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Science in Society Forum 2005:



Setting the scene



SCIENCE AND SOCIETY



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Foreword



Research and development has long been a vital catalyst for European economic growth. Halfway through the Lisbon process, it has become clear that Europe needs to pump more investment into R&D, if it is not to slip behind its major competitors. This is a critical juncture for European competitiveness.

As European Science and

Research Commissioner, I intend to create a new momentum for European science. The goal is to reinforce what I call the 'knowledge triangle' of education, research and innovation. In other words, we must become better at creating knowledge through research, at diffusing knowledge through education, and at applying knowledge through innovation.

Investing more in science, and creating the right regulatory and financial conditions, are vital parts of the new strategy. But these alone are insufficient.

It is also essential that our science policies meet the needs of European citizens. To ensure this, we must redouble our efforts to reach out to society: this is why the Science in Society Forum is so important.

I believe that to bring science closer to society, science must be made a public endeavour. The public has to be kept aware – and be capable of scrutinising – new scientific and technological pathways and, as the consumers of tomorrow, be able to make informed choices on the fruits of technological progress.

We need to promote scientific awareness and culture, and find ways to engage with the public in science-based policy-making. This is at the heart of the European Commission's position on scientific governance in the EU, which recommends broad civil society participation in all stages of the policy-making process.

Let me stress that none of this calls into question the academic freedom of responsible scientists. It is simply a matter of opening up research policy – as with all EU policies – to the fresh air of democratic accountability. If we get it right, we stand to gain the triple prize of an engaged and well-informed public, the opening of exciting new research avenues, and the development of robust public policies based on scientific assessments.

The EU is well aware of these challenges and, as you will see in this brochure, it has taken massive strides towards a more inclusive scientific culture since it launched its flagship Science and Society Action Plan in 2001.

In reviewing what we have achieved and mapping out what is still to be done, the Science in Society Forum 2005 will help to ensure that science is not apart from, but rather a part of, society.

A handwritten signature in blue ink that reads "Janez Potočnik". The signature is written in a cursive style with a long horizontal line extending to the right.

Janez Potočnik

EU Science and Research Commissioner

Science in Society – an introduction

People describe the current era in many ways. They call it the information age, or the post-industrial age. But above all, we are increasingly aware that we are living in a knowledge age. Science and technology have acquired a pivotal role in modern society. They underpin almost every aspect of our lives.

Many of the things we take for granted – from switching on a light, having drinkable water on tap, phoning our friends in Africa – would be unthinkable without science and its technological applications.

The world around us is changing at a phenomenal pace. Most adults can remember a time when their lives were significantly different. For instance, although many of us cannot imagine life without our PCs, the internet and mobile phones, many of these ‘indispensable’ technologies are fairly recent arrivals.

This trend looks set to accelerate for future generations.



A constant endeavour

One reason for this is that science has become ‘hard-wired’ into our society. Since the Enlightenment, the pursuit of knowledge has become consistent and systematic. The belief in the benign nature of science has made the quest for knowledge for its own sake seem desirable.

But with the growing scarcity of natural resources, pollution, nuclear proliferation, environmental degradation, food scares, and more, we now realise that the relationship between technological development and progress is not a simple one.

Today, society’s view of scientific inquiry has become more sophisticated and nuanced. Scientific progress can lead to applications that do harm as well as good. But this cannot be a reason to put a brake on science – ignorance is never good.

Traversing new frontiers

As scientists push back the frontiers of knowledge, their forward march is bound to have major societal implications. This is why the EU has been backing a broad public dialogue to set the research agenda and move science into the public domain.

To reach out to society effectively, the European Commission – at the request of the Council of Ministers – compiled its Science and Society Action Plan in 2001.

The strategy has three main objectives:

- Promoting a scientific and education-based culture in Europe, addressing public awareness; science education and careers; and dialogue with citizens
- Bringing science policies closer to citizens, concerned with involving civil society; producing gender equality in science; and research and foresight for society
- Putting responsible science at the heart of policy-making, dealing with the ethical dimension in science and the new technologies; risk governance; and the use of expertise.



To mark the three years since the Science and Society Action Plan was launched, coinciding with the halfway point of the EU's landmark Lisbon Strategy, the Science in Society Forum will outline the various aspects of the science and society debate in Europe, and potential for further mobilisation in this important area. It will explore four main core issues:

- Science, society and the Lisbon Strategy
- Science, technology and democracy
- Towards a culture of science communication
- Fostering diversity, inclusiveness and equality in science.

It will also showcase current examples in the following areas:

- Popularisation of science
- Public debates and participatory processes
- Addressing various groups in society.

It will host many 'satellite' debates around specific EU-backed and national initiatives.

Finally, it will culminate in a 'Grand Debate' which, in a spirit of mutual learning, should draw together all the threads. This part will also include reports from six national events.

National reflections

To lay the groundwork for the Science in Society Forum 2005, the European Commission invited national players to reflect on some of the major issues scheduled for the Forum at a number of parallel mirror events organised locally.

In all, there were six such mirror events in six different EU countries organised on a voluntary basis.

