from electric vehicles, charging stations and communication protocols to smart meters and smart grids.

Electric vehicle and smart grid technology that can significantly cut CO2 emissions, reduce our dependence on increasingly expensive oil, and spur "green tech" job growth is within our reach and the reach of our consumers. I am confident that we will not let this opportune moment in history pass us by, and demonstrate again that by working together we can make a real difference in meeting the global challenges we both face.

The importance of substantial investment in science and innovation

Dominique RISTORI

Director-General of the European Commission's in-house science service, the Joint Research Centre

We live in a rapidly-changing world, the rate of which is probably faster than at any time since the Renaissance, when progress in science made major technological breakthroughs possible.

When looking at science and innovation in Europe, total investment in research increased by 50% in real terms between 1995 and 2008. However, this performance appears less impressive when compared to investment in the rest of the world. Indeed, during the same period, total investments in research in real terms increased by 60% in the United States and by 75% in the four leading Asian countries in terms of knowledge (Japan, South Korea, Singapore and Taiwan).

The proportion of world R&D activity conducted outside of Europe is therefore increasing rapidly. In 2008, less than a quarter (24%) of total world R&D expenditure was made in the EU, compared with 29% in 1995. In addition, research and innovation tends to lack intensity in countries where the public sector is their primary source of finance. On the other hand, investment made by the private sector predominates in countries whose R&D performance is more dynamic. The private sector's share of total R&D expenditure is 74% in Finland and 70% in Germany, but only 50% in France and 32% in Poland.

Of course, the European Union's performance in terms of science and innovation cannot be measured solely in terms of volume of investment. Improving our performance requires better coordination between higher education, theoretical and applied research, public and private research and industry's needs. This can be referred to as reducing fragmentation, that is to say the need to work increasingly in networks and collaboration rather than working in an exclusively vertical manner, as done in the past. Europe's approach is indeed still too fragmented; and there are problems in effectively bridging the gap between research output and bringing new products to market.

Nevertheless, Europe has enormous potential. Several Member States possess research experts, entrepreneurs and companies that are competitive at the world level . This includes the aerospace and telecommunications industries, as well as the fields of biology, health, the environment and agronomy.

In the context of globalisation however, there is room for significant improvement. This is the objective of the "Horizon 2020" proposals concerning the EU's research policy for the 2014-2020 period, which were put forward by the European Commission in November 2011.

The European Commission has proposed the allocation of 80 billion euros by the Member States over the course of this period, in order to stimulate research and innovation in Europe."Horizon 2020" brings together all of the European Union's funding for research and innovation into one single programme for the first time. It sets out to transform scientific discoveries into new products and markets, which create growth and jobs.

Within this framework, the "Innovation Union" initiative, which was launched by Commissioner Máire Geoghegan-Quinn, is set to focus Europe's investments on key challenges such as climate change, energy, food security, health and population ageing. It will allow the public sector to take action in order to stimulate the private sector and remove obstacles which prevent ideas from reaching the market.

Science and innovation are also closely associated with key sectors of the economy due to the enormous financial requirements in terms of investment, whether these are the establishment of new transport networks, the development of smart grids or in the field of sustainable development.

A report from the European Energy Markets Observatory estimates that investments totalling 1,000 billion euros will be required over the next twenty years in the energy sector alone, both for the development of distribution infrastructures and the replacement of obsolete power stations.

Other priority sectors such as Information and Communications Technologies, clean transport, eco-industries, biotechnologies, personal security and strategic businesses also represent a significant market. The development of these business sectors requires major technological breakthroughs in science and technology.

However, providing scientific support for large-scale projects and making financial means available for their implementation is not enough. It is also necessary to put a number of tools and procedures in place, such as the development of common standards, particularly in the fields of electro-mobility, smart grids and information and communication technologies, in order to facilitate market penetration. For example, a credible standardisation system is a precondition for consolidating the distribution of new products and services at the global level, as is an accessible and cost-effective patent system.

Finally, it is essential to promote close relations between the world of science, research and technology and that of political decision-makers, in order to improve the elaboration of the various public policy sectors.

On these conditions, Europe will be able to get back on course for new growth and job creation.

The role of universities in the promotion of science and innovation

Martin H. GERZABEK

University of Natural Resources and Life Sciences Vienna, Austria

For more than 600 years, universities have been a prominent factor for science, innovation and societal development in Europe. While medieval universities focussed on teaching and education, the concept of closely linking research and education was introduced by Wilhelm von Humboldt during the first decades of the 19th century. Today, universities – the universities 3.0 – are an important part of the innovation cycle. The yearly expenditure for research and development in the EU-27 (basis 2008) reaches 237 billion €, with 54 billion € being the share of the higher education institutions; they employ 668.000 of a total of 1.584.900 European R&D personnel.[1] Out of 2906 higher education institutions, 1364 are research active, 850 are PhD awarding and 171 highly research-intensive universities that produce more than 60% of the research output.[2] The strengths of the European innovation system are the large number of researchers and the increasing share of the population graduating from tertiary education.[2] However, Europe is also facing numerous weaknesses:

1. the underinvestment in research and education compared to the USA and leading Asian countries,

2. the weak co-operation between science and industry,

3. the shrinking world wide share of highly cited publications and patents as well as

4. the unfavourable frame for entrepreneurial activities.[2]

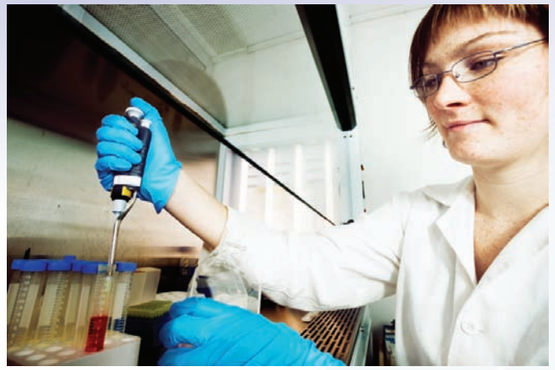
Universities are facing several challenges. Besides financial constraints, the vast acceleration of the production of additional information by science and research has to be mastered. Since the birth of Christ, it first took the internationally registered discipline-oriented knowledge 1750 years to double, then around another 150 years to double again and now approximately every 5 years the amount of produced knowledge is duplicated.[3] Universities have a vital role in analyzing new information and making textbook knowledge out of it by transferring it to students and society. In this context, lifelong learning strategies have to be further developed or promoted by universities. A higher complexity of knowledge needs a more interdisciplinary orientation of universities – in teaching, research and innovation. Additionally, universities today have to take responsibility of the ethical aspects of their research endeavours. “Ethics is integral to science, which means that unethical science is bad science, not just bad ethics”.[4]

In an article about “2020 visions” published by “Nature”[5] in January 2010, many tasks were envisioned for universities. They should seek solutions for reducing poverty, improving human health in developed and developing countries. The demand for a collaborative, multidisciplinary (inter- and transdisciplinary) approach was emphasised. The grand challenges of the future need academic centres based around broad themes. Thus, European universities and universities in general have to act locally, regionally and globally to support the development of society and economy - based on an international level in science, research and teaching. Supporting EU Regional Strategies such as the Baltic and the Danube Region is a significant task of HEI[6] in Europe.

The European HEI – 30 % of them organized as research universities, which is a larger share than in other parts of the world - in principle have a good basis to cope with these demands. However, international rankings do not satisfactorily reflect the strengths of the European universities – the decision of the European Commission to develop an additional ranking tool for Europe will lead to a more objective picture of the situation and a base for strategic improvements.

The European Research Area is an important, maybe the most important factor in fostering the potential of universities with respect to science and innovation. “The Union shall have the objective of strengthening its scientific and technological bases by achieving a European research area in which researchers, scientific knowledge and technology circulate freely, and encouraging it to become more competitive, including in

1. Eurostat: Science, technology and innovation in Europe. 2011
2. European Commission, Innovation Union Competitiveness Report 2011
3. C. Tünnermann Bernheim, M. de Souza Chaui, UNESCO Forum Occasional Paper Series Paper No. 4, 2003
4. Somerville M.A. and R.M. Atlas: Ethics: a weapon to counter bioterrorism. Science 307, 1881-1882, 2005
5. Nature 463, 26-32 (7 January 2010)
6. Higher Education Institutions



its industry, while promoting all the research activities deemed necessary by virtue of other Chapters of the Treaties.”[7] The framework programmes, the European Research Council and the Joint Programming Initiative[8] are crucial factors in this context. Due to financial constraints in most European countries, the contribution of EU-funds to third party funded research is essential to many universities. For the forthcoming Horizon 2020 programme it will be important to ensure competitiveness, administrative efficiency and a balance between impact-driven and science-driven research.

Another important instrument to support the European universities as key promoters of science and innovation are university networks dedicated to the development of their member institutions with respect to research, education and knowledge transfer. European networks like the European University Association (EUA), topical networks like e.g. ICA (European Association of Life Science Universities) or regional networks like e.g. the Danube Rectors’ Conference (DRC) all play their significant role in this context.

Active participation in the innovation process is a field of possible improvement for many universities in Europe. Knowledge transfer and entrepreneurship still have to be fostered. Japan and the USA have almost twice as many public-private co-publications than Europe.[2] Intensive co-operation of universities in general and with non-university research establishment and industry – including the Joint Research Centres of the EU - is a prerequisite for future success and competitiveness. Universities are benefiting from the professional innovation processes established at research institutions as do the partner institutions from the pool of talented graduates or young researchers at the universities. More recent successful examples are the Karlsruhe Institute of Technology or the Technopol Tulln in Lower Austria including companies, the IFA Tulln and the common research centre of the Austrian Institute of Technology with the University of Natural Resources and Life Sciences, Vienna. These examples demonstrate that the traditional role of universities - performing excellent scientific work and educating highly qualified graduates - is still a key issue in the innovation system.

Nevertheless, an even closer link of the European Higher Education Area with the European Research Area and strictly following the Lisbon strategy will be needed to achieve and support the European Knowledge Area, fostering future innovation potentials of Europe.

7. Treaty on the Functioning of the European Union, article 179.1
8. (COM(2008) 468)

The new directions with regard to Innovation in the Horizon 2020 regulations

Teresa Riera MADURELL

MEP, Group of the Progressive Alliance of Socialists and Democrats, European Parliament
Rapporteur responsible for establishing Horizon 2020

The proposal of Horizon 2020 merges for the first time under a single Common Strategic Framework for Research and Innovation

1. the successor of the 7th Framework Programme,

2. the current Competitiveness and Innovation programme and

3. the European Institute of Innovation, combining two legal basis: TFEU articles 173 and 182 on industry and research.

The integration in one single Programme of the whole chain of innovation, from fundamental research to the market is a major doctrinal shift from previous science-driven Framework Programmes. This new strategic approach responds to the well-founded diagnosis by which the underperformance of the EU is directly attributable to the weakness of the link between research, innovation and economic development. As a consequence Europe has been failing to convert science into products and employment at the same pace than its competitors.

For the most part, the proposal of Horizon 2020 builds on existing -however embryonic- instruments in both FP7 and CIP programmes. Yet it has the double merit of bringing them together under a single framework and of taking them a step further, both in scope and financing. The new financial instruments are a clear case of this approach. In a context where our structural lack of financial support at the commercialisation phase for young innovative European companies and for entrepreneurship in general has been worsened by the financial crisis, these instruments seek to target a EU market failure and to attract additional private finance. But what is really relevant here is that they have been designed to provide support for the whole value chain and each stage of the enterprises' life cycle while pursuing that financial intermediaries back our Europe 2020 objectives.

However, the defining strength of this new architecture could also become its weakness. In order to be consistent with the choice of a «seamless support for R&D and innovation activities» it has become more crucial than ever to define the links between the different instruments and topics and to assure that the bridges from research to market are consistent and well developed. This means that we need to clarify some elements like the internal governance of the H2020, the scope of some funding schemes such as the SMEs instrument or the implementation of transversality and multidisciplinarity, to name but a few.

A further relevant task ahead of us is to make sure we manage a balanced budget approach between the different phases of the innovation chain. Shifting the focus too much towards funding short-term, close-to-market innovation could come at the detriment of more long-term, fundamental research that often is the source of radical, disruptive innovation. But not providing the opportunity to ensure effective knowledge and technology transfer of our research results would weaken the competitiveness of our industry vis-à- vis our global competitors. And this Europe can no longer afford.

The Danube Strategy, an example of transnational scientific cooperation in Europe

Markus FERBER

MEP, Group of the European People's Party (Christian Democrats), European Parliament

Crossing 10 countries and running almost 3000 kilometres, Danube is Europe's second longest river. Linking the Black Forest to the Black Sea, it has always played an important role in transport and trade between the countries of Western and Eastern Europe through the waterway.

After the 2004 and 2007 Eastern enlargements of the European Union when the number of Danube's neighbouring countries in the EU increased from 2 to 8, the river gained in significance on European level. Its function as a link between old, new and potential EU members brought greater international focus to Danube and revealed the need for a strategy for the Danube macro-region to commonly approach challenges and improve cooperation.

