Thematic Workshops Abstracts

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Information and Communication Technologies

SESSION 1 - DECULTURATION AND/OR ACCULTURATION IN THE INFORMATION SOCIETY

The endless exchange of information across the globe means that all can now share a common culture. News of major political events reaches everyone, everywhere within seconds, and commercial music, novels and films are distributed simultaneously worldwide – so much so that people sometimes speak of "world culture". Fears that these developments might result in cultural levelling or homogenisation have proved unfounded, and electronic communication tools have not spelt the end of traditional knowledge. On the contrary, they have even enabled certain languages and literatures to flourish which might otherwise have faded into oblivion. This first session will review the current situation, highlighting what the exchange of information has brought in terms of cultural impoverishment and enrichment.

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* Rafael Capurro, *Professor of Information Management and Information Ethics, Stuttgart Media University (Germany)*

Ethics between Law and Public Policy. The European Group on Ethics in Science and New Technologies

This presentation addresses the relation between ethics, law, and public policy. After a brief historical introduction it deals, in the first part, with the question of the legitimation and tasks of ethics councils in the sphere of public policy. Ethics councils have the function of reflecting on the moral and legal foundations of specific controversial issues arising from new developments in science and new technologies. Their task is reflection and counseling, not decision-making or dog-matic proclamation. They may be legitimized by different political bodies (parliament, executive) but they are (or should be) politically independent, pluralist, and multidisciplinary. They should not view themselves as guarantee of an established morality or of current law but as a critical space where an open debate can take place. Although they might look for consensus, this should not be a *'conditio sine qua non'* of their opinions. In the second part, the tasks, working methodology and activities of the European Group on Ethics in Science and New Technologies (EGE) to the European Commission are briefly described.

* Charles Ess, *Distinguished Research Professor, Drury University (USA), President, Association of Internet Researchers*

The World is not Flat: Culture, Communication, and ICTs

As facilitating instantaneous communication on a global scale, ICTs are especially crucial to notions of the world as "flat," i.e., as no longer defined economically, politically, or socially in terms of geographical (state) boundaries. These visions of a flat world, however, rest on assumptions and promises of communication that is value-free and culturally neutral, characteristics especially crucial for communication in the natural sciences.

I will show, however, how ICTs both embed and foster the specific cultural values and communicative preferences of their creators. In doing so, ICTs threaten to exclude and marginalize the values and preferences of multiple "Others" – including women, minorities, and non-western peoples and cultures. This overview will thus first provide an ICT-specific response to a primary question of the conference, "How do people's geographic and cultural origins modify the way they learn, understand and use knowledge?" Moreover, it will allow us to address the question, "Do women and men have the same access to knowledge, whatever their country, their traditions or their religion?" Unfortunately, given that ICTs are indeed shaped by specific values and preferences, the answer to this question is "no." Similarly, if we ask, "Are scientific and technological institutions … the same everywhere?" – in terms of communication, at least, we will have to say "no." Finally, if we ask "Does an international scientific community already exist? Or do we have many scientific communities, each with its own codes, references, validation procedures, etc.?" – we will have to say "yes" but also "yes."

I will conclude with several suggestions for how we can move towards cross-cultural communication online that is less likely to impose a specific set of cultural values and communicative preferences, and thereby more likely to foster the sorts of scientific communication that will realize its goals of greater gender and cultural inclusiveness.

* Monique Slodzian, *Professor, Institut national des langues orientales (France)*

A Flat World: Directions for Using the Web

The aim of the semantic Web is to make the vast resources of the current Web more accessible by man and machine through the semantic representation of their contents. Therefore, in 1994 the World Wide Web Conference set itself the objective of encoding the content of the 500,000 documents stored on the Web using 15 metadata elements known as the Dublin Core. It quickly became apparent that although it was relatively easy to agree on objects such as the format of the document (titles and authors, for example) the description of the themes and contents themselves defied standardization by the Dublin Core. Dozens of initiatives followed and the debate on the relevance of metadata remains open. In parallel with the notion of metadata, ontology – a pro-duct of knowledge engineering – generated a flood of proposals. While some people tried to produce a universal model of the world through ontologies, the diversity of points of view characteristic of human practices made others more cautious. The mixed results of ontological experiments therefore led them to question meaning and interpretation as imposed by actual languages. Advocates of the semantic Web, in a quasi-theological approach, are striving to make the world as flat as possible in the name of "true knowledge". Pursuing the object of "de-Babelizing" knowledge, they are condemned to creating ever more metadata and constantly inventing new ontologies. They are placing themselves at the epicentre of the tension between de-culturation and acculturation and perpetuating the tradition of linguistic reductionism under cover of multilingual ontologies in the name of universal communication.