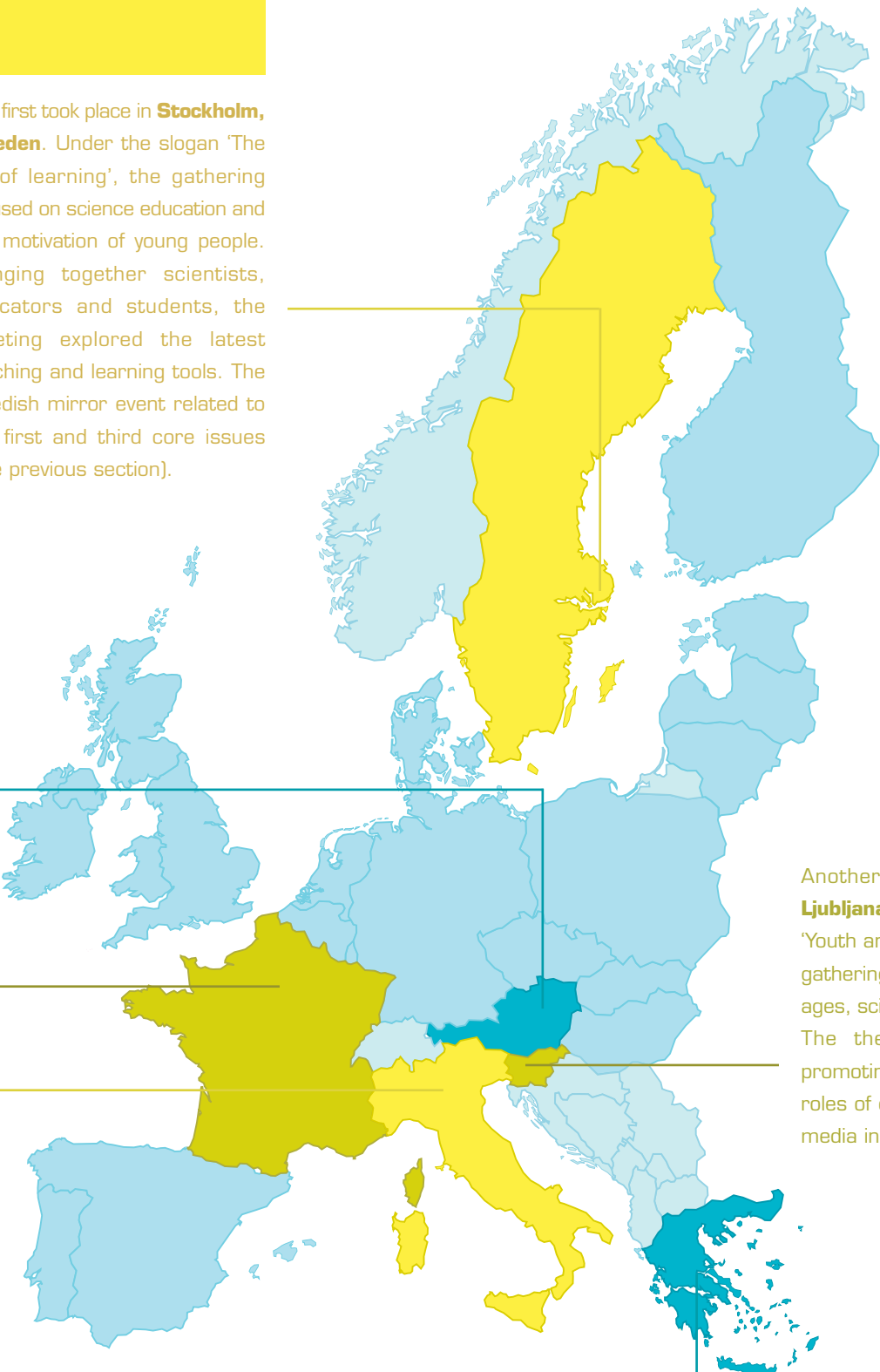
In addition to the mirror events, the Commission organised a number of preparatory meetings to pave the way for the Science in Society Forum 2005. For instance, in November 2004, the coordinators of the various national projects that were to be showcased at the Forum gathered in Brussels to coordinate their activities.



An event entitled 'Mapping controversies' took place in **Vienna, Austria**. Linking to core issue two, it brought together scientists and policy-makers to explore the controversy surrounding genetically modified food. Looking through the lens of dynamic cartography, the gathering mapped out the GM public debate in Europe. This event marked the first in a series held at Vienna's brand new Gallery of Research that will chart other scientific issues of broad public interest.

In **Paris, France**, a mirror event was held under the slogan 'Mobile communications: capturing it all'. It sought ways of tapping into young people's fascination with mobile telephones and the culture that has sprouted up around them, e.g. SMS messaging, and how this relates to their perceived risks. It was organised on the sidelines of a six-month exhibition that delved into "the invisible world of mobile telephony". The French gathering linked to core issue two. This represented a case-in-point of risk governance subject to public questioning.

The final mirror event was the first gathering of the Italian Science in Society Forum in **Vicenza, Italy**. The forum sought to offer all stakeholders the "opportunity to formulate suggestions and proposals in order to improve the dialogue between science and citizens". This Italian debate was enriched with data generated from an internet consultation. Among its specific features, the mediation function of patient organisations, and the capacity of secondary school teachers to act as eye-openers, received prominent attention.



The first took place in **Stockholm, Sweden**. Under the slogan 'The joy of learning', the gathering focused on science education and the motivation of young people. Bringing together scientists, educators and students, the meeting explored the latest teaching and learning tools. The Swedish mirror event related to the first and third core issues (see previous section).

Another mirror event was held in **Ljubljana, Slovenia**. Under the banner of 'Youth and knowledge for the future', the gathering brought together people of all ages, scientists and government officials. The themes they covered included promoting scientific careers, as well as the roles of communication, women and the media in science.

In **Thessaloniki**, the co-capital of **Greece**, a national debate was held on governance in the knowledge economy and society. The workshop discussed the results of the Greek Technology Foresight Programme. Other topics covered were 'Governance and eGovernment', 'ICT and e-business', and 'Urban governance and digital cities'.

Showcasing exemplary actions

The Science in Society Forum 2005 will showcase a number of EU-backed and national actions and projects that seek to bring science right into the heart of society. These actions are grouped under three main clusters: the popularisation of science, debates and the participatory process, and addressing groups within society.