As many of the problems that member states have to face do not know borders, the European Union utilizes the concept of "macro-regions" as an essential part of its structural policy. With the intention of bringing together states with common interests, the EU invests in creating a regional identity. The advantage of transnational cooperation is obvious: resolving issues and working together in small groups of countries will very likely bring better results than individual initiatives.

On European territory, several macro-regions have been identified and addressed by respective strategies. The first of its kind was the strategy for the Baltic Sea Region adopted in 2009, followed by the Danube Region in 2011 and a potential region for the near future could be the Mediterranean Sea Region.

As an independent player with respected authority, the European Union is in a good position to facilitate cooperation in these regions by implementing a framework to provide efficient solutions to the key challenges and new opportunities for sustainable development in the region.

The Danube region covers parts of 8 EU countries (Germany, Austria, Hungary, Czech Republic, Slovak Republic, Slovenia, Bulgaria and Romania) and 6 non-EU countries (Croatia, Serbia, Bosnia and Herzegovina, Montenegro, Ukraine and Moldova). Today, more than 100 Million people live in its river basin region which covers one fifth of the total territory of the EU. Therefore the wellbeing of the region is essential also for the wellbeing of the Union as a whole.

Both the European Commission and the states consider the river as an important element that unites the countries in terms of their political, social, cultural, environmental and economic interests. The strategy addresses all of these issues while balancing concerns for the environment, energy and climate policy, food and water safety and environmentally friendly navigation.

Addressing these common goals alongside the river will also help to improve the quality of life in the Region. People will benefit not only from faster and cleaner transport but also from the availability of cheaper and more secure energy thanks to better connections and alternative sources. In addition, cleaner water, protected biodiversity and cross-border flood prevention will have positive effects on the quality of life in the Region.

The strengthening of the Danube Region also includes joint development and marketing of the Region in order to make it more attractive as a tourist destination. Higher prosperity should be achieved through transnational work on economy, education, social inclusion, research and innovation.

The role of science and research in the Danube strategy is crucial. Without scientific and technological expertise the aims of the strategy could not be realized. Science needs to contribute with effective solutions in almost all the strategy's area of action, such as connectivity, energy, environment and risk management. The implementation of the strategy in the member states will create much cooperation between universities, research institutions, and the private, public and civil sectors. Joint coordinated action will bring together education, labour market, innovation and research for competitiveness.

Successful implementation of the Danube Strategy in the member states and a strong scientific and political partnership for the various future challenges could make the Region become the symbol for the successful reunification of the two parts of Europe after the Cold War.

Scientific back-up for security and growth in Europe

Gilles DE KERCHOVE
EU Counter-terrorism Coordinator

Since 9/11, much progress has been made in security technology: aviation has become more secure, our critical infrastructures are better protected and security of mass events and soft targets are the focus of significant research activities. But we have had to react to an evolving threat. Terrorists have got more and more sophisticated in their ways of attacking our society: they improved the use of explosives, they learned to better conceal weapons when boarding airplanes (using liquid explosives or hiding bombs on their bodies), they studied security measures to circumvent cargo controls (implanting bombs in printer cartridges). They even changed their ways of communication to avoid surveillance and observation. The security community, researchers and industry have reacted to this and created a field of innovation and growth from the business of ensuring our security. Yet, the very nature of the evolving threat requires continuous efforts and forward-planning, especially in research and technology to stay ahead of the threat - be it terrorism, organised crime or state sponsored activities. In the EU, our security approach ensures parallel guarantees of ethics privacy and human rights. This sets requirements also for security technology (in the field of data collection, scanning technology, etc). To ensure that available technology fulfils certain safeguards we need a European response, ie international standards that follow our principles. This is a challenge for our industrial policy and in our research activities.

Fostering an industrial policy at EU level in the security sector is not an easy objective to achieve. Security is a highly sensitive area for Member States and has so far been dealt with at national level. However, the fragmentation of the EU market leads to inefficiencies, poor economies of scale, and weakens the competitiveness of the security sector to the disadvantage of both the industry and end-users.

Significant progress has been made, but key challenges remain to provide the EU with a consistent and competitive technological base for the security industry, delivering the security needs of society: the security market remains too fragmented, the synergies between civil and military research are not fully exploited, and public-private partnerships are underdeveloped, both at EU and national levels.

Cyber-security illustrates the convergence of interests and the interdependence between the public and the private sector. Cyber-security has already become a major aspect of security both within NATO and the EU and will remain so in the years to come. Stuxnet and the threat against Critical Information Infrastructures, cyber spying, adequate surveillance of new communication tools for intelligence purposes or evidence-gathering by law-enforcement are just some examples. Industry is the main owner of most of the Critical Information Infrastructures. Therefore a common response is essential. Cyber-security is a matter of industrial policy and should be tackled as such at EU level. In some sectors, the capacity to produce core components in Europe has already been lost.

Efforts need to be stepped up in addressing the fragmentation of the EU Security market and in supporting its industrial base. Developing common assessment procedures as well as standards and labels in the security area could provide more security, growth and at the same time foster security solutions which fully respect European values and legitimate concerns regarding privacy. Research can increase both security and privacy. The creation of EU certification schemes for «privacy-compliant» processes, technologies, products and services should be supported. Furthermore, pre-commercial procurements at EU level should be encouraged.

Such certification schemes could boost innovative Privacy by Design which has to be embedded into the design and architecture of IT systems and business practices. Privacy by Design extends to a «trilogy» of (1) IT systems, (2) accountable business practices and (3) physical design and networked infrastructure.

It ensures secure lifecycle management of information, end-to-end and involves both system architects and operators. In order to determine the kind of built-in privacy that would be needed for specific uses, it is important for industry to reach out to the end users. In this context, a pilot project by the EU financed research project SURVEILLE already provides industry with the possibility to reach out and receive privacy and other advice.

Ministries of the Interior need to be encouraged to develop a culture of forward planning as practiced in the defence sector. Closer cooperation between the Member States and strategic planning of future needs in Justice and Home Affairs, supported by a better coordinated procurement process, would help to get better, cheaper and more advanced security products and be a driver of innovative solutions, and ultimately of growth.

Strategic planning would also foster synergies between security and defence technologies. There is indeed a need for a more systematic cooperation, at an upstream level for capability development and research. The outcome of coordinated research projects could be used to undertake coordination at the level of standards. Such synergies could allow both the security suppliers and the Member states to face the budget cuts.

The Communication of the European Commission on an Industrial Policy for the Security Industry and the forthcoming proposal for the 8th Framework Programme («horizon 2020») will give the opportunity to discuss these issues.

The benefits of scientific networks in Europe: the example of EASAC and nanotechnologies

Professeur Sir Brian HEAP
President, European Academies Science Advisory Council
Halle, Germany

Dr Robin FEARS
EASAC Biosciences Secretary

Scientific networks are structures with which to interrogate and diffuse ideas and innovations relevant to the enhancement of national and international policies and economies. Three distinctive features can be noted from the experience of the network of European Academies Science Advisory Council (EASAC).

First, EASAC has a degree of independence and authority that can be useful to politicians and policy-makers. EASAC was established in 2001 to provide advice to the European Institutions - Council, Commission and Parliament - particularly where such advice was important as background to, and underpinning for, policy formulation. Individual academies did offer such advice from time to time, and sometimes advice on the same topic arose from several academies. EASAC was formed to provide collective advice as this would be more effective and more efficient, and had the substantial added benefit that it would represent the best combined expertise of all the European academies, particularly in terms of horizon-scanning. With the growing importance of the European Union as an arena for policy, academies recognise that the scope of their advisory functions needs to extend beyond the national to cover also the European level.

EASAC has a simple structure; a Bureau of elected officers, a Council of Presidents (or deputies) of academies, and an Executive Secretary based at the German Academy of Sciences Leopoldina in Halle. Council comprises highly experienced scientists nominated one each by the national science academies of EU Member States, Academia Europaea, ALLEA, and the Swiss and Norwegian academies. It is open and transparent in its processes, and its views are vigorously independent of commercial or political bias. It has carried out substantive studies of the scientific aspects of policy issues such as Climate Change and Infectious Diseases, Transforming Europe's Electricity Supply, Drug-resistant Tuberculosis, Ecosystem Services and Biodiversity, Synthetic Biology, Impact of Nanomaterials on Health, Concentrating Solar Power, and Plant Genetic Resources for Food and Agriculture. Current work includes studies of Biofuels and Biodiversity, Climate Change Adaptation, Direct-to-Consumer Genetic Diagnostics, Carbon Capture and Storage and GM crops. In identifying topics, EASAC's Council draws on the rich diversity of its members according to their science and technology background and socio-economic status such that mutual interests identified by the network are likely to be robust, credible and of significant interest to policy customers.

Second, European networks are able to compile the evidence through their interconnections with expert scientists who are willing to offer their academic expertise without cost and in a spirit of freedom and independence. Working Groups bring together a range of skills from all relevant scientific disciplines and backgrounds. Individuals contribute separately from other affiliations and work collegially as part of the EASAC process. Through them, and through an open call to all academies for evidence, the project is able to connect to the wider scientific and other networks and to other relevant developments. The result is balanced discussion, consensus where that can be achieved, accompanied by identification of knowledge gaps. Such networks are particularly important in an area like nanotechnology and climate change where there may be uncertainties in the science and a range of regulatory options that requires comprehensive and unbiased analysis.

Third, delivering outputs to networks of customers in the policy-making community depends on building a trusted source of information. Because of its established strengths, track record and parentage, EASAC can convey messages to various EU audiences and their networks (e.g. Commission, Parliament, Council of Ministers, trade bodies, scientific communities etc). Through the member academies, key messages can also be communicated in all the Member States and the academies can deliver sustained impact via follow-up work. In consequence of their participating in the EASAC network and sharing good practice, academies also improve their own advisory and networking capacities.

The report on Nanomaterials consisted of an extended network with the Commission's Joint Research Council (JRC). It has proved valuable for EASAC to collaborate with others on occasion (e.g. FEAM, where additional access to medical sciences is required) provided EASAC's independent voice is guaranteed at the outset. The partnership with JRC on nanomaterials provided information that would otherwise have been time-consuming to collect (e.g. current and likely future regulatory developments), technical aspects of safety assessment to complement the fundamental scientific knowledge contributed by the Academy nominees to the Working Group, advice on key policy customers who were already within the JRC-networked contacts, and the resource to communicate main messages to scientific and media communities as well as policy-makers.

Innovation in care: a sound investment for the future

The Ambient Assisted Living Joint Programme (AAL JP)

Paul TIMMERS

Director, Directorate ICT for Societal Challenges, DG INFSO, European Commission

A major Societal Challenge for Europe

The basic data concerning Europe's ageing population is well-known. It shows an imminent and significant change in both the EU's society and its economy for which it is still not well-prepared. Indeed, a shortage of up to 2 million jobs in care and health is projected to emerge by 2020, the cost of care may grow with 1-2 percent of GDP and the ratio of people aged over 65 to working people (aged 15-64) will drop from approximately 1:4 in 2008 to 1:3 in 2020 and 1:2 in 2050.

The major opportunity behind the challenge

Innovative products and services based on Information and Communication Technologies (ICTs) can undoubtedly play an important role in dealing with these challenges. It can do so by improving the quality of life for elderly people and their carers and by increasing the cost-effectiveness of care, thereby creating large new market opportunities in Europe and beyond. These are also known as Ambient Assisted Living (AAL) solutions. The trans-formational nature of ICT allows for innovation in the organisation of care. Take for example the possibility of increasing the time carers spend with their elderly clients. This can be achieved by improving the effectiveness and reducing red tape in care, finding adequate solutions to improve working conditions as well as the well being of informal carers, personal lifestyle and independent living, and allowing continued and active participation of elderly in both the EU's economy and society.

An increasing number of case studies show care efficiency gains of 20-30%, delayed onset of institutional care by 10-30%, high levels of user satisfaction, and growth in business of over 10% p.a.[1]

However, to succeed a wider approach to innovation and technology use is necessary, combining technological and social innovation with innovation in service and business models in which older adults and their carers - and other relevant intermediaries - play a direct part. Small and medium-sized enterprises constitute the key players in the field and are essential for bringing new products and services to the market.

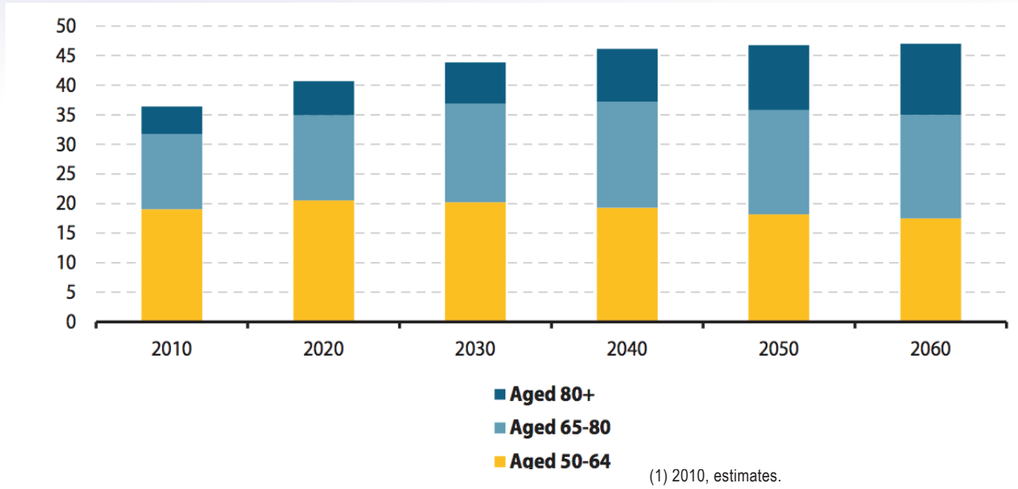
AAL JP, a European success story

In order to address these challenges but also the opportunities, the AAL Joint Programme (AAL JP) was created in 2008 by 20 EU Member States and 3 associated countries.