Session 2 - The Neutrality of Technology

Human soldiers will soon be replaced by armies of robots whose self-control will make regrettable blunders a thing of the past. Civilians will be neutralised and eliminated in a rational manner, with neither hate nor ferocity, the only consideration being the reaching of military objectives. While war as waged by androids may well prove "cleaner" than the human warfare which preceded it, questions will still be raised. Does the use of all manner of artificial agent – avatars, automatons and virtual beings – give rise to new forms of responsibility, and is there still room for questions of morality? Certain legal experts would reply to the latter question in the negative, stating that Roman law could easily be applied, on condition that the robots be given the same status as that granted to slaves in antiquity; others would disagree and call for new solutions. In a word, the question remains open: do modern techniques lead merely to a reformulation of age-old questions or do they require the introduction of new ethical concepts?

* Luciano Floridi, *Professor of Philosophy, Research Chair in Philosophy of Information, University of Hertfordshire and Director of the IEG, University of Oxford (Great Britain), could not attend*

Human Evolution after the Information Revolution

Recent technological transformations in the life-cycle of information have brought about a fourth revolution, in the long process of reassessing humanity's fundamental nature and role in the universe. We are not immobile, at the centre of the universe (Copernicus); we are not unnaturally distinct and different from the rest of the animal world (Darwin); and we are far from being entirely transparent to ourselves (Freud). We are now slowly accepting the idea that we might be informational organisms among many agents (Turing), inforgs who share with other biological and artificial agents a global environment that is ultimately made of information, the infosphere. This new revolution is humbling, but also exciting. For it requires an evolution of our self-understanding and of the sort of IT-mediated interactions that we shall increasingly enjoy with the environment and other agents inhabiting it, whether natural or synthetic. Some of the problems affecting the development of knowledge in the information society (such as overabundance, deflation and misuse of information, excessive reliance but also reduced interest and trust in science), might be overcome by developing a new ecological approach to the infosphere.

* Simon Rogerson, *Professor, Director of the Centre for Computing and Social Responsibility at De Montfort University (Great Britain)*

Ethics: the Driver of an Empowering Information Society

The world has become increasingly dependent upon information and communication technology. Those who live in this world must engage with ICT if they are to survive and prosper. There appears to be little choice. Whilst there are huge potential benefits to be gained by many there are also costs to be met by others and in general dangers to be safeguarded against. Escalation of the negative impacts of ICT is faster and more widespread than previous technologies and thus so much more dangerous.

There is an ongoing debate as to the winners and losers in this so-called Information Society. Many ethical issues relate to this debate. For example, is there equality of access and opportunity as literacy and computer-literacy skills have to increase to use ICT? Is information collected, stored, processed, distributed and destroyed in a way which is acceptable to those associated with that information? Are people unfairly penalised if they choose to opt for a non-ICT existence? Are the needs of individuals catered for in the delivery of ICT-based services and products?

Overall policy makers, developers and service deliverers must take into account that our society is heterogeneous – one ICT solution is no solution. ICT must be flexible and fit-for-purpose so that maximum benefit can be realised for us all.

Judgement is based upon knowledge which in turn is based upon information. In the information society the very nature of information is changing in terms of its form, communication and value. ICT can manipulate information in a multitude of ways so that the presentation can alter as well as its very content. Is such manipulation acceptable? If so should such manipulation be transparent? These are examples of the issues which impact upon whether we can trust the information presented through ICT. Untrustworthy information leads to flawed knowledge and poor judgement which in turn has serious negative consequences for us all.

This talk will review the ethical issues which surround society's increasing dependence on ICT and the manner in which ICT impacts upon the very nature of information. It is the ethical dimension of ICT which dictates whether we are masters of the technology or its slaves.

SESSION 3 - NEW CULTURES AND NEW PRACTICES OF THE INFORMATION SOCIETY

The information society has brought with it new behaviours born of free access to countless resources such as online encyclopaedias and classical literature, free downloading of music and films, free e-mail and open-source software. These behaviours have, in turn, helped drive the development of the Internet. At the same time, new standards and new forms of legitimacy have emerged, giving rise to near-boundless hope.