A special information pack has been produced to profile each of the showcase actions and projects. Below is a brief description of all these actions grouped according to three clusters of showcase actions.

Cluster I: Popularisation of science

• Science on the web – the Netherlands – NL

Kennislink is an independent, virtual platform for science communication based on the network idea. More than 60 Dutch and Flemish partners offer their public information via Kennislink. It now contains over 7 000 articles and multimedia items.

Website: www.kennislink.nl

• Science on the web – Sweden – SE

forskning.se (research.se) is a nationwide Swedish website that provides information on research and research findings. It aims to generate interest in research as a source of information, insight and development – both for the individual and for society.

Website: www.forskning.se

• Science on the web – Norway – NO

Targeting young adults, forskning.no (research.no) is a web service with news, background articles, multimedia applications and interactive services from Norwegian and international research. It reports on all facets of research.

Website: www.forskning.no

• SCP – University Science Communication to the Public – IS

SCP draws on two existing initiatives: the Icelandic Web of Science (IWS) and the Young People's University (YPU). IWS introduces scientific concepts by answering questions posed by the public. YPU is a summer school for young people covering such fields as engineering, languages, physics, and ethics.

Website: www.visindavefur.hi.is/

• CORDIS – the EU's on-line research and innovation information service

CORDIS assists researchers, entrepreneurs, business specialists, government agencies, political decision-makers, public services, non-profit organisations, journalists and various key players in the R&D and innovation fields. This dynamic and interactive platform encourages technology and knowledge transfer across national borders in Europe, including accession, candidate and associated countries.

Website: www.cordis.lu

• European Commission, Research-DG: life sciences and biotechnology, societal scrutiny and dialogue

The European Commission's Research Directorate-General showcases its activities in the field of life sciences and biotechnologies through a large number of brochures and leaflets. These publications present EU-backed research projects in and outside Europe, as well as Commission's many initiatives to engage in debate with the various 'stakeholders' interested in research-related topics (ethics, social dimension, innovation, future challenges, etc.).

• AlphaGalileo Foundation – UK

AlphaGalileo is Europe's internet-based research news service. It provides media worldwide with access to the latest European research news. The Foundation is UK-based but operates in collaboration with ten European countries and all the research promotion and media bodies in Europe. AlphaGalileo Foundation is working with its partners and the



European Commission towards the creation of a proactive European research press centre.

Website: www.alphagalileo.org

• Expertanswer – SE

Expertanswer is a media service offering journalists from all over the world access to Swedish science sources and research news. Around 4 000 journalists in Sweden and other countries are members and uses the service for queries and as a news source.

Website: www.expertsvar.nu

• European Science and Technology Week – EC

Through thought-provoking activities across Europe, European Science and Technology Week aims to create a totally new perspective on science. The emphasis is on showing, rather than telling, Europeans how science and technology affects them, from the simplest gadgets to the most sophisticated satellite technology.

Website: www.cordis.lu/scienceweek/

• Engineering in summer – PT

'Engineering in summer' brings the engineering of everyday life to the attention of the public by promoting direct contact with specialists in the field. It organises visits to large engineering facilities and to companies where engineering plays a central role.

Website:

www.cienciaviva.pt/veraocv/engenharia/eng2004/

• GSF - Genova Science Festival – IT

The Genova Science Festival seeks to lay a common ground where science and society meet in an interactive and diversified way. Using appealing and simple language, the Festival is a showcase of events with a 'scientific flavour'.

Website: www.festivalscienza.it

• House of Science – SE

Visitors to the House of Science – teachers and secondary school students – can conduct amusing but rather advanced experiments in physics, astronomy and biotechnology.

Website: www.houseofscience.se

• Invent an ET! – PT

To explore the topics of communication and the five senses, this interactive exhibition was built around the theme of

inventing an extraterrestrial. Each experiment enabled the children to choose the ET's various sensorial characteristics.

Website: www.exploratorio.pt

• IPUSTS – Improving Public Understanding of Science and Technology in Slovenia – SI

The Slovenian Science Foundation has launched a number of initiatives to enhance the public image of science, such as the hands-on 'science adventures' organised at the annual Slovenian Science Festival. Children learn important scientific concepts through actual experimentation.

Website: www.ustanova-szf.si

• Science and the city – ES

Barcelona's 'Science and the city' initiative brings science out of the lab and on to the streets. It has brought prominent scientists to libraries and civic centres, produced a guide book for 'Walks around the scientific world of Barcelona', and much more. It focuses especially on the important role that local administrations can play as boosters of scientific culture.



• Science Picnic – PL

Science Picnic is an annual outdoor fair which takes place in the market square of Warsaw's old town in June. For that one day only, a city of 130 tents sprouts up, where scientists and students carry out different science-related activities.

Website: www.radio.com.pl



- **SFPL – Warsaw Science Festival – PL**

The Warsaw Science Festival is organised by academics for the general public. Visitors can observe scientists carrying out real experiments, take part in hundreds of activities and attend science lessons.

Website: www.icm.edu.pl/festival

- **YESS – Yearly European Science Society – EC**

YESS is a new annual event organised for 9 May (Europe Day). In 2005, it will take place in ten different EU countries where citizens will participate in demonstrations, activities and debates on the topic of brain research.

Website: www.ecsite.net

- **ZIELONA – Green Action – PL**

Rather than bringing children to universities, academics in Poland hit on the novel idea of taking the universities to the children. Known as 'Green Action', this initiative encourages students at various higher educational institutes to give up two months of their summer holidays to attend kids camps at remote rural schools.

Website: <http://davinci.mini.pw.edu.pl/zielona/>

Cluster II: Debates and participatory processes

- **CLIMAX – Interactive exhibition on global warming – FR**

The CLIMAX exhibition peers into the future to chart the various possible climate change scenarios. It is an interactive expo – including films, forums and simulators – that is part of a long-term process including a consensus conference on climate change.