The AAL JP is a funding programme for applied research aiming to support projects developing ICT solutions for ageing well, with a 2-3 years to market time horizon. It has a minimum total budget of €600m, including €150m from the European Union (from Framework Programme 7) and runs between 2008 and 2013.

1.Action Plan on Information and Communication Technologies and Ageing (2007) http://europa.eu/legislation_summaries/information_society/strategies/l24292_en.htm, e-Health Lead Market Initiative (2007) http://ec.europa.eu/enterprise/policies/innovation/policy/lead-market-initiative/ehealth/index_en.htm, ICT programme of FP7 http://cordis.europa.eu/fp7/ict/programme/, CIP ICT PSP http://ec.europa.eu/ict_psp/, AAL JP work programme www.aal-europe.eu

Projected structure of the population by age group, EU 27, 1 January (1)
(% share of total population)



(1) 2010, estimates.
Source: Eurostat (online data code: proj_10c2150p)

Within the European landscape of ageing and innovation, as described by and discussed in the European Innovation Partnership on Active Healthy Ageing[2], AAL JP complements the longer-term research in the Framework Programme 7 and downstream innovation and market validation under the Competitiveness and Innovation Programme.

Key Achievements and outlook

As a major initiative in the overall European effort on innovation and ageing, the AAL JP already shows signs of being a European success.

So far more than 82 projects have been launched covering ICT based solutions for older people and their carers – in the fields of prevention and management of chronic conditions, advancement of social interaction, participation in the self-serve society of elderly people mobility and social participation.

The network of actors involved in the AAL JP shows an excellent participation of SMEs (more than 40% compared to FP7 where the average SME participation in the ICT programme is 14.4%) across all Partner States and user organisations. This is important as it supports economic growth and ensures better market acceptance.

There is a lot of enthusiasm surrounding the AAL JP, demonstrated by an incipient community across Europe which did not exist prior to the creation of the AAL JP. The first three annual AAL JP Fora have gathered between 600 and 900 participants every year and have become a major mobilisation of the actors in the value chain in ICT for Ageing Well.

The volume of research and innovation generated across FP7, AAL JP and the CIP pilots (more than one billion € between 2008-2013) makes the European ICT for Ageing Well initiative the world's largest in this area.

Activities are ongoing to explore continuation of the initiative under the proposed Horizon 2020 funding programme for 2014-2020 timeframe.

This is an example of how innovative cooperation can create opportunities and growth potential while tackling one of Europe's greatest societal challenges.

The views presented are those of the author and do not necessarily represent the official view of the European Commission on the subject.

2. http://www.ec.europa.eu/active-healthy-ageing

Solutions exist for meeting the need to boost R&D in Europe!

François LE JEUNE

Director France of F.Iniciativas

The current state of European R&D presents a mixed picture: although ever more substantial means are being devoted to the effort to fulfil the objectives of the Europe 2020* strategy, resulting in a clear increase in investment in innovation, the EU is nevertheless struggling to catch up with the three research giants constituted by China, the United States and Japan.

Another statement of fact: companies involved in research and development activity are new (created after 1975 on average, source IR&DS**); they invest twice as much as companies established before that date and most of them are SMEs. The older major companies mainly invest in defensive projects, but no longer innovate for the general public.

Nevertheless, certain European incentive schemes have proven their effectiveness, in particular tax credit for research in France (Crédit d'Impôt Recherche) and its equivalents in Spain and Portugal… although the latter two Member States invest little in R&D as compared with the OECD average. This hesitant R&D activity is partly attributable to the all too numerous disparities in financing mechanisms: there are virtually as many different financing systems as there are countries in the EU. Moreover, Tax Credit for Research as such is not universally applied. Neither Germany nor Sweden, for example, has put measures of this kind in place. However, regular studies (IGF report [French General Inspection of Finances]) demonstrate that it constitutes the most effective measure, with regard to both short and long-term considerations.

In addition, there are major differences between existing financing mechanisms: while some are based on indirect aid through the provision of incentives (tax relief and reductions in social security contributions), other systems favour direct aid (subsidies and repayable advances). Accordingly, the results obtained vary widely from one country to another and the objectives are often targeted too narrowly (favouring certain sectors or geographical areas for example), with consequences that can actually penalise certain categories of companies whose investment in R&D is relatively low (or which make no such investments in the absence of means and subsidies). This competitive imbalance is therefore very detrimental with regard to Europe's economic influence.

* Europe 2020 Strategy

The Europe 2020 strategy follows on from the Lisbon Strategy, which covered the 2000-2010 period and put forward the bases of a "knowledge-based economy" with stable and sustainable economic growth accompanied by job creation. Its three main objectives were: investment in R&D equivalent to 3% of GDP and an employment rate of 70% of the population in working age, within a framework of green growth.

The Europe 2020 strategy perpetuates these objectives (the target employment rate for the population in working age has been raised to 75%), while endeavouring to fight against social exclusion, with the constant aim of guaranteeing better competitiveness for Europe on the world market.

When these disparities are taken into account, Europe's backwardness ceases to be surprising. Nevertheless, when the various policies for financing R&D across Europe are examined, the fact emerges that they all aim at three principal objectives:

• R&D is intended to promote employment (with subsidies allocated for young engineers and doctors);

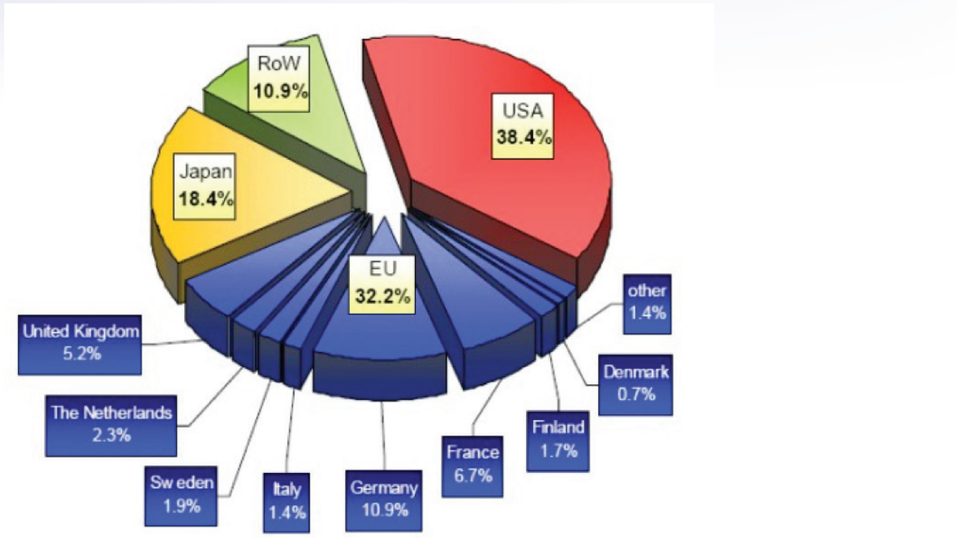
• In addition, it should create intelligent and attractive growth, which improves knowledge and human and technical skills;

• Finally, it should also make it possible for partnerships to emerge between private companies and public institutions.

These various factors should be coherently organised in an ecological context, in particular with regard to the energy sector and sustainable development.

In this situation, it is becoming increasingly clear that a common R&D policy in Europe needs to be created. The EU's failings in this regard are attributable to this lack of vision and overall concerted action. Indeed, although it brings numerous entities together, it is however faced with giants that do not burden themselves with issues arising from heterogeneous and often divergent policies (though the objective pursued is the same for all). This situation is highly detrimental to Europe at the world level. It would undoubtedly be in Europe's interests to put in place a common policy on innovation, compiling and promoting the best existing mechanisms, in order to create a "universal" model. The latter could be treated as an initial means of organisation, leaving enough flexibility for its subsequent application to each country, according to national economic specificities.

The share of R&D investments for the 1,402 companies audited by geographical origin (in % of the 372.9 billion euros invested)



Source : European Commission – 2008

Moreover, the pursuit of the Europe 2020 strategy undoubtedly requires greater involvement of the actors engaged innovation as a whole. The establishment of a "legal obligation to contribute to investment in R&D"*** – just like the French model for the financing and promotion of Professional Training – would make it possible to regulate the financing of (both public and private) R&D and provide a solid basis for the emergence of numerous projects.

It is also worth remembering that intellectual property remains one of the last safe assets in the face of competition from emerging Asian countries. Unfortunately, Europe often remains deadlocked in this respect, in the face of the issues raised by open innovation in particular. Indeed, traditional "closed innovation" poses more and more problems in terms of profitability and, above all, feasibility: the making of ground-breaking innovations is becoming rarer and, in most cases, has been replaced by the "revamping" of previously existing products. This "open" innovation makes it possible to pool skills and knowledge, with a significant reduction of costs. However, it also poses the problem of intellectual property.

It is becoming crucial to lay down new conditions for the establishment of intellectual property and to standardise policies for the financing of innovation at the European level, in particular with regard to the eligibility criteria for research projects as well as the targeting of sectors, which are grouped together around a few major areas of activity, chief amongst which are ICTs, chemistry and pharmaceuticals, the motor and aerospace industries (and to a lesser degree, the food processing industry). From this perspective of standardisation, it is not unrealistic to propose a requirement for involvement in R&D initiatives for the companies concerned. From an overall point of view, it is necessary to transform the geographical heterogeneity of European skills into a network of actors capable of working together as an international economic grouping.

** Source International R&D Scoreboard

*** R&D Legal Obligation

This initiative would be based upon a system similar to that for the financing of professional training (FPC) in France:
- Levying of a very low percentage of the wage bill in order to create a mutual fund;
- This would be collected and managed by bodies approved by the Ministry of Higher Education and Research and would be integrated into the mechanisms designed to encourage innovation;
- Any resulting residual funds could be used to finance collective actions for the expansion and promotion of R&D, or for strategic purposes coming within the framework of innovation.

The need for European cooperation in the strategic fields of innovation

Zoran STANCIC

Deputy Director General , DG Information Society and Media, European Commission

A powerful partnership for change

The European Innovation Partnership on Active and Healthy Ageing (EIP-AHA) is new. It is the pilot of a new policy instrument proposed in the Innovation Union. It has been selected to tackle the demographic challenge: Europe is ageing and this has dramatic consequences for the cost and sustainability of our health and care systems. The EIP-AHA is a unique attempt to bring together all relevant stakeholders in the fields of research & innovation (from scientists to companies), and health and ICT (from doctors and care-professionals to patients and consumers). The aim is to address the ageing challenge through smart innovation with ICT. The mission of the EIP-AHA is ambitious and appealing: to add, by 2020, 2 healthy life years to the life of the average European citizen. In November 2011 the Steering group of the Partnership (some 30 high level stakeholders) selected 5 (+1) actions to accomplish this mission:

1. Innovative ways to ensure patients follow prescriptions – an action in at least 30 European regions;

2. Innovative solutions to prevent falls and support early diagnosis for older people;

3. Co-operation to fight functional decline and frailty, with a particular focus on malnutrition;

4. Spread and promote innovative models for integrated care (such as remote monitoring) for older patients with chronic diseases, in a number of the EU's regions;

5. Improve the interoperability of ICT independent living solutions through global standards, to help older people stay independent, mobile and active for longer.

The sixth action is about networking and knowledge sharing on innovation for age-friendly buildings, cities and environments.

From plan to action

ICT and innovation are keywords for all these actions, and they should between now and 2015 lead to a triple win for citizens, society and economy: a better health and quality of life for (especially older) European citizens; more efficient and sustainable health & social care systems; and a better competitiveness of EU health and care industry through an improved business environment.

On 29th February 2012, the Commission launched a Communication to the European Parliament and the Council, to support the implementation of the Strategic Implementation Plan, including the 5 (+1) actions. From now on it is crucial to get all relevant stakeholders on board, committed to the actions and to form Action Groups that will actually carry out the actions. The Commission recently launched the Invitations for Commitment and on April 3rd Vice-President Neelie Kroes and Commissioners John Dalli and László Andor kicked off a conference to get 'from plan to action'. Around 600 participants registered, which showed the enthusiasm with which the EIP-AHA has been met. This event allowed people, organisations and companies, that are active in the field of care and ageing, to present their integrated projects (very promising projects can apply as a candidate reference Site). At that day it will be launched an interactive platform – the marketplace for innovative ideas - on which the AHA-network can grow,

to exchange views and cooperate across all conceivable boundaries: countries, regions, private - public sectors, etc.[1] Only an integrated approach can remove the barriers for large scale implementation of projects that contribute to the actions above.