Some observers fear that these new standards and new forms of legitimacy are doomed to disappear, since they cannot continue to exist if the powers that be refuse to let go of their prerogatives. This shift towards a different, more open world may well be threatened, and the system which allows free movement of ideas and knowledge may well be succeeded by a rigid world peopled by accountants and litigants. Innovative legal solutions have been put forward, among them open-source software and "creative commons" licences for the protection of intellectual property. This workshop will review these new solutions and consider their future, asking whether they will succeed in gaining a firm foothold and in paving the way for a fairer world.

* Colin Allen, *Professor, History & Philosophy of Science and Cognitive Science, Indiana University (USA)*

The World is not Flat: Expertise and InPhO

The Indiana Philosophy Ontology (InPhO - http://inpho.cogs.indiana.edu/) is a "dynamic ontology" for the domain of philosophy derived from human input and software analysis. The structured nature of the ontology supports machine reasoning about philosophers and their ideas. It is dynamic because it tracks changes in the content of the online Stanford Encyclopaedia of Philosophy. This paper discusses ways of managing the varying expertise of people who supply input to the InPhO and provide feedback on the automated methods.

* Helen Darbishire, *Director, Access Info Europe (Great Britain), could not attend*

Freedom of Information and Access to Scientific Knowledge

In 1948 the Universal Declaration of Human Rights enshrined the concept of "freedom of information" into international law. This right, elaborated in subsequent human rights treaties and national constitutions, includes the freedom to seek information, to receive it from willing providers, and to disseminate the information to interested recipients. In other words, information can flow freely without hindrance, without prior or posterior censorship.

The development of the Internet promised to make the global free flow of information a reality and was welcomed with the cry "information wants to be free". This intervention will examine the current obstacles to the right to freedom of information, such as intellectual property and commercial secrecy rules. The intervention will examine development of the right of access to information held by state/public bodies, a right recognised in 2006 by an international human rights court as an intrinsic part of freedom of information. The intervention will examine the right of the public to access scientific knowledge where it has been created with public funds. Obstacles to access to public sector information such as licences for the reuse of that information and the application of business secrecy limitations to publicly-funded research by private bodies will also be examined.

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* Jeannette Wing, *President's Professor of Computer Science, Computer Science Department at Carnegie Mellon University, Assistant Director, Computer and Information Science and Engineering Directorate, National Science Foundation (USA)*

Computational Thinking and Thinking about Computing

My vision for the 21st Century: Computational thinking will be a fundamental skill used by everyone in the world. Just as reading, writing, and arithmetic are fundamental skills every child learns, computational thinking is a skill needed for every citizen to function in today's global society. Computational thinking is an approach to solving problems, building systems, and understanding human behaviour that draws on the power and limits of computing. Computational thinking is the use of abstraction to tackle complexity and the use of automation to tackle scale. The combination of the automation of abstraction underlies the enormous capability and reach of computing. In this talk I will argue that computational thinking has already begun to influence many disciplines, from the sciences to the humanities, but that the best is yet to come. Looking to the future, we can anticipate even more profound impact of computational thinking on science, technology, and society: on the ways new discoveries will be made, innovation will occur, and cultures will evolve. Teaching computational thinking also raises new challenges for education, especially in early grades. While we have models for teaching children mathematics and physics, we do not yet have such models for teaching computational thinking. Moreover, we have the unique opportunity to make most effective use of the computer as a tool to enhance the learning of computational thinking. In this talk, I will give many examples of computational thinking, including ones from our daily lives. It is exciting to imagine the day when computational thinking will be commonplace.

Information and Communication Technologies

Session 4 - New Powers and New Political Challenges in the Information Society

The protocols governing electronic communication are based on standards which can be implemented only if they are accepted by all. The development of the information society therefore brings with it global standardisation agreements which force states to relinquish some of their traditional prerogatives. At the same time, recent experience has shown that the possibilities afforded by technology tend to encourage identity-related demands and local management – in a word, when faced with the globalisation born of technology, people tend to react by turning inwards. What of the resultant balance? Will the mechanisms of regulation and governance of and by the Internet smooth the world, ridding it of nationalism, or will they lead to further inward focus based on identity and to the emergence of various forms of regionalism?