Website: www.cite-sciences.fr

- **Nano Dialogue – IT, UK, BE, FR, DE, SE, PT, ES**

The Nano Dialogue project aims to establish a Europe-wide integrated process of communication and social debate on nanotechnologies and nanosciences. It is working to raise awareness of the latest developments in the field and to implement social dialogue between the research community



and civil society, using the methods and communication tools peculiar to science centres.

- **Nanoforum – UK, DE, ES, FR, NL, PL, BG, TR, AT**

Nanoforum is an on-line nanoscience and nanotechnology platform that seeks to promote communication within the nano-community and with other stakeholders about the exciting developments in this emerging field. It also aims to help coordinate fragmented EU research efforts.

Website: www.nanforum.org

- **PPGI – Public Participation and Governance of Innovation – IT**

PPGI has sought to test out – for the very first time in Italy – new methods of citizen participation in techno-scientific policy. As a test case study, the topic of GMO research was selected as the main focus of panel discussions.

Website: www.fondazionebassetti.org

- **Technology foresight in Greece – EL**

The Greek Technology Foresight has been examining the implications of emerging science and technology on the future of Greek society and the economy. In particular, it has sought to investigate how science, research and technology are expected to contribute gradually, over the next 20 years, to shaping the emerging Greek 'Knowledge Society'.

Website: www.foresight-gsrt.gr/english/

- **TRUSTNET – Improving governance of hazardous activities – EC**

TRUSTNET is a pan-European think-tank dedicated to improving the governance of hazardous activities. Having diagnosed failings in conventional regulatory regimes, TRUSTNET has identified a new approach based on a more inclusive, partici-

patory regime. Inclusive governance is directed towards restoring the political dimension of decisions on new or contentious technological activities by gradually opening the decision-framing process to concerned individuals and organisations. Website: www.trustnetgovernance.com/

• **AMRC – Messenger Role of Medical Research Charities – UK**

One of the Association of Medical Research Charities (AMRC) most important roles is to engage in dialogue with the public and decision-makers on issues of concern in medical research. On the basis of agreed position papers and briefings on issues such as the use of animals, human embryonic stem cell research and genetics, AMRC enables patients, charity supporters and the scientists they fund to become 'messengers' for key audiences, including members of the UK and European parliaments.

Website: www.amrc.org.uk

• **Democracy on the move – AT**

New Orientations for Democracy in Europe >node< is an innovative research programme in Austria seeking to embed science and society issues at all levels of research. It encourages the participation of stakeholders in the research programme, stimulates continuous dialogue between science and society, and promotes specific target groups like young researchers and women.

Website: www.node-research.at

Cluster III: Addressing groups of society

• **fFORTE, Women in Research and Technology – AT**

fFORTE is a comprehensive programme aiming to dismantle the career impediments holding back women in science and research. The programme proposes remedial measures to correct the gender imbalance in science, and carries out training courses for women.

Website: www.fforte.at



• **FiF Contact Point: coaching for women scientists – DE**

The FiF Contact Point offers specialised seminars for German women – who are under-represented at European level – to help increase their participation in EU-backed research. It seeks to integrate gender mainstreaming into the forthcoming Seventh Framework Programme.

Website: www.eubuero.de

• **CEWS – Coaching for Women Scientists – DE**

CEWS has helped hundreds of women to prepare their (junior) professorship applications in special career training and coaching seminars conducted across the country. The programme addressed female scientists from all fields.

Website: www.cews.org

• **MERA – Pupils in Research – CY**

MERA is a science competition for elementary and secondary school students who submit research proposals and projects in order to compete for financial awards and commemorative certificates. The MERA competition aims to develop a science and research culture for youngsters from the early stages of their education.

Website: www.research.org.cy

• **Science Generation: bridging the gap between Biosciences and Citizens – FR, IT, SE**

Science Generation seeks to remove the barriers to communication between citizens, experts and decision-makers by promoting new forms of dialogue between bioscience and society and giving ordinary citizens an active role to play in the discussion process.

Website: www.science-generation.com

• **EFYP – Ethical Forum for Young People – DK**

The Ethical Forum for Young People has explored various bioethical issues, including cloning (in 2001), the biotechnological enhancement of humans (in 2003), and the ethical aspects of stem cell research (in 2005). Debates are conducted in schools all over Denmark and 17 students are selected to become members of the Forum for a particular year.

Website: www.etiskraad.dk/sw2472.asp



- **EMBO – Biology education and communication – EC**



The European Molecular Biology Organisation is contributing to building a 'European Education Area'. An example of this is 'Continuing Education for European Biology Teachers' – a training programme for school teachers across Europe. Communication prizes, media workshops, and public conferences complete EMBO's Science and Society Programme.

Website:

www.embo.org/projects/scisoc/index.html

- **Euroscene 2003 – European Science Education Network 2003 – SK**

Euroscene dealt with the analysis of national school science education systems in order to promote the study of scientific and technical disciplines. Special attention was devoted to the development of talented students.

Website: www.newnet.sk

- **YEBN – Young European Biotech Network – IT, DE, FR, CH, NL, PL, PT, AT, FI, HU**



The Young European Biotech Network (YEBN) is an international non-profit organisation for young students, PhDs and scientists from 12 European

countries. It aims to strengthen co-operation in Europe in order to increase the competitiveness of the European Life Science sector worldwide. YEBN promotes and is promoted by a responsible and dynamic community of young people.

Website: www.yebn.org

- **ZUKUNFTSWERKSTATT – Didactic concept for knowledge transfer – DE**

ZUKUNFTSWERKSTATT has developed a specific didactic concept for the transfer of knowledge. This concept differs considerably from traditional science transfer and is characterised by such aspects as an understanding of science and technology and a specific reference to the daily environment of the individual target groups.