No new funding but interaction

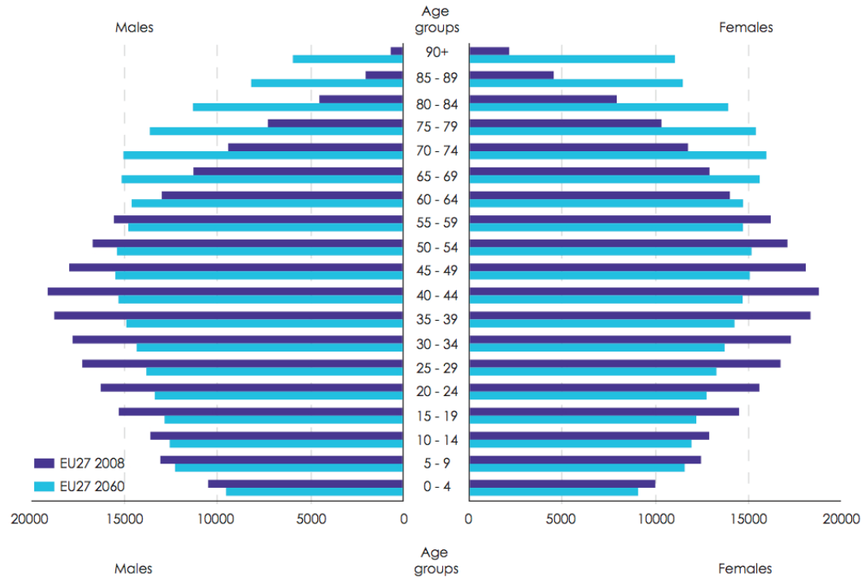
The EIP-AHA is not a new funding instrument, but seeks to leverage and focus programmes like Health for Growth, FP7, CIP, ESF, ERDF, Horizon 2020 and CEF. Important elements of that focus are the demand side perspective, the active use of innovative procurement, innovative incentive mechanisms, and options for venture capital support, all to mobilise resources from the actors interested in bringing forward some or all the Actions.

It is up to the European Parliament, Commission, Council and Member States to create favourable framework conditions, such as regulatory and standardisation conditions and effective funding within the current set of instruments, to support the implementation of the actions.

The ageing European society is a huge challenge. The EIP-AHA seeks to turn that challenge into an opportunity for economy and society. Active and healthy ageing can be an economic multiplier and driver for innovation. The investments of today in innovation for active and healthy ageing are the way forward for a better quality of life, more efficient and sustainable care, innovation and economic recovery.

The views presented are those of the author and do not necessarily represent the official view of the European Commission on the subject.

Population pyramids (in thousands), EU27/EA, in 2008 and 2060



1. The Marketplace for innovative ideas is open to all stakeholders willing to get involved in the EIP-AHA. It can be found at the EIP-AHA home site: http://ec.europa.eu/active-healthy-ageing.

The search for alternative sources of energy

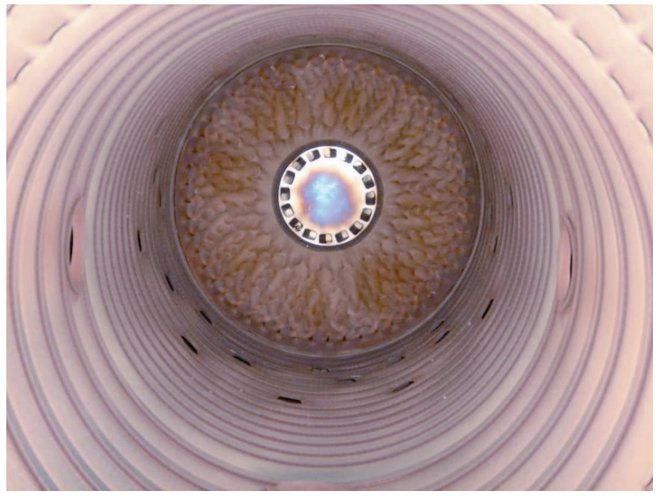
Fulvio CONTI
CEO Enel

Energy is a distinctive catalyst in the effort to improve the human condition. The quest for the technology required to meet increasing global energy needs while preserving the world's ecosystem is and will remain a fundamental challenge. In a world in which 1.5 billion people still don't have access to electricity, this has become a priority approach, together with the necessity of utilizing all of the best technologies available today to their most efficient level, and finding new forms of energy that will allow for power generation that is capable of preserving available resources and protecting the environment.

This is even more evident in the study of new technologies in the renewable energy sector due to their intermittent nature. In this field Enel has a lot to offer, setting the energy development of the planet as our priority objective. Some examples that demonstrate this are: the application of concentrated solar power, for example, as part of the Archimede project at our 5MW plant in Priolo Gargallo, near Syracuse, Sicily, making it the world's first integrated solar thermodynamic combined cycle power plant. Based on highly innovative technology developed with the Enea institute, the sun's rays are concentrated by means of parabolic mirrors onto collector tubes. This highly innovative technology uses molten salts in the place of diathermic oil to increase the plant's performance by 17%, equal to an annual output of around 10 million KWh, saving the consumption of 2,000 metric tons of fossil fuels and 6,200 tons in CO2 emissions.

Our experimental Fusina plant located in Marghera, near Venice, is another example of integrating innovative technology into the "power mix", and is the world's first industrial scale power plant to run entirely on pure hydrogen. The 12 MW plant consists of a combined cycle in which a hydrogen fuelled turbogas is used to generate electricity releasing only a small amount of nitrogen oxide, hot air and water vapor into the atmosphere, while satisfying the power needs of some 20,000 local residents. Enel is using this and other innovative technologies such as carbon capture and oxygen combustion systems to further enhance environmental performance in order to create "chimneyless plants" by 2050 as a part of the "Zero Emissions Platform".

Rethinking the energy sources that end consumers use every day is another fundamental pillar to resolve the "energy equation" – electricity that is affordable, available and abundant to everyone. For example CO2 emissions from traditional vehicles are responsible for nearly one third of polluting emissions worldwide. We can drastically limit this by making



The Fusina hydrogen plant's combustion chamber

Enel E-mobility recharging column

choices like switching over to electricity for urban transport. Enel has been active in developing and promoting this technology through several initiatives, among them that of E-mobility. In Europe, we have installed 400 recharging "columns" in the Italian cities of Rome, Pisa and Milan, and our subsidiary in Spain, Endesa, has also led installation with 546 units in the cities of Madrid, Barcelona and Seville. Though the results are still in their early stages, the new and fundamental infrastructure is being rolled out.

Also in relation to end-consumers, the emergence of digital technologies, which are improving the efficiency of the distribution grids, has allowed consumers to play an active role in energy generation, transforming them into «prosumers». At the heart of such technological transformation there is the smart meter, an innovation in which Enel is a World leader with over 32 million meters deployed in Italy, and another 13 million to be installed in Spain by 2015. Leveraging on this technology, many technological advancements are taking place as may be seen in our Malaga Smart City project, a real demonstration of technological convergence for a series of applications including more efficient public lighting, e-mobility and energy storage.

Enel is one of the world's leading energy operators, present in 40 countries worldwide, with over 97,000 MW of generating capacity and some 61 million clients. Our unique position on the global energy landscape allows us to enact concrete changes in terms of alternative energy, and we have acknowledged this commitment as a core value not only to our business, but also to society as a whole. We have already achieved a balanced generation mix with a high percentage of carbon-free technologies: over 40% of our energy output comes from generation facilities using water, sun, wind, the Earth's heat, or nuclear energy to generate electricity. Our subsidiary Enel Green Power is among the world's leading producers of renewable energy with over 7,000 MW of installed capacity, and a project pipeline that ensures capacity will reach almost 12,000 MW by 2016. Our commitment is therefore addressed to the key fields of energy innovation, from renewable energy sources to energy efficiency and storage, to the reduction of emissions from conventional generation technologies, smart grids, and electric mobility. Enel will continue its pioneering role in research and development in the power sector in order to ensure that innovation remains a driving force not only for the business of electricity, but also for everyone who uses it.

Detail of parabolic mirror at the Archimede solar plant

Innovation in the electrical grid sector: super grid and smart grid

André MERLIN

President of CIGRE[1] and CEO of MEDGRID[2]

Energy transition to the sustainable development of societies with low carbon footprints is going to lead to an increase in the proportion of electricity in energy mixes. By the year 2050, it is possible to envisage electrical systems that take into account the development of carbon-free energies and the implementation of CO2 capture and sequestration techniques, which will henceforth ensure the virtual absence of CO2 emissions.

Such a transformation will lead to an increase in the strategic role of electrical grids with regard both to electric power transmission and distribution.

The massive growth of renewable (wind and solar) energies has two principal consequences for electrical grids.

1. Due to the decentralised and dispersed nature of renewable energies, their production sites are most often connected to medium and low-voltage distribution networks. For this reason, the very functionality of these networks is changed. Instead of being a simple means of delivery to clients of the electricity produced upstream by the large power stations, they become active networks supplying the electricity produced on them, according to their particular circumstances, for local consumption on the network, as well as to consumers in other locations, which may be very far from the sites of production.

As a result, the management of these systems becomes increasingly complex and requires greater intelligence. The Smart Grid concept deals with this requirement through the use of information and communication technologies in the management of electrical grids. Although sometimes viewed as such, these developments are not in fact new. However, because of the energy transition which is now beginning, they are going to increase in scale, especially for the lowest-voltage electrical networks.

2. Because of the intermittent nature of their production, massive growth of renewable energies will have a major impact, not only on the development of low-voltage networks, but also on the large electric power transmission networks. Hence the Super Grid concept is imposing itself not only in Europe, but also in other regions of the world, such as China, India and Brazil.

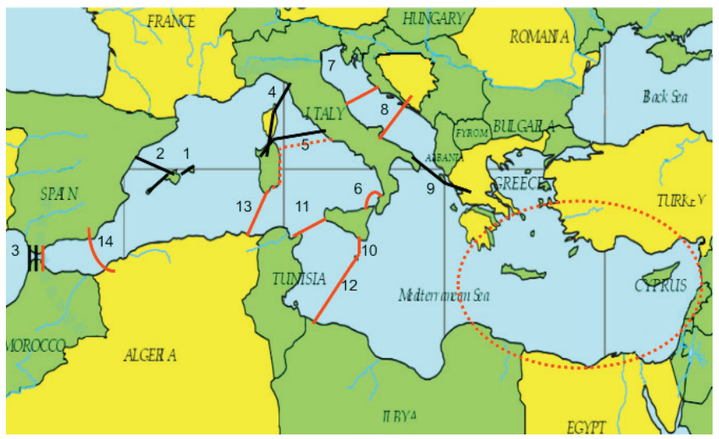
In Europe, it needs to be possible to connect up the vast wind farms, and in particular those which are going to be built in the North Sea and the Baltic Sea, as well as the solar power plants which are due to be built in the South of Europe and indeed, in the South of the Mediterranean.

Very high-voltage and high-capacity aerial and undersea electrical links need to be built, in order to make it possible to transport the large quantities of electricity supplied by these new forms of energy production, as well as for optimal management of their intermittent nature. This requires new direct current electric power transmission technologies, for which Europe is looked upon as a leader at the world level. The three principal industrial groups in this field are European.

MEDGRID is one of the industrial initiatives underway in Europe. It aims to promote and give impetus to the establishment of a powerful interconnected grid between the northern and southern shores of the Mediterranean. It is fully in line with the European Union's strategy of building a large European electric power transmission network.

1. International Council on Large Electric Systems
2. Industrial Initiative for the promotion of electrical interconnections between Europe and the South and East of the Mediterranean.

Existing and projected submarine links



existing or under construction — *under study* — *in perspective*

SUPELEC - 2 February 2012

Which research and which innovation for which energy mix in France?

Bernard BIGOT

Chairman of the CEA (French Atomic Energy and Alternative Energies Commission)

Currently in France, our primary energy consumption still relies for more than 50% on fossil fuels which we must import: oil, coal and gas. These energies produce greenhouse gas and other emissions which, in case of massive use, have a negative impact on health and the environment and these resources exist in limited quantity on our planet. With the strong growth of the world demand, pushed by developing countries like China and India, depletion of these resources is inexorable, sooner or later. This depletion is accompanied by an ineluctable rise of the price of these fossil resources, weighing heavily on the trade balance of France: in 2011, these imports reached 62 billion Euros i.e. the equivalent of 90% of our trade deficit.

In addition to the economic problems posed by our dependence on fossil fuels, is the environmental challenge. France has committed to reduce its greenhouse gas emissions, in complete accordance with the European objectives: in 2008, the 27 Member States adopted the Energy-Climate Package which imposes, by 2020, 20% reduction in energy use by improving energy efficiency, 20% of greenhouse gas reduction and 20% of renewable energies in the total power consumption of the EU.