Website: www.science-live-Heidelberg.de

- **COST – European Co-operation in the field of Scientific and Technical research – EC**

COST is the oldest and broadest European intergovernmental network for research co-operation. Established in 1971, COST is presently used by the scientific communities of 35 European countries to collaborate on common research projects supported by national funds. COST's bottom-up nature resulted in many actions that were close to the direct needs of society.

Website: <http://cost.cordis.lu>

- **ERRIN – European Regions Research and Innovation Network – EC**

The European Regions Research and Innovation Network is a Brussels-based community designed to help regional players to participate fully and effectively in the European Research Area by improving coordination and communication between regional representations.

Website: www.errin-brussels.org

- **ETHNIC – Raising Awareness of S&T among Ethnic Minorities – AT, CZ, HU, IT, SI, UK**

ETHNIC seeks to mainstream racial equality issues in science by raising awareness among both the scientific community and ethnic minorities. This involves promoting the idea among the most marginalised ethnic groups that science is not the exclusive preserve of others and is an option for everyone.

Website: www.bit.ac.at/ethnic

- **ISSNET – Improving Science Shop Networking – NL, DE, AT, RO, DK, ES, FR, UK, USA**

Improving Science Shop Networking (ISSNET) helps existing science shops – community-based research organisations – to share their expertise and to help interested individuals and organisations set up their own community-based research organisations.

Website: www.scienceshops.org

- **Regional Research and Development Centres – IL**

Regional R&D Centres conduct research that presents unique advantages to the regions in which they operate, and also contributes to the social and economic prosperity of the area. Leading local scientists carry out the research.

Website: www.most.gov.il

The road from Lisbon



In March 2000, European leaders gathered in the Portuguese capital Lisbon to plot a course ahead for a new millennium. At that meeting, the European Union set itself the

ambitious goal of becoming the “the most dynamic and competitive knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion, and respect for the environment by 2010”.

Although science has long underpinned European prosperity, this Lisbon Strategy, as it became known, explicitly recognised the central role of knowledge as a motor of economic wealth and social welfare in our high-paced, technology-driven world.

Investment in the science and innovation system

The Commission estimates that R&D investment is responsible for 25 to 50% of economic growth in Europe. Yet European research investment continues to lag behind that of its major global competitors, namely the United States and Japan.

One important aspect of Lisbon is the commitment of more resources to R&D. This was fleshed out in Barcelona in 2002, when EU leaders committed themselves to boosting research investment to 3% of the Union’s collective gross domestic product, from around 2%.

In 2003, the European Commission unveiled a ‘road map’ to help guide Member States towards this ambitious target. This action plan sets out key actions to consolidate the so-called European Research Area. These include overcoming the fragmentation of research policies and actions, and designing new and ambitious instruments – such as pan-European research platforms in partnership with industry – to tackle upcoming challenges.

The plan also encourages EU Member States to invest in manpower, to refocus and increase public research

and innovation spending, and create a coherent policy framework on several fronts, including regulatory, fiscal, innovation, industrial and competition. In concrete terms, reaching the 3% target by 2010 will require the public sector to raise its R&D investment by 6% a year and the private sector by 9%.

Policy shift

In its Communication published at the beginning of February 2005¹, the Commission proposes specific measures designed to help meet the 3% target. The key elements of an effective strategy should be a coordinated European approach to the tax environment for R&D and a set of national Lisbon programmes that explain which necessary steps will be taken to achieve the desired level of research investment.

The Commission will also design the EU’s new Seventh Research Framework Programme in a way that makes it easier to provide financial support for research and innovation, especially for young and innovative minds.

Finally, a revision of the existing State Aid Framework for R&D will also be needed so that financial support for research and innovation, particularly for innovative companies is easier.

If this ambitious drive succeeds, the higher investment in knowledge will help the EU economy grow by an additional 0.5% and create 400 000 jobs every year from 2010 onwards.

Socialising science

Lisbon is not just about financial investment. There is more to making Europe a true knowledge society than just pumping money into research. There are the cultural and societal issues linked to science, too.

The EU and its Member States believe that better links to culture and society will help science meet the needs of European citizens, and build a body of good practice to manage controversial issues responsibly, as we enter uncharted scientific terrain. ▶

¹ Communication to the Spring European Council. ‘Working together for growth and jobs: a new start for the Lisbon strategy’ (COM (2005) 24)

Since Lisbon, the European Union has made a concerted effort to bridge the gap between science and society. This has called for coherent and cohesive action at European level that would complement the national efforts of Member States. More can be learnt from a wealth of local initiatives that helped, in various ways, to engage specific social groups, in a more general process, to turn consumer-citizens into actor-citizens.

Mid-term review

The Council of Ministers and the European Commission decided, in 2004, to prepare a mid-term review of the Lisbon process, which will be officially presented to the spring summit in March 2005.

A High Level Expert Group headed by former Dutch Prime Minister Wim Kok was charged with preparing the review. The Kok Group called for the sharpening and focusing of the Lisbon Strategy and its goals. The science and society interface features prominently in the mid-term review. The Expert Group recommends the forming of 'partnerships for reform' with the various stakeholders, including citizens, social partners and public authorities.

The Science in Society Forum 2005 will examine Lisbon under its 'Science, society and the Lisbon strategy' core issue one. The questions that will be raised include:

- Are there prerequisites for European society to shift to a research-innovation system boosted by a more competent workforce, with the support of financial investments and appropriate legal incentives?
- How is our society going to nurture this expansion strategy, in other words will Europe eventually kick start its 'knowledge engine'?
- The roles of research scientists as primary actors, of citizens as ultimate beneficiaries, and of trade and knowledge flow between Europe and the rest of the world, will be examined critically.

A chain of distinguished voices

Architects of the Lisbon Strategy and other prominent movers and shakers will address the 'Science, society and the Lisbon strategy' session at the Science in Society Forum. Maria João Rodrigues was a key adviser to the then Portuguese Prime Minister Antonio Guterres during the formulation of the Lisbon Strategy. Her talk is likely to reveal some of the assumptions which implicitly underpin the landmark policy.

Although primarily focused on Europe, Lisbon undoubtedly has an international dimension. Gilberto Antonelli, a professor of economics at the University of Bologna, as well as Mark Holderness of CAB International, will delve into this oft-overlooked aspect of the science and society debate – the needs and moves of non-European societies. Mario Telo, research director of European Studies at Belgium's Université Libre de Bruxelles (ULB), will also examine the international dimension of research policy. Taking onboard the 'asymmetric' expertise civil society can greatly improve scientific decision-making. Massimiano Bucchi, who teaches the sociology of science at the University of Trento (IT), will explore how the views of citizens can enrich research policy.

Meanwhile, Bernard Chevassus-au-Louis, who is president of France's National Museum of Natural History in Paris, will explore the role that society can play in fuelling or holding back innovation. Scientists can also help or hinder the growth of a knowledge society and Volkswagen's Secretary-General Wolfgang Krull will explore this important issue.

To shed more light on this, Gerd Wolf, professor emeritus at Düsseldorf University (DE), will share a scientist's view of the research and innovation process.

Without scientific talent, there would be no innovation – and Europe is facing a growing shortage of human resources. Paul Caro, a member of the High Level Group on Human Resources for Science and Technology in Europe which was chaired by José Mariano Gago, will discuss how the Union can make the most of its research talent in enhancing its competitiveness.

Science, technology and democracy: new challenges, new opportunities

In democratic societies, many would argue, public involvement in policy is a fundamental right. On a more practical level, ensuring that science delivers what people need involves intimately weaving the social dimension into scientific research. Participatory processes have the potential to bolster the efficiency of the decision-making process and can significantly contribute to increasing knowledge and balancing out competing interests.

This means that policy-makers should actively engage civil society and other stakeholders, including the research community and industry, in the policy-making and monitoring process. Stakeholders can be involved through public consultations, focus groups or citizen panels.



“The public deficit model – i.e. assuming that the reason the public is opposed to something is because they lack information – is no longer enough,” explains Pierre Benoit Joly, research director at France’s Institut National de la Recherche Agronomique.

“Part of the learning society is that policy-makers need to learn constantly from society,” notes Nina Sartori of Austria’s fForte, an organisation for empowering women in science.

Society’s place in the lab

Stakeholders are clear that participation is not a passing fad – it is here to stay. As public debates over GMOs and stem cell research indicate, the concept of participatory governance is entering the political agenda and political consciousness.

This means that science and technology policy at regional, national and European level has to become more and more inclusive. Participatory processes do not exempt decision-makers from taking tough decisions. They do, however, give them a powerful tool to enhance the decision-making process and ‘test the water’ on contentious issues. ▶

Multiple sources of expertise

Science is about more than some abstract notion of knowledge; it is also about politics, ethics and quality of life. Since the influence of science stretches far beyond the scientific community and its ultimate mission is to serve society, a balance needs to be struck between the freedom of scientists and the needs and concerns of citizens.

Moreover, expertise is no longer the exclusive domain of scientists, but other segments of society – such as non-governmental organisations, environmental groups, patients’ groups, and consumer organisations – can also bring useful knowledge to the table.



Although public engagement and accountability are crucial aspects of democratic societies, as always, the devil is in the detail. Who exactly should participate? How do you represent the diversity within each stakeholder group? When should they be called on? What form should this participation take? How should their responses be incorporated? How do we make a process inclusive without making it exhaustive?



Some fear that, rather than boosting the legitimacy of the political process, direct participation could lead to political inertia and could have the unintended side effect of undermining the legitimacy of representative democratic institutions. This raises the questions of how to decide on which issues to open up to public participation and consultation and what to do if the process ends in deadlock.

Plural challenges

Europe's diversity is its biggest strength and its greatest challenge. Despite its long history of pluralism and consultation, the question of how to boost participation is not straightforward. The huge array of European interest groups means that there is a wide spectrum of needs that the participatory process must address and a broad range of alternative models for its application. One advantage of pluralism and diversity is that successful exercises and experiments can be applied more widely. The EU is replete with examples of know-how and

experiences that were successfully transferred (see showcase projects). One EU-backed project, Participatory Approaches in Science and Technology (PATH), explores various approaches to 'scaling up' regional and national models and making them applicable in a European – and even global – context.

However, the mechanisms and tools of participation mean very little without an underlying culture of consultation and participation. Forging the right cultural landscape requires changing institutional and individual attitudes which, in itself, is a gradual process that also involves wide consultation.

The Science in Society Forum 2005 will explore these governance-related issues under its core issue number two: 'Science, technology and democracy'.



Science, technology and democracy

The 'Science, technology and democracy' session at the Science in Society Forum aims to reflect upon the ways through which science interacts with policy-making in democratic societies, especially at the EU level.

Chaired by Zdenek Konopasek of Charles University's Centre for Theoretical Study (CZ), the morning session will discuss four key modalities embracing different facets of the interactions between science and society:

- Jan Staman, director of the Rathenau Institute (NL), will discuss technology foresight as an input for policy-making. He will analyse the links between technology foresight, technology assessment, and participatory processes.
- Isabelle Stengers, a professor at the Free University in Brussels (BE), will address the issue of scientific expertise, and its use in policy-making. She will discuss questions, such as what makes scientific expertise different from other forms of knowledge, and how to handle scientific expertise in relation to validation, ignorance and uncertainties.
- Ortwin Renn, a professor at the State University in Stuttgart (DE), will outline a general policy framework for enabling practical resolution of the queries and ambiguities arising from the understanding and the implementation of the precautionary principle.
- Sheila Jasanoff, a professor at Harvard University (US), will measure the strengths and weaknesses of participatory processes, and discuss the integration between participatory processes, use of scientific advice and risk governance.