Despite its dependence on fossil fuels and the resulting problems, the energy mix of France is virtuous, in comparison with many other countries, in particular thanks to its renewable energies and its production of nuclear power. The current price of energy is bearable by the consumers, either individuals, SMEs or industrials, in particular thanks to the use of nuclear energy: for example, electricity is twice less expensive in France than in Germany. As for the greenhouse gas emissions, they are four times higher in the average of the OECD countries than in France. In terms of energy safety, France, without the nuclear power, would import 92% of its primary energy (fossil fuels). Last but not least, concerning the performance of the national energy sector, nuclear industry represents 410.000 jobs in our country, and renewable energies should benefit from a strong industrial development.

In order to withdraw itself from its dependence on fossil fuels, France must start an energy transition: it is based, combined with energy sobriety and efficiency, on a synergy between nuclear energy and renewable energies. This energy mix for the future aims at
1. reducing the dependence on fossil fuels imports,
2. preserving our national energy industry competitiveness,
3. maintaining an energy low price for individuals and for industrial companies,
4. limiting greenhouse gas emissions.

This synergy requires an effort in research and innovation on several aspects, in which CEA is highly active.

In all the countries of the world, the supply of a basic electric power, by the nuclear power or fossil fuels, is essential. Research on future nuclear reactors is essential, in order to design reactors known as of IVth generation, which will consume depleted uranium present on the French territory (500 000 tons by 2040) and plutonium resulting from spent nuclear fuel of the current power plants, feeding the park for more than 3000 years without importing new fuels.

CEA has been strongly involved for ten years in research and development in renewable energies and energy storage, focusing on both main sectors consuming fossil fuels in France: building (43%) and transport (31%). Within the next 5 years, CEA proposes to double its budget and its manpower in these fields, in order to reinforce innovation in renewable energies (electric and hybrid vehicle, buildings, smart grids, solar energy), and to support development of genuine industries.

Energy sobriety and efficiency are a national priority: they require important investments in transport and housing. The integration of renewable energies to the electrical grids cannot be made without developing sufficient capacities of storage, which current technologies do not offer: storage will help smoothing renewable energy production - these energies are intermittent (no solar energy during the night, no wind energy without wind) - and injecting energy for the periods of demand. Research on storage remains essential. Renewable energies also require development of communication and information technologies to the service of the electrical grids: these smart grids will be able to match supply and demand. The modelisation of electricity production from renewable sources is also important and will enable to anticipate the intermittent production.

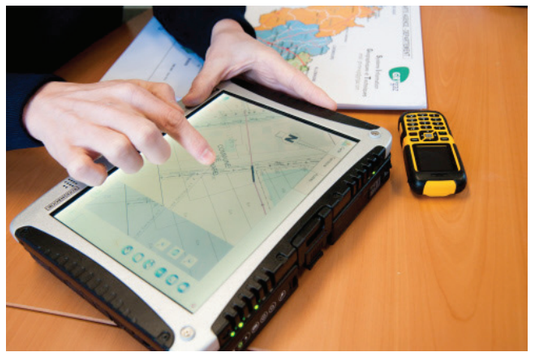
Innovation and investment: keys for the essential development of energy transmission networks

Philippe BOUCLY
General Director of GRTgaz

The energy sector as a whole is faced with enormous challenges. It needs to simultaneously support the competitiveness of our economies and prepare for energy transition, which is indispensable in order to face climate change. The natural gas transmission networks are at the heart of these changes.

The transmission infrastructures constitute essential tools for the creation of a great European energy market and for guaranteeing the continent's security of supply. They also play a fundamental role in the provision of innovative and sustainable energy solutions, while making it possible for companies and private individuals alike to optimise their energy consumption. In order to face this new situation, major investments need to be made. The European Commission estimates the latter at 140 billion euros for the electrical grids and 70 billion for the gas transmission networks. GRTgaz, for its part, plans to devote 8 billion to investment in the development of its network in France over the next ten years. Europe's longest network (32,200 km) is thus set to be supplemented by more than 1,000 km of new main transmission pipelines. To reap their full benefits, these infrastructure investments need to make use of innovation in order to continuously adapt the services supplied to the new needs of the market.

Innovation constitutes a vital lever for the fulfilment of our objectives and should be seen as a continuous process of improvement and perfection. Although the innovative approach, or "innovative attitude", has long been an established policy at GRTgaz, it needs to be continuously consolidated. Our in-house innovation competition, "Challenge des initiatives" [the Initiatives Challenge], involves 25% of the company's workforce every year. When new ideas have been discovered, they need to be backed up, used and disclosed, both within and outside the company. This usually requires a major commitment to the conduct of change. At the same time, a continuous watch needs to be kept in order to enrich in-house procedures with elements observed among other actors (clients, competitors, suppliers etc.). In my opinion, one of the keys to the success of this process lies in greater transverse relations between the various company departments. It involves promoting improved collaboration between the various business processes, technicians, IT specialists and salespeople.



More than a quarter of our agents are equipped with the «Nomade» PC Tablet

In short, innovation needs to be at the heart of a company's corporate vision.

Of course, the desire to better fulfil the expectations of our clients and of the market is one of the principal motors of innovation. A process of intense dialogue with our clients has now been in place for several years. This has made it possible, for example, to considerably develop the services offered by GRTgaz, with a new modular transmission contract and the creation of a flexibility service specifically designed to meet intraday modulation needs. The latter service in particular consists of rapidly supplying large quantities of energy to power stations producing electricity from natural gas. These power stations need to be expanded, since they form the ideal complement to renewable energies, which are intermittent by their very nature. Since electricity is not storable, in the absence of wind or sun gas is able to offer an alternative by means of these power stations, providing the flexibility that is essential for a broad energy mix. Moreover, this effectiveness was demonstrated in action in the course of last February's period of extreme cold, during which the gas power stations were in full operation. It was therefore important to provide them with satisfactory technical and marketing solutions.

The Nomade PC tablet provides our field agents with the necessary software to fulfill their mission in the best possible conditions

The possibility of injecting biomethane – a renewable energy produced from the fermentation of agricultural and household waste – constitutes another major innovation for our network. Our ambition is to inject at least 3TW·h per year into the network, that is to say the fuel equivalent of 50% of the urban buses on the roads in France. When properly processed, this gas will have the same properties and qualities as the natural gas transmitted in our pipelines. A virtuous circle is thus created: waste is eliminated, while producing clean and renewable energy. In addition, transmission by underground pipelines is more reliable than transport by train or road, takes up less space, preserves peace and quiet for inhabitants and respects landscapes. Above all, it consumes less energy and emits less greenhouse gas. Companies that select this solution are thus able to take advantage of an opportunity to reduce their environmental footprint.

IT development also constitutes a major field of innovation. It gives us the means of managing our network in a more effective manner, following the example of what is done in distribution networks with smart meters. In addition, we are currently working on increasing the frequency of publication of available data for our clients, whether industrialists or shippers of natural gas. Our objective is to make it possible for them to optimise their natural gas needs, avoiding possible imbalances between their planned and real consumption.

With regard to the operation of the network, the search for effectiveness calls for the perfection of new tools, such as our "Micado" geographic information system for example. This system allows very easy access to operating applications and to a very wide-ranging body of data concerning the network and its environment. More than a quarter of our staff are already equipped with "Nomade" Tablet PCs. Nomade places all of the necessary software and information (and Micado in particular) at the disposal of our staff on the ground, allowing them to carry out their duties in optimal conditions. It thus allows them to increase their autonomy and effectiveness.

In conclusion, innovation is truly at the heart of our activity. It is major part of our corporate vision and is intended to allow us to achieve our ambition: to be the benchmark transmission system operator in Europe and, according to our slogan, to "Build Tomorrow's Gas Transmission." In the face of the emergence of new paradigms in the energy sector, we are duty bound to deliver ever more attractive and innovative energy services and solutions.

Innovating in order to face the new energy challenges

Bernard SALHA
Director of Research and Development, EDF Group

With the growing importance of the economies of the South and Far East and increasing urban concentration, with more than ten mega-cities a year set to grow beyond the 7 million mark in terms of number of inhabitants over the next twenty years, the world has considerable energy needs, and electricity needs in particular. At the same time, the requirements of protecting the environment and fighting against global warming mean increasing investment in innovation, in order to better control consumption and develop new means of production of carbon-free electricity.

The EDF group is at the heart of these challenges and, with its R&D, which is supported by 2,000 researchers, 15 departments and 12 laboratories, in association with major academic partners, it intends to fully contribute to resolving them. For this purpose, our fields of research and innovation are based on three main priorities:

1. Consolidating and developing a low-carbon production mix. Actions in progress are aimed at improving the safety, performance and operational lifespan of current nuclear power plant still further and developing new reactors, while incorporating the lessons to be drawn from the Fukushima Daiichi nuclear disaster. These are major sources of innovation.

Similarly, hydraulics, fossil-fired energy production, coal-biomass co-combustion, CO2 capture and storage and renewable energies (Photovoltaic Energy, thermodynamic solar energy, onshore and offshore wind turbines and tidal energies as a whole) are also among EDF's fields of research and innovation.

2. Planning the electrical system of tomorrow. The transition to a low-carbon energy economy in Europe means meeting new challenges. Amongst these are optimal management of the intermittence of certain energy sources, integration of new uses of electricity while optimising means of production and network requirements, the elaboration of energy management systems in the local, regional and national networks, the development of grid infrastructures and the optimisation of electricity flows in Europe.

3. Developing a flexible, low-carbon demand for energy. The landscape of competition between different kinds of energy has been profoundly changed by new European and French regulations, the promotion of new uses of electricity (heat pumps, electric mobility etc.) and the development of technical and economic models for sustainable buildings and cities that promote energy efficiency. The emergence of smart interactive communication technologies such as smart grids and smart homes in the energy field constitutes another of EDF's essential areas of research and development.

EDF is not alone in conducting R&D in order to meet these major challenges. Partnerships are opportunities for exchange and openness and constitute an integral part of EDF's R&D. Indeed, they promote the detection, dissemination and industrialisation of innovations and facilitate the group's access to an international pool of scientific skills.

In France, EDF has been developing an active policy of R&D partnerships for several years, with the academic, institutional and industrial worlds, on major issues for the Group such as smart grids, the fight against global warming, sustainable cities, the ageing of power plant installations and renewable energies.

It is also involved in about sixty projects financed by the French National Agency for Research (ANR), the French Environment and Energy Management Agency (ADEME) and the French inter-ministerial funding agency (Fonds Unique Interministériel), many of which are officially certified by the French competitiveness clusters. The future establishment of EDF's principal R&D site at Saclay, alongside major companies and the research centres of the grandes écoles and universities, will make it possible to consolidate this policy over the coming years.

EDF is involved in about sixty R&D projects at the European level, under the seventh Framework Programme in particular, which allow it to explore new subjects, such as the ADDRESS project on smart grids and the PERFORM 60 project on the lifespan of nuclear power stations, for example. EDF R&D also collaborates with major actors in the energy sector on research projects in fields such as dynamic network modelling, with the Canadian electrical engineering firm Hydro-Québec, and offshore wind turbines and underwater networks, with the Norwegian SINTEF research centre.

In the United States, EDF and the Massachusetts Institute of Technology (MIT) are consolidating their collaboration through the implementation of new joint research projects, in fields of major interest for the group such as nuclear energy and energy forecasting.

EDF also intends to ensure that its R&D is at the heart of the innovation ecosystem, via support for start-up companies. Accordingly, since 2009, EDF R&D has put in place an international network for the detection and transfer of external innovations. In 2011, this network became the Open Innovation team. It is present in California and in Beijing and covers Europe with the Chatou R&D site. The team's main objective is to identify innovative start-up companies and propose their services for the Groups business processes, in liaison with its R&D experts and programmes, in order to plan experiments and demonstrations capable of giving rise to partnerships with the best of these companies. It has also joined forces with venture capital funds based in Europe, North America and China, dedicated to the development of start-up companies in the energy eco-technologies field known as "clean technology".

The need for European cooperation in the strategic fields of innovation

Jean-Pierre AUDY
MEP, Group of the European People's Party (Christian Democrats), European Parliament
Member of the ITRE Committee, Industry, Research and Energy

The European Union (EU) is meeting with failure on numerous issues. The most bitter of these is the failure of the Lisbon Strategy, which was decided upon by the heads of state or government during the European Council meeting of 23rd and 24th March 2000 and was aimed at making the European area into the most competitive and dynamic knowledge-based economy in the world by 2010. The central role of science, research and innovation was acknowledged in this strategy.

However, the question of whether all of the lessons have been drawn from this failure needs to be examined, notably with regard to European cooperation in general, and in the fields of research and innovation in particular.

Today, we are pursuing the "EUROPE 2020" growth strategy for the 2011 – 2020 period. The obtainment of growth, driven by a knowledge and innovation-based economy, is among its three priorities. Amongst the 5 objectives that it has set itself, the EU aims to invest 3% of its GDP in research and development. The European Commission has put forward the creation of an Innovation Union. In a specific European Council meeting, held on 4th February 2011, the heads of state or government were clear on this matter. It is essential to seize the opportunity offered by the European Commission's proposals as a whole, which are intended to promote research, innovation and competitiveness in Europe, in order to make Europe the world leader in numerous fields. This will depend not only upon the policies that are implemented with regard to research and innovation, but also upon the EU's capacity to be a motor for innovation. The European Commission is well aware of this and has therefore made the "Innovation Union" into one of the flagship initiatives of the "Europe 2020" strategy and placed innovation at the heart of its proposals for the Horizon 2020 strategy. Naturally, these policies require and are accompanied by measures aimed at consolidating the EU's industrial capacity.