Chaired by Brian Wynne of Lancaster University (UK), the afternoon round table will illustrate the issue of making democratic choices under constraints, using the example of nuclear energy.

Although nuclear energy is not a new technology, it is a good example of the interface between science and society and the dilemmas it may create. It has been studied extensively by science and society academics, and provides the ideal case to test if institutions can learn from past experience as made available through their work. The round table will not be a debate on nuclear energy in itself, but will invite science and society academics and policy-makers to respond to a common set of questions, including:

- What difference does it make to involve the public in the debate on nuclear energy issues?
- What influence has the public debate had on the research agenda?
- Can traditional democratic institutions/decision-making processes cope with the challenges posed by science and technology-related issues, such as nuclear energy?
- Can we bring science and society/democratic concerns into the policy process at an earlier stage?
- To what extent are national experiences transferable to other countries?
- To what extent are lessons drawn from nuclear energy debates transferable to other areas of science and society and vice versa?



Pop science

In popular culture, science is often personified in the form of the eccentric scientist or the 'boffin'. These wild-haired, reclusive figures occupy a strange, parallel world of inexplicably complex pursuits.



While few believe such comical caricatures, they do strike a chord of recognition for many. To the layperson, the realm of science – with its quantum leaps, dark matter, curved time, 'designer' organisms, and nanomaterials – can appear to be a puzzling and alienating place. The EU has identified a lack of awareness and communication as two of the key factors behind the widening gap between the scientific community and society at large.

Taking the temperature

Eurobarometer has been the European Union's public opinion gauge for more than three decades. It carries out surveys in all Member States on a broad range of topics, from European enlargement and quality of life to scientific progress and security, providing revealing insights into the perceptions and needs of European citizens.



In 2001, Eurobarometer carried out a survey to take the temperature of European public opinion on science and technology. This was updated in 2003 to cover the then 13 candidate countries, 10 of whom have subsequently joined the Union.

'Europeans, science and technology' studied the scientific experiences and perceptions of European citizens. Over 16 000 people, reflecting the population demographics of the then 15 Member States, were interviewed. The survey found that nearly half of Europeans were interested in science and technology, but two-thirds considered themselves to be poorly informed – except in the cases of topical issues, such as global warming. Most respondents identified television as their primary source of scientific information.

Shades of view

Respondents generally held a positive view of the benefits of science and technology, but many no longer viewed them as being able to find the answers to the world's most pressing problems, such as eliminating poverty and famine.

The study found that doctors, scientists and engineers are the most highly regarded professions in Europe. Nevertheless, an overwhelming majority of interviewees desired some social control – i.e. through public participation in the research agenda – of science as it enters uncharted terrain.

Respondents attributed the flagging interest in scientific studies and careers among young people to their lack of appeal and difficulty. The perceived complexity of scientific disciplines and the accelerating rate of change have caused many young people to avoid scientific studies and careers.

Eurobarometer has conducted a new survey to see how the perceptions of Europeans towards science and technology have shifted since the 2001 Science and Society Action Plan launched a concerted bid to reach out to the public.

Two-way channel

As Eurobarometer and other surveys reveal, Europeans obviously have a fair grasp of science. However, as the GM and stem cell debates underscore, there is a disparity in perception between scientists and the public. This is partly due to a lack of mutual awareness and a breakdown in two-way communication.

"Complexity is generally appreciated by the public, even if they do not have a scientific background or training," explains Brian Wynne who works on the EU-backed Public Acceptance of Agricultural Biotechnologies (PABE) project. "They understand the conditional nature of science."

If European science is to move forward unimpeded, meet the needs of society, and enhance EU competitiveness, then better mutual awareness and two-way channels of communication need to be promoted. "The one-way model of communication to a public that needs to be educated...has been challenged," Wynne points out.

In recent years, the European Union and its Member States have backed numerous initiatives to make science more popular, improve scientific communications, and promote better ties between the scientific community and society.

The Science in Society Forum 2005 will delve into these and other related issues in its core issue number three: 'Towards a culture of communication of science in society'.



Building a communication culture

The 'Towards a culture of communication of science in society' session will explore the science-related communication and popularisation issues. It will be chaired by eminent French journalist Patrice Lannoy of *Le Figaro* and will cover the following themes:

- **The public:** speakers will include Acting Head of the Research DG's Communication Unit Michel Claessens; the French Ministry for Research and Technology's Sophie Tocreau who is the coordinator of the French Science Festival; and the European Space Organisation's Claus Madsen.
- **The media:** speakers will include Alicia Rivera, a journalist at the leading Spanish daily *El Pais*; and French author Frederic Courant who also presents the popular TV science show, *C'est pas sorcier* (It's not magic).
- **The scientists:** speakers will include University College London's (UK) Steve Miller who is also a member of the European Network of Science Communication Teachers; Catharina Ottensam (SE) of the ECOTARGET project; Torrun Klemp, rector of Sor-Trondelag University in Norway; and Patrice Lannoy, a journalist at France's *Le Figaro*.

Science for all

Science and technology have broad influence and are the cause of fascination for many. Unfortunately, for numerous reasons, access to them is not evenly spread between the various groups in society. Women, ethnic and racial minorities, and the poor are disproportionately excluded from steering scientific progress and reaping its fruits.

Young people and children are also an important group that has been slipping off the radar. Although student numbers are on the rise, a growing number of youngsters are opting out of science courses at school and university. In addition, an increasing proportion of science graduates are choosing not to pursue scientific careers.