It goes without saying that the innovation aspect is of great importance. While conducting fundamental research based upon the principle of excellence, it is also necessary to carry out innovative applied research and make provision for marketing clauses within the reference framework.

However, we should not delude ourselves; in these difficult times of economic crisis and profound economic change we cannot act independently of each other! Today we are in competition with economic and political powers such as the United States of America, China, India, Brazil, Australia and Russia, which are continents in themselves. Yet, we are not a Nation but a Union of States. It is essential for us to combine our forces, in order to provide common European responses to the major challenges with which we are faced, such as population aging, supplies of energy, water and food, sustainable development, the fight against climate change, industrial policy etc. and to develop the knowledge base which will allow European companies to be more innovative and consolidate their competitiveness.

Europe has an abundance of talents. No one can say where the winner of the next Nobel Prize will be found. No one can tell whence the next innovative idea will come. It is therefore important to consolidate European cooperation and, beyond that, regional cooperation. Not only do we have much to learn from each other but, in addition, the financial aspect must be taken into account. What is the sense in financing 3, 4, 10 or 20 similar projects across the EU, when it would be much more coherent to finance a single such project while allowing exchanges and making them easier. Today, we have the technological capacities to make this possible. One might think, for example, of teleconferencing, which allows research centres, researchers and companies etc., based in different European countries, to make live exchanges with each other. Moreover, within this framework I am delighted with the Information and Communication Technologies Policy Support Programme (ICT-PSP) put in place by the European Commission and aimed at stimulating a wider uptake of innovative ICT based services and the use of digital content across Europe, by citizens, governments and companies in particular. This programme was put in place with the aim of helping to overcome obstacles such as lack of interoperability and market fragmentation.

It has become essential for us to pool our resources!

The best way of avoiding failure for the excellent "Europe 2020" programme is to develop cooperation between the Member States, the European Union and the regions, and to bring resources together rather than dividing them.

We need to be united in our diversity.

Mission growth & jobs: propelling demand for innovations in Europe

Daniel CALLEJA CRESPO

Director-General, DG Enterprise and Industry, European Commission

A response to the European Council's conclusions:

"Creating the best possible environment for entrepreneurs to commercialise their ideas and create jobs and putting demand-led innovation as a main driver of Europe's research and development policy"

A well-functioning EU internal market for innovative products and services will attract a new generation of high-tech manufacturing businesses and services. It will create high-skilled jobs in Europe. This must be a key ambition for the EU. Therefore, public policy should shift up a gear to bolster innovation-friendly markets, where private actions and public policies encourage demand for innovation. Demand-led policies create incentives for innovation by using public and private procurement, regulation, standardisation and end-user engagement. The use of tailored packages of such demand-led policies could drive fundamental transformation in industrial sectors and support the emergence of new growth markets (e.g. in shipping or electronics).

Europe's sizeable public sector needs innovative products and services to adapt more quickly to the rapidly changing societal needs, for example in the field of eco-innovation[1]. Moreover, winning a public contract for an innovative product is very important to companies[2], because this often leads to increased sales to the private sector. However, the European Commission's 2011 Innobarometer[3] showed that only 14% of surveyed companies had won public procurement contracts in the last two years.

The 2011 Innobarometer showed further that despite the economic crisis more than one-third of companies introduced innovative products or services over the last two years. So, even during the recession, business transformation moved ahead at a relentless pace. However, the innovation performance of other regions (especially Asia) is rising rapidly[4]. Europe risks losing important investments as companies will locate their innovation activities in those markets with earlier and quicker uptake of innovation. Therefore, we need to increase the uptake of innovation in Europe. There are many different reasons behind the slow uptake of innovative products and services in Europe. The box below contains some of the main obstacles.

Root causes - what slows down the demand for innovations in Europe?

- fragmentation of markets;
- scant attention by public purchasers;
- conflicting regulation and red tape;
- conflicting standards;
- poor information levels about products and services;
- high price of innovation.

Harnessing innovation demand as an investment in our future:

In times of crisis we need additional measures to help turning innovative ideas into new marketable products and services, creating jobs and growth in Europe. A well-functioning EU Single Market for innovation should be ensured. There is a vast potential in harnessing the demand-side in innovation policy development to promote the uptake of innovative products and services.

Public and private procurement, regulation, standardisation and end-user engagement can create incentives for the demand of innovation. The long and arduous journey to market needs to be cut, while creating incentives for developing new forms of innovation. Innovation is not only about new technologies and bringing scientific breakthroughs to the market. Non-technological innovation, e.g. in design or services, can play a major role for our economic development.

From a policy perspective, the European Commission has considerable experience in demand-led tools such as the Lead Market Initiative, which deployed a diversified set of policy tools in six pilot areas (eHealth, protective textiles, sustainable construction, recycling, bio-based products and renewable energies). Networks of public procurers and developing European Innovation Partnerships are other demand-side policy instruments developed by the European Commission.

To answer the call for action by the European Council for demand-side innovation policies and building on our extensive experience in this field, the services of the European Commission will be working with EU Member States, industry and civil society to put effective demand-side innovation policies in place in 2012 and beyond.

The European Commission will soon launch a public consultation on demand-led innovation policies, inviting contributions on the policy measures, on the target sectors and on how policies should be implemented. The Commission's proposal for the future research & innovation framework programme Horizon 2020 foresees the funding of a wide range of demand-side actions.

In conclusion, Europe cannot wait for game-changing breakthroughs to emerge from our research communities to overcome the crisis. We need to focus on stimulating the demand for innovation – there is no time to lose.

1. 2011 Eco-innovation action plan: http://ec.europa.eu/environment/etap/inaction/policynews/772_en.html
2. See http://underpin.portals.mbs.ac.uk/
3. The Innobarometer 2011 published in April 2012.
4. European Innovation Scoreboard: http://ec.europa.eu/enterprise/policies/innovation/facts-figures-analysis/innovation-scoreboard/index_en.htm

Public Procurement driving growth and efficiency

Malcolm HARBOUR

MEP, Conservative Member of the European Parliament, representing the West Midlands Region of the UK
Chairman of the Internal Market and Consumer Protection Committee, which includes Public Procurement rules within the remit

We need far better opportunities - both in quantity and quality - for businesses to benefit from the public sectors' enormous buying power. Public procurement accounts for over 16 percent of EU GDP yet this spend is presently not readily available, in particular to smaller and medium sized businesses. The need for the public sector, including Universities, to search for innovative solutions to the problems caused by growing demand and frozen or shrinking revenue streams is real. The public sector needs a change in culture to fully embrace the practice of presenting its requirements to business, and including them in the process of devising innovative and optimum solutions. It is imperative that public bodies entrust the business world to come up with the answers rather than attempting to micro-manage and specify every detail of the solutions they seek in isolation.

Successful businesses for their part must also drive the delivery of innovative proposals for quality, efficient and modern public services. These are seldom the hallmarks of public bodies but are those of our most innovative enterprises, and they are now desperately needed attributes for spending taxpayer's money well.

Public procurement is still being held back by a straitjacket of bad policy but changes recommended to the EU rules will cut red tape. I chair the European Parliament committee on the Internal Market which is responsible for EU law on public procurement, and we are working hard to make the process smarter and more focused on innovative public service delivery, while providing more opportunities for entrepreneurs and better quality for citizens. Amongst other proposals to modernise the system, my Committee supports sweeping simplification and more flexibility in applying the rules. I am delighted that as a result the Commission is considering a new chapter in the rules to foster the creation of Innovation Partnerships which will encourage public buyers to set ambitious outcomes and work with suppliers to develop and implement new solutions.

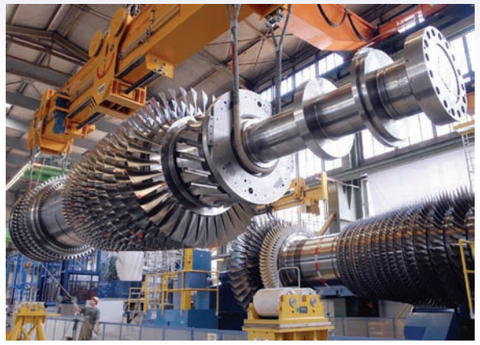
We are also urging public bodies to look at the whole life cost of contracts and consider what factors other than lowest price they should include in tender specifications. For example the higher environmental footprint or more expensive recycling costs of certain office hardware solutions or public transport systems, might well make for initially lower bids, but which are more onerous overall. Lowest price isn't always best value for money at the end of the day. Before publishing a tender, public bodies should also consider the way in which they might divide contracts up into lots with the advantage of widening the pool of potential SME suppliers and inviting more specialist companies to get into the market offering solutions to particular problems rather than trying to come up with solutions that take them too far out of their own area of expertise.

We hope that this legislative reform, accompanied by new European schemes to support innovation in public markets, will open a new era in EU public procurement. We want the rules to support good procurement, and no longer to be a constraint on good practice.

A melting pot of knowledge

Siemens and the European Commission join forces in research to increase competitiveness

March 23, 2012 saw the crowning of a new European champion. Not the top European soccer team – that won't be decided until June – but the continent's No. 1 patent applicant. And of course, it's no accident that Benoît Battistelli, the President of the European Patent Office, presented the award at the SiemensForum in Munich: Siemens is Europe's new patent champion. Always enthusiastic innovators, employees of the 160-year-old company have consistently been among the leaders in the patent statistics. Now, in the 2011 Patent Applicant Ranking of the European Patent Office, they've captured the No. 1 spot for the second time.



The world's most efficient gas turbine is now in operation in a power plant in Irsching, Germany. A large number of patents are safeguarding technological leadership and jobs - not only in Germany.

This success comes as no surprise since the number of Siemens invention reports has been steadily increasing over the past few years. In 2011, the company reported about 8,600 inventions or roughly 40 per workday. That's ten percent more than in fiscal 2010. And the number of initial patent filings has also been rising. In 2011, the figure was about 4,300 – a 15 percent gain over the year before. Today, every second Siemens invention report yields a patent. The increase in the efficiency of the company's 27,800 researchers has been remarkable. Per employee, the number of invention reports has doubled since 2001.

Focused patent activities safeguard competitiveness

The figures are impressive. And Benoît Battistelli had only plaudits for Siemens and its CEO Peter Löscher at the Munich awards ceremony. Still, patents are not an end in themselves. They exist to maintain and enhance market competitiveness. As a result, Siemens has around 220 patent experts engaged in active patent portfolio management. Their job is not to push the number of patents granted – some 53,300 in fiscal 2011 – even higher. It's to ensure that Siemens' patents always match its business strategy. That's why key patents are always expanded before the introduction of new technologies. Today, Siemens' patent experts are focusing their activities on promising areas like gas turbines. For the world's most efficient and powerful gas turbine – which is now in operation in Irsching, Germany – Siemens began implementing a focused patent strategy in 2001. At the height of the development phase, the builders of the 444-ton powerhouse – the turbine weighs as much as a fully fueled Airbus A380 – averaged one patent application per month.

Siemens' success in protecting its intellectual property in Europe shows how important the company considers the continent to be. Europe is the world's largest single economic area. Despite globalization, it continues to be Siemens' most important market. The same applies to the German economy as a whole, which ships 60 percent of its exports to other EU countries. German companies profit from the European common market. At the same time, Germany, as the continent's economic driver, is playing a leading role in, among other things, mastering the current financial crisis.

For a continent like Europe that has few natural supplies of raw materials, patents are a vital resource. A further resource – and perhaps the most decisive – is a well-educated populace that can generate patents and ensure that the flow of innovation is never interrupted. And innovation is crucial if Europe is to remain competitive at a time when consumer goods can be manufactured more cheaply elsewhere.

For this reason, the EU Commission is forcefully promoting research in Europe – for example, through framework programs that bring together the best and brightest from the continent's research organizations, universities and companies in order to enhance international competitiveness. Investments in joint research projects have increased substantially. In the first research framework program, which ran from 1984 to 1987, €3.3 billion was earmarked for research. The seventh program, which covers the period from 2007 to 2013, has a research budget of €54 billion. And the figure for the eighth framework program is projected to total €80 billion. Even more would be desirable since other countries – primarily Asian nations like China, India and South Korea – are increasing their R&D investments considerably faster. Only a few EU members have reached the target set by the Lisbon strategy – an increase in European R&D outlays to three percent of GDP. Most countries – including Germany – still have a way to go.

An open European research area

But money alone isn't the answer. Funds also have to be spent wisely. The EU Commission knows that they can't be thinly distributed and that the value of a European research area lies in networking. No one university has all the expertise or resources needed to fully cover a research field. Progress in research requires information exchange between the best and the brightest. As many companies have discovered, "open innovation" is just another word for something that European researchers – and Siemens – have already been doing for nearly three decades.

But economic growth and job creation are only possible if research and business are closely allied. For this reason, Siemens has been participating in EU research projects since the first framework program was launched in 1984. The company is currently involved in some 50 projects. About a fifth of Siemens research is embedded in publicly supported cooperative projects. This shows how important EU research programs are for the company. But it also shows how much a major company like Siemens can contribute to the European research area. In 2011, Siemens invested some €3.93 billion in R&D. In 2012, this figure will be increased by a further €500 million. The European research area and Siemens are partnering to profit from one another.

The Internet of Things at Work shows what this partnership looks like in practice. Coordinated by Siemens, the EU project, which is part of the seventh research framework program, is developing an internet system that links things rather than people – in particular, the components, tools, transport containers, materials and machines used in manufacturing and logistics. Vast amounts of data are exchanged every second between objects and control software to ensure that processes run smoothly. The Internet of Things increases the flexibility of manufacturing and logistics so that even very small production runs are economical. Such flexibility is an important advantage for a high-wage location like Europe. At the same time, the system must be protected against cyber attacks – an aspect on which Siemens experts are intensively focusing.

Renewable energy storage with the hydrogen electrolyzer, cells and membranes of which being controlled by a researcher.

But the company is also active in the European research landscape on a private basis, participating in some 1,000 targeted projects with research institutes, universities and industry partners every year – many of them in Europe. Siemens maintains very close contacts with a number of top universities, where it's established Centers of Knowledge Exchange (CKIs) at which key account managers and mentors exchange information directly with scientists. The company has four CKIs in Europe – one of them at the Danish Technical University (DTU) in Copenhagen.

Top graduates for top research

Such cooperative projects benefit all participants. Scientists profit from the resources of a major company and can be assured that the results of their work have significant application potential. The company, on the other hand, gains access to the latest research findings and the best university graduates. In today's knowledge society, the competition for talent is intense. That's why diversity – the cooperation of people from different cultures and with different ways of thinking and different types of specialist knowhow – is of great importance for Siemens. To succeed, companies need the best people – regardless of their gender, nationality or religion. As a result, there's now a wide range of lucrative job opportunities for well-educated specialists throughout Europe.

Siemens' own research activities are only the tip of the iceberg. The company also creates jobs at the institutes, universities and research organizations with which it cooperates. New technologies that succeed on the market generate jobs in industries in which Europe is the trendsetter. Environmental technologies are the prime example here. In fiscal 2011, Siemens generated revenue of some €30 billion with its Environmental Portfolio. This figure is expected to reach €40 billion by 2014. The portfolio encompasses all the products and services that enable Siemens' customers to reduce their energy consumption and emissions and protect the environment. About 132,000 of the company's 360,000 employees now work in areas that contribute to its Environmental Portfolio – a proportion that is also expected to increase.

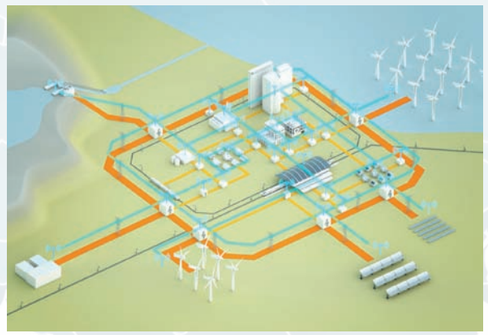
Siemens' Environmental Portfolio is a good example of how the company's research activities are creating jobs all over Europe. Roughly 12,000 Siemens researchers and developers are employed in Germany, while many product-related development and manufacturing activities are located in other European countries. For example, Siemens produces its ecofriendly metros and trams at a plant in Vienna, Austria. The Oslo metro – probably the world's most resource-friendly railway, with a recycling quota of nearly 95 percent – was also built in Vienna. In the Danish city of Brande, Siemens is developing and producing wind turbines that – due to their robustness – are popular with wind farm operators worldwide. Construction of record-setting gas turbines like the one now in operation in Irsching, Germany is planned to start in Saint Petersburg in 2014, bringing 500 new jobs to the city. And wherever Siemens produces ecofriendly systems, other companies come as suppliers. As a result, jobs at Siemens are always a lever for additional jobs at small and midsized companies in Germany and other EU countries. For example, 300,000 new jobs have been created in Germany in the area of renewable energies in the last few years – thanks in many cases to Siemens.

The company's Environmental Portfolio doesn't only include products and solutions for the generation of renewable energies. It's also helping transform the energy system in the area of power distribution. For example, in anticipation of the EU Commission's recommendation of March 2012 to replace 80 percent of all electricity meters in the EU, Siemens is now offering smart meters that enable customers to better monitor their power consumption and take advantage of lower prices on the electricity market.

Focus on people

The energy transformation now underway is a truly herculean task. But the greatest hurdles are not technological. Due to intensive research in the last few years, many of the technologies needed for the smart grid of the future are now ready for application. But these successes are of little value if users don't cooperate. From their perspective, there's little need to introduce smart grid services. Electricity supply is still reliable and relatively cheap. The smart grid initiative is currently being driven by the utilities and grid operators who will have to cope with increased use of renewable energy sources. The map in the EU Commission's Joint Research Center now shows more than a dozen smart grid projects in Germany alone – most of which are testing new technologies.

In a joint project with the Allgäuer Überlandwerke, a utility in the south of Germany, Siemens is trying something different. In a pilot project in the small town of Wildpoldsried, the company has placed the focus on prosumers – that is, electricity consumers who also generate power with solar and biogas systems, for example. The partners are experimenting to find ways of harmonizing people and the power grid in order to identify the advantages for the test participants. The project also features 30 electric cars, which can be charged decentrally using the energy produced and can help buffer grid fluctuations. Feedback from participants has been very positive. But acceptance won't come overnight. The residents of Wildpoldsried have been active in energy production for 15 years now and currently generate twice as much power as they consume.



A lot of research has been done to make the smart grid and thus the integration of renewable energy into the grid work.

Siemens, the global company, and its project in Wildpoldsried make one thing clear: the transformation of the energy system will require an integrated approach that leverages R&D efforts Europe-wide. Only by networking will it be possible to master the technological challenges and develop lead markets. But the technologies will have to be implemented locally by committed citizens in order to bring the benefits of Europe's technology to people and create jobs.

A revolution is underway: the sustainable approach of construction

Gaëtan DESRUELLES
Executive Vice-President, R&D, Innovation and Sustainable Construction, BOUYGUES Construction

Although construction is usually considered to be a sector in which tradition holds sway, seldom as today has it been possible to associate it so strongly with the notion of innovation. Indeed, the intensity of innovation in construction is such that we can readily declare that we are not building "as before" anymore. This represents an almost unspoken revolution while the challenges and consequences of the ongoing changes are considerable.

Driven by economic, social and environmental factors, construction is an activity with an embedded capacity for contributing to solutions to be implemented on issues like CO2 emissions reduction, economy of natural resources or even global quality of life for populations.

In this dynamic context, the building industry has quickly become a natural epicentre for the application of new technologies but also a privileged investigation domain for many Research and Development centres of various industrial sectors: new materials, air treatment systems, renewable energies, lighting, information technologies etc. These technological evolutions combined with the creativity of architects and the builders' know-how have turned buildings in aggregators of innovative solutions, with the objective of improving evermore performances, be it for energy saving, saving of water and other natural resources, or improving indoor air quality.

Energy in these last years has been at the very heart of preoccupations and the level of performance reached - passive or positive energy buildings – might lead us into thinking that most of the path is behind us, but this is far from true. The latest technologies that we are applying today will probably seem very obsolete to future generations who will be able to rely on newer solutions.

If the diversity of parameters to take into account for one given building site - geography, climate, local resources, regulation, usage, life styles,... - may lead into thinking that there is only one solution at the crossing of all these varying parameters and that each building is a particular case, a prototype, which is what we can often hear, there nevertheless remains an important work to be done on construction processes. The solutions to be elaborated for allowing the implementation of large scale retrofitting programmes which are key to reach the objectives of CO2 reduction represent the first challenge, immediately followed by the integration in construction of quality objectives close to those of the industry. This industrialisation of construction processes will also have to pursue the objective of reducing the duration of works in order to limit environmental impact as well as overall costs.

Be it the living place or the working place, citizens in developed countries spend more than 90 % of their time indoors. The strength of this statement should have led to the hypersensitivity of inhabitants to the suitability of these indoor spaces and to their quality. This is far from happening. The urban planning and building construction rarely give room for debate with future dwellers. In the large majority of cases, the future user's sole flexibility is to adapt to an environment that was planned and built assuming his expectations and its usage.

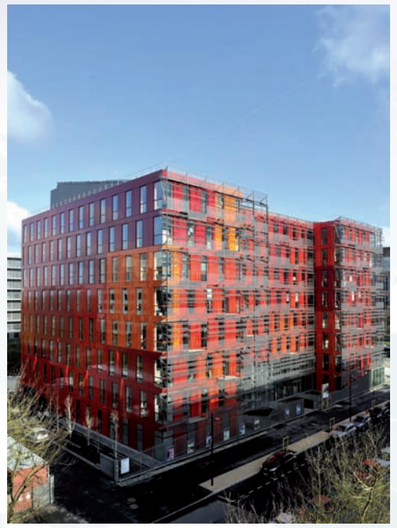
What is the European Union's position on these matters? What role does it play?

In this framework, the policy followed by the EU since 2007 allowed both to guarantee a progress in the performance of the quality of construction and to bring together the private stakeholders around common objectives. For the Construction sector, the 7th Framework Programme 2007-2013 for R&D (FP7) constituted a noteworthy turning point. Indeed, it all began with the creation of the European Construction Technology Platform (ECTP) in 2004, during the preparation of FP7: a concept created by the European Commission and enthusiastically implemented by stakeholders from civil society, at the instigation of major companies. Then, Energy-efficient Buildings (EeB), one of the first Public-Private Partnerships (PPP) for Research, was launched in 2008, within the framework of the EU recovery plan. Moreover, the Energy Efficient Buildings Association (E2BA), an offshoot of the ECTP, established itself as one of the European Commission's strategic partners for ensuring optimal use of the 500 million € devoted to this field under FP7. In the current preparation of Horizon 2020, which must follow up to FP7, it is important to confirm this Research PPP's strategic role and to ensure its permanence.

GreenOffice of Meudon, positive energy building
Photo : L. Zylberman / Architect : Ion Enescu / ATELIER 2M

The stakes in construction for the EU are considerable and obviously so are the underlying stakes for R&D in this area. The solutions that will be fine tuned to launch rapidly large scale retrofitting programmes will allow reaching highly significant results in terms of CO2 reduction, but also will have major social consequences by contributing to the reduction of "energy precariousness". As the construction cannot be delocalised, the benefits on employment will be immediate, massive and happening where the EU will choose to intervene.

Everything related to construction is having such an impact on the life of populations, individuals and on environment that the level of expectation but also of implication from the EU can only be that of excellence: excellence in the programmes conception, their implementation and in the collaboration with all concerned stakeholders. This requirement for excellence equally concerns the industrials associated to the implementation of those programmes.



Australia building, ETDE's new headquarters in Montigny-le-Bretonneux, HQE certified (High Environmental Quality) and BBC-effinergie (Low energy building)
Photo : L. Zylberman / Architect : Hubert Godet

In its recent Communication on Innovation in the European Union, the EU launched the concept of "European Innovation Partnerships" (EIP). Amongst those planned, the "Smart Cities EIP" is an ambitious concept aimed at sustainable city development, via the interconnection of their building, transport and energy infrastructures by means of an intelligent information network: the Smart Grid. This technology still requires significant research and must not lead to relaxing the efforts on energy performance in buildings on its own. The EU should be praised for its leading role, its global vision and for its continuing support on this issue. Each building must be seen as a high potential contributor to energy management but also among others to water saving.

On the latter, a new initiative undertaken by the European Commission is the preparation of the "Blueprint on Water", upon which work will be continuing throughout 2012. The construction sector will involve itself with the same conviction, in order to ensure that progress is made in the management of water in buildings with the same success as for energy. Once again, Research, Development and Innovation will be key factors in this respect.

Since construction companies have multiplied activities in R&D to improve energy efficiency in buildings with the support of the EU, very high level performances have been reached. The solutions that make these results possible are technically and economically applicable on a large scale. The reinforcement of legislation combined to the implementation of ambitious retrofitting programmes will allow in the mid-term the EU to near or reach its objectives of lowering CO2 emissions.

Connecting cars, saving lives: the automotive industry challenge

Steve WAINWRIGHT

Vice-president sales & marketing, General manager Freescale EMEA

The recent ups and downs of the automotive market, as well as the shift in demand for cars from developed countries to emerging countries, have been masking the fact that the industry as a whole is undergoing a major structural change. We have known for years that innovations in the automotive segment are becoming more and more dependent on electronic components and software. The car has evolved from a purely mechanical system to an information system, that embeds more than 4km of cables, and it is probably the most computing intensive platform the consumer owns today. Three large trends currently drive the industry forward and give us hope for growth in the automotive market for the next decade: energy efficiency and emission reductions, safety and the reduction of worldwide traffic-related deaths, the "Connected car" or the interconnection of the car with the environment. All are based on innovation, research and development, all plays with the key European industrial strengths, all demand a significant change from the industry.