The EU is committed to fostering diversity and equality in science and research. It has launched a swath of initiatives targeted at these under-represented groups. In fact, creating an inclusive and dynamic European Research Area is now at the heart of EU science policy.

Reasons for this imbalance include popular misperceptions of certain fields as being 'manly', gender bias when judging scientific excellence, reluctance to hire women because they are not seen as flexible enough, and fear among women that they may face the unenviable choice of either giving up their career or the idea of starting a family.

If the European knowledge society is to be realised more research personnel will be needed. It makes practical sense to try and draw more women into scientific studies and careers.



Women in science

Women make up half of humanity, half of the European workforce (51.6%), more than half of the student population, and half of the Union's brainpower. In fact, women now represent the majority (56%) of graduates in higher education in Europe.

But when it comes to engineering, the numbers begin to skew. Here women account for 25% of graduates. The proportion of women in research dwindles further as you climb up the career ladder, particularly in industry. Only 14 % of all full professors in Europe are women.



Since the Commission's first Women and Science conference in 1998 highlighted the gender gap in research, the EU has been taking action to strike a better gender balance in science. Member States are also redoubling their efforts.

Ethics in science

While a common set of basic shared values exists at European level (e.g. the European Charter of Fundamental Rights), the European Union is characterised by pluralism and socio-cultural diversity.

The concepts of equality and non-discrimination, and in particular equality between women and men, are also deeply rooted in the European Union's values and principles and as such enshrined in the Treaty of Amsterdam.

Respect for differences, solidarity, justice and equality of treatment are implicit milestones in building a Europe-wide democratic society.



Europe is nowadays witnessing an accelerated transformation into an ever more multi-cultural society in which diversities are becoming more marked.

Ever greater cross-cultural co-operation in scientific research, which is essential for the development of a more economically dynamic Europe, is resulting not only in the emergence of common fundamental ethical principles but also in an awareness of the need to preserve the cultural diversity at the heart of the European ideal.

Therefore, in order to increase the trust and engagement of science, it is important that a dynamic balance embracing both shared values and diversity is encouraged, not only in the research population but also in the scientific objectives and methods.

Injecting young blood

A passion for science is often sparked at an early age. For instance, the world's most recognisable physicist, Albert Einstein's fascination began when he was given his first compass as a child and he puzzled over why the needle always pointed in the same direction.

If it were not for that compass, perhaps Einstein would have gone off in a different direction, and our view of space, time, energy and matter would have been entirely different.

Carrying on in this great tradition, the EU continues to be the world's biggest 'brain factory', producing over half a million S&T graduates per year. Although more than

70% of 18-year-old Europeans are in full-time education, the number of young people choosing to study and work in science is not growing fast enough.

Who knows how many future Einsteins, Marie Curies or René Descartes have opted for alternative careers in management or marketing?



If Europe is to continue to be at the forefront of global science and to build a knowledge-based economy, then it needs to lure more young people to science. The Union and Member States are doing this through a mixture of educational initiatives, science competitions and awards, as well as festivals and popular science events targeted at young people. ▶



Diversity, inclusiveness and equality in science

The concepts of equality and non-discrimination are deeply rooted in the European Union's values and principles and, as such, are enshrined in the Treaty of Amsterdam.

As Europe becomes an ever-more multicultural society, respect for differences, solidarity, justice and equality of treatment are implicit milestones in building a Europe-wide democratic society. They are also important in building a more inclusive scientific culture and a more robust economy.

The 'Fostering diversity, inclusiveness and equality in science' session will explore:

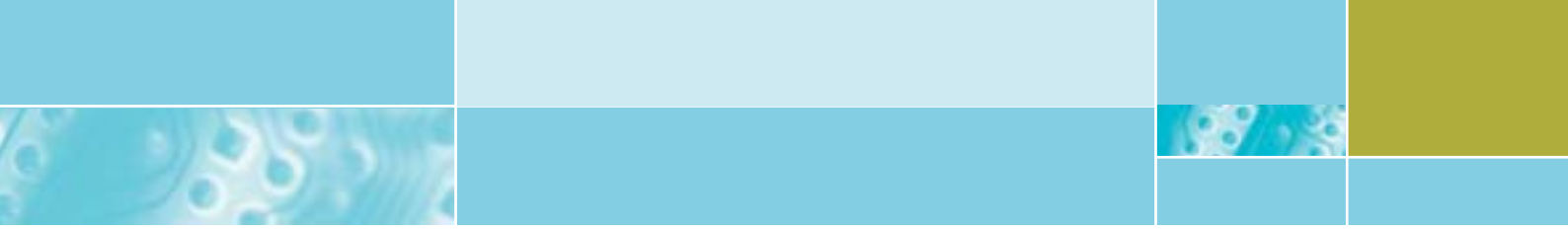
- How ethics reflects diversity and inclusiveness and how research benefits from such an effort.
- Why addressing the gender dimension is a prerequisite for good science.
- How socio-cultural diversities may be used to increase European societal and cultural inclusiveness, competitiveness and quality of science.
- How science can guarantee the integration of different social actors.



The session will be divided into three parts:

- **Part one:** president of the Estonian Parliament Ene Ergma will address the issue of diversity, inclusiveness and equality in science from different perspectives.
- **Part two:** speakers will address a number of issues, including ethical pluralism, ethics at the global level, gender diversity, excellence evaluation in research, anticipating discussions on the ethics of new technologies, and the technology gender gap.
- **Part three:** a round-table discussion bringing together different stakeholders involved in the debate on diversity, inclusiveness and equality will cover the issues raised in part two.









Web links

Science in Society Forum 2005 website

<http://europa.eu.int/comm/research/society2005.html>

Science and Society website

http://europa.eu.int/comm/research/science-society/index_en.html