"By the time you read this, someone has been killed or seriously injured in a road accident…"

- World Health Organization Statistics.

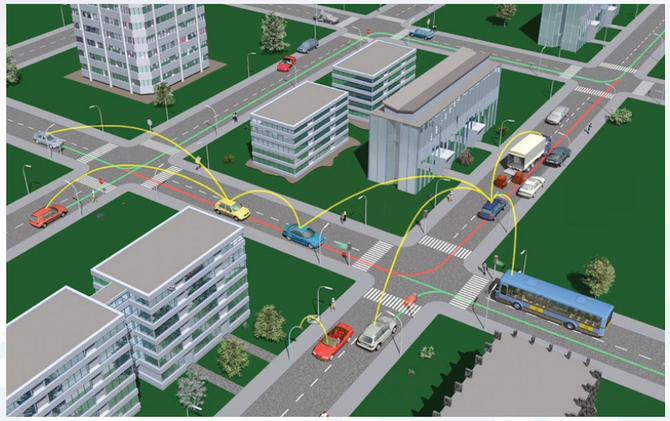
I will focus on safety, as it is probably the most time critical item the industry has to address. Unbelievable progress has been made during the last decade. Passive safety systems first, or "Guardian Angel" functions like Airbags, have achieved a high level of penetration in the developed markets. Even if a bundle of measures is still required to make these systems a standard requirement, the fruits of these investments have lead to a clear reduction of traffic-related deaths.

We are now also seeing a plethora of new, active safety systems, or "Copilot" functions like Lane Departure Detection or EPS, which will ultimately prevent accidents from happening. Radar technology and cameras are finding their way into the automobile adding to the sensors already present today.

The next move will be the one to the "connected car", which can be split into car to car communication and car to road or infrastructure communication. The safety benefits are enormous. The basic application would be the one of a road incident. If a vehicle has or detects an incident, this information can be broadcasted to all vehicles in the close vicinity. If the receiving vehicle detects that the incident is ahead it provides corresponding information to the driver, warning him he has to slow down or be careful. This can be extended to any hazardous situation, such as road works, icy roads and, traffic jams. Connected vehicles will also have the ability to "see round corners". As the driver moves to turn and will be informed of hidden danger, whether it is pedestrian or vehicle.

Another example would be related to green light speed advisory. The traffic light could broadcast information to nearby vehicles. This includes information about the topology of the intersection and the phase schedule of each traffic light signal. Approaching vehicles can receive this information and calculate the optimal approaching speed. At optimal approaching speed, energy-efficiency is improved and stops may even be completely avoided.

Lastly, we could think about a Self-Organising Traffic Information System using car to car communication to collect information on the local traffic situation. Vehicles gather information such as average velocity for all driven road segments and send it to other vehicles. In this way, an up-to-date traffic analysis for a local area can be obtained in a highway scenario, even if only 1-2% of all vehicles are equipped with the ad hoc communication system. Adaptive Cruise Control system could take control of the speed through accelerator & brakes, plus steering to nudge back into lane and manage speed of all cars on the motorway to avoid stop/start oscillations. This would ultimately lead us to a vehicle that could become autonomous in case of danger or particular road traffic conditions, dramatically improving safety, as well as fuel consumption.



"I'm not in the business of helping people tweet better. I'm not in the business of helping people post on Facebook better". David Strickland, Administrator of the National Highway Traffic Safety Administration, USA

We have to be clear on one critical point: "the connected car" is not the transformation of the vehicle into a consumer device, aimed at texting, chatting, tweeting. There is a difference between technologies that help the driver or enhances vehicle safety and services that distract people from driving safely. We're not going to dispute that people want these services in the car. They do, we've all done it. But do you know the cost? Distracted driving is a factor in 25% of accidents in US, and accounts for 16% of all traffic fatalities. In US alone 5,000 are killed & 450,000 are injured due to distracted driving each year (NHTSA).

Drivers will use Smartphones in their cars. We cannot rely on unenforceable legislation, but we have an obligation to make it possible and safe, by relying on embedded car connectivity solutions that show the driver the right information, whether it is safety or infotainment information, at the right time using the right interface - very likely multi-sensory interface. Those infotainment, comfort features could help stimulate the penetration of safety driven applications.

How much does the automotive consumer value safety? The answer could be given by the top two options selected today: leather seats and alloy wheels. Some work is clearly still to be done in defining the services that can drive business models to encourage the roll out of the connected car. To develop this, companies that are sometime competitors – car manufacturers, OEMs, telecom operators, internet providers to name a few - will have to get together in partnerships that at first sight could be seen as "unnatural" but that will for sure benefit to all the players.

There are different scenarios for connected car penetration, the difference between the conservative and the aggressive number is basically legislation. We have the opportunity to tackle the stats on road accidents with the adoption of these new technologies - the technology is ready, the trials have been successful. If the governments do not legislate or in some way incentivize the adoption of connected car technologies, for example trough reduced road tax or insurance premiums for compliant vehicles, and then we will have to wait a long time to have the penetration that is needed to have a big social impact. Whether it is an impact on safety and fatalities, or on energy savings, or more broadly on the European industry, as the connected car development brings together automotive, telecom, software and services industries all together.

Israel's Scientific Challenges and Innovation in the Water Field

Shaul ZEMACH

Director General of Israeli Ministry of Energy and Water Resources

Israel is located in a semi-arid region where water supply is scarce and a major cause to conflicts and wars. Since its foundation in 1948, Israel has placed great emphasis on maximizing its limited water resources and has become a world leader in water management and innovative technologies.

The rising world population, urbanization, and global warming have resulted in a decrease in the availability of drinking water, massive water shortages, floods and water contamination, impacting health, agriculture, economy and international relations on a global scale.

All natural water resources in Israel are national assets managed by the water authority. Water supply is operated by the national water company «Mekorot». Recently, private sector companies have also entered the market mainly in areas such as desalination and reuse wastewater as well as municipal water services. Furthermore, by 2014, desalination plants operated by private companies will supply around 600 million m3 of water per year, nearly 50% of the country's fresh water consumption.

Water supply system in Israel is linked by a national grid around the National Water Carrier of Israel of fresh water. In addition, reclaimed wastewater goes through another national wastewater carrier and conveys water from the central wastewater treatment plans to the Negev Desert for agricultural uses.

Some examples of Israel's achievements due to breakthrough technological innovation in the water arena:

- Israel, with an 80% wastewater reuse rate, is the world's leader in wastewater reuse.[1]
- Drip Irrigation helped achieve70%-80% of water efficiency in agriculture, which is the highest rate in the world.
- Israel is home to one of the largest Seawater Reverse Osmosis (SWRO) desalination plants. RO desalination process was first promoted in UCLA (USA) by Prof. Sidney Loeb from Ben Gurion University, who built the first installation in the USA in 1965 and the second in Israel in 1968. Israeli SWRO facilities are highly energy efficient with less than 4kWh/m3.

Research and development is heavily supported by the government.

Israel in a nutshell

Total area: ~22K square kilometer.

Location: Middle East, a semi-arid area.

Population: 7.6 million

Water & Wastewater in Israel

Capita water consumption: 90 cubic meter per capita per year.

Water supply: continuous, central national grid, drinking quality.

Five seawater desalination plants will supply ~50% of the fresh water

Fresh water supplied to neighboring countries: ~10% of total fresh water.

93% of the sewage is treated to secondary and tertiary quality (90% will be tertiary in 2016).

80% of the treated wastewater is reused for agriculture.

Water for agriculture (2010): 48% potable, 38% reclaimed wastewater, 14% brackish.

Water for agriculture (2050): 26% potable, 67% reclaimed wastewater, 7% brackish.

Examples of major R&D topics:

- *The Energy-Water Nexus*

Water desalination, pumping, distributing, wastewater treatment and disposal systems take a significant amount of energy. Developing novel energy efficient solutions for global water challenges is a top priority. New energy efficient desalination and pumping technologies have already been implemented successfully. Much attention is still devoted to reduce water losses and flow disturbances in distribution pipelines.

- *The conservation of natural water resources and water quality*

Technologies are developed to identify and treat various water pollutants; developing water demand management and integrated resource planning strategies, as well as monitoring and evaluation systems that utilize scientific knowledge in decision making processes.

- *New water resources and sustainable development*

Focusing on improving existing technologies without damaging or undermining society or the environment, research institutes are working to advance technologies such as water desalination, surface runoff collection and storage, and cloud seeding. In particular, strategies in development include improving energy efficient technologies, desalination membranes, and pre- and post-desalination treatment.

- *Wastewater reuse*

As a world leader in treated wastewater mainly for agricultural irrigation, Israel's R&D centers focus on monitoring capabilities that would prevent damage to agricultural land and crops, advancing technologies in areas such as irrigation and wastewater treatment, including complementary technologies such as disinfection and filtration.

The Government promotes R&D cooperation programs between research institutes, industry and public entities. For example, the government is supporting joint projects between the municipal water supply and sewage treatment corporation and startup companies, where the latter are incentivized to apply their technologies in local municipalities. Furthermore, the government supports technological incubators that give entrepreneurs an opportunity to develop their innovative technological ideas and set up new businesses in order to commercialize them.

In addition, a national water technology center was established to assist innovators and entrepreneurs starting with idea origination and progress, through basic and applied research, to technology development and commercialization.

Israel is looking forward to sharing its expertise and experience, and building new collaborative partnerships in research and development on the basis of mutual interest and mutual benefit.

Panoramic view of the Judean Desert, Israel

1. The second largest wastewater reuse is in Spain, with a rate of 17%

CEITEC - Central European Institute of Technology: Centre for Research in Life and Material Sciences

Tomas HRUDA
Executive Director CEITEC

CEITEC is a centre of scientific excellence in the fields of life sciences and advanced materials and technologies, whose aim is to establish itself as a prestigious European centre of science. It is a consortium whose partners include the most prominent universities and research institutes in Brno, the second largest city in the Czech Republic and the capital of inovations boasting with potential of more than 90 thousand university students. The Centre will feature modern laboratories with state-of-the-art instrumentation, technologies and infrastructure for six hundred scientists, twelve hundred students and hundreds of innovative companies from the region as well as abroad.

CEITEC's vision

"We create a centre of scientific excellence whose results will contribute to the improvement of QUALITY OF LIFE and HUMAN HEALTH"

The Institute will grow to the worth of €208 mil. in Brno in 2014. The project CEITEC was approved by the European Commission on 6 June 2011 as the first finally approved large project of a centre of scientific excellence in the Czech Republic. The source of funding is the European Regional Development Fund to be financed through the Operational Programme Research and Development for Innovations.

CEITEC's mission

- to produce excellent scientific results and to utilize synergies in research in the fields of life sciences and advanced materials and technologies
- to create optimum working conditions for research supported by a state-of-the-art infrastructure, independent evaluations of results and the backed by the best scientists
- to support high-quality education and the development of scientific talents
- to encourage the transfer of research results into practice and to foster the development of innovative companies in the region, the Czech Republic and abroad

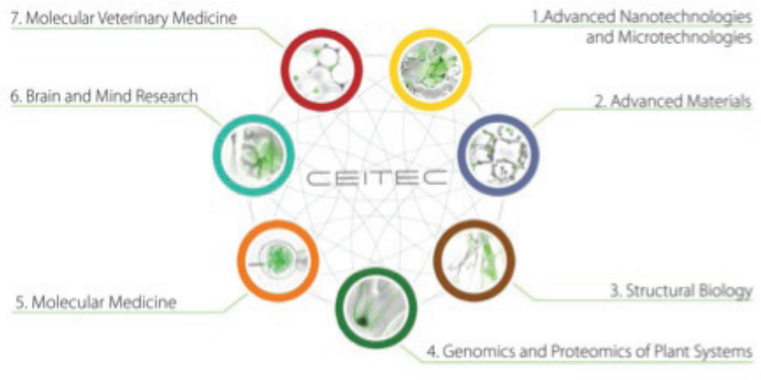
Multi-departmental centre

Multi-field CEITEC is in fact the first type of a scientific centre in the Czech Republic to integrate research and development in the fields of life sciences, advanced materials and technologies in such a large range. The research is divided into seven programmes: Advanced Nanotechnologies and Microtechnologies, Advanced Materials, Structural Biology, Genomics and Proteomics of Plant Systems, Molecular Medicine, Brain and Mind Research and Molecular Veterinary Medicine.

New modern laboratories of an area of 25,000 m2 will grow in the University Campus of Masaryk University in Brno - Bohunice and in the Brno University of Technology Campus "Pod Palackého vrchem". Almost 700 special instruments and unique facilities will be selected and acquired based on the specific needs of scientific teams. The key equipment is concentreted in 10 Core Facilities, within which will be housed state-of-the-art technologies accessible not only to the scientists from CEITEC, the whole of the Czech Republic and Europe, but they will also help to foster cooperation with inovative companies.

International management and cooperation

The management and setting of the centre is assessed by recognized foreign experts according to strict international standards; the internal language is English. The key managerial positions are occupied by recognized foreign experts. The Research teams are regularly evaluated by an independent team of independent foreign experts in the given fields.



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