* **Jacques Berleur**, *Emeritus Professor, Faculté universitaire Notre-Dame de la Paix, Namur (Belgium)*

Ethics and Regulation in the Information Society

The issue of Internet governance seems to many observers to be a symptom of the way in which the information society is tackled. It has become the focus of much debate and of international meetings between institutions. This approach would appear to be dictated by technology. The World Summit on the Information Society (WSIS) held in Geneva in December 2003 and in Tunis in November 2005 almost collapsed over this issue. What was clearly obvious was the will for a multistakeholder approach. The Internet and the wider information society have been the focus of so much contradictory comment that we are led to consider this to be a sign of the many interests involved. If there is any governance, perhaps we need to examine the actual form which it takes. Regulation in the information society now takes many and varied forms, with stakeholders interacting according to different approaches, which may or may not be of benefit to this world. After having assessed the scope of the question raised at the WSIS and extended by the Internet Governance Forum (IGF), the three areas in which ethical issues are impinging on the future of this information society will be examined: technical regulations, self-regulation and legal regulation in the strict sense of the term. An attempt will be made in each case to assess the ethical challenges.

* Vittorio Bertola, *Internet Consultant, Società Internet (Italy)*

Flatter Power for a World of Peers

The Internet made a new social model – the network of peers – a mass reality; for the first time in history, individuals from the entire world were free to share their ideas and products, in a manner which indeed tends to be flat and amalgamating, but also free and equal as never seen before.

This has deep, subversive impacts on all aspects of society, including politics. The traditional structures of representative democracy are hierarchical and thus radically incompatible with a flat network. New concepts such as participatory democracy and multi-stakeholderism have been developing; eventually, the Internet makes these concepts central in modern policy-making processes. Citizens are increasingly reluctant to delegate authority to representative structures, which in turn become less and less capable to deal with global issues that are too big for them, and with local issues that are too small. Citizens also have more and more options to act directly and independently and affect the world.

Globalization makes every person a potential stakeholder in every issue; at the same time, the world is still far from being flat in terms of political customs and basic values. In the new global governance structures, as participation grows beyond diplomatic personnel and includes other types of stakeholders, cultural clashes often make dialogue difficult ; the different stages of democratical development reached in different parts of the world make it hard to share values and attitudes.

To govern and solve global issues that affect the entire planet, common underlying political and ethical values are necessary; these values do not really exist yet. Proposals to establish them – such as the Internet Bill of Rights one – need to focus not on the content, but on the process through which the entire planet might develop and agree a common – even if limited – framework of values, rights and duties, even before recognizing them formally. However, in the absence of such framework, the world will evolve according to the principle that rules complex systems: chaos.

Climate and Energy

SESSION 1 - SCIENTIFIC ASPECTS AND IMPACT

Global warming linked to human activities will constitute a major challenge for our societies over the coming decades and beyond. This first session will look at how the scientific community has approached climate change and its impacts, in terms both of knowledge acquisition and societal ramifications.

* Stéphane Hallegatte, *Economist, Meteorologist, Météo France/Centre international de recherche sur l'environnement et le développement, CIRED (France)*

Difficulties in Estimating Climate Change Impacts, and Solutions to Adapt to Them

Climate change will affect all human activities in all regions, but these impacts will differ greatly from one region to another, from one population to another, and from one sector to another.

This presentation will first summarize IPCC findings concerning climate change impacts and discuss the large uncertainties that surround them. In particular, differences between socio-economic impacts in developing and developed countries will be addressed. The presentation will then highlight the difficulties in predicting and assessing climate change impacts.

These difficulties include the disagreement over value judgments for non-market impacts; the lack of research and analysis on important sectors and regions; the unknown role of possible political destabilisation; the difficulties in assessing indirect impacts and ripple effects within the economic system; and finally the uncertainty on how efficient adaptation can be.

These questions have been the topic of intense debates in the writing and approval process of the Fourth Assessment Report of the IPCC, and will be at the heart of the fifth one. Finally, the presentation will make the case that it is not because impacts cannot be predicted with certainty that adaptation strategies cannot be developed and assessed. In particular, the presentation will focus on the role of climate change uncertainties, which make it difficult to assess climate impacts and to provide "climate forecasts" that could be used directly by decision-makers to design adaptation measures.

In this presentation, five strategies to get round this problem and reduce future climate vulnerability are examined: (i) selecting "no-regret" strategies that yield bene-

fits even in absence of climate change; (ii) favouring reversible and flexible options; (iii) buying "safety margins" in new investments; (iv) reducing decision time horizons; and (v) promoting soft adaptation strategies, including scientific research, information sharing, long-term prospective, insurance, and other institutional innovations. Consequences will be derived on how best developed countries can support adaptation in developing countries.

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* Susan Solomon, *Senior Scientist, National Oceanic and Atmospheric Administration (USA)*

A World of Climate Change: Yesterday, Today, and Tomorrow

This talk will address both scientific aspects of climate change and some of the reasons why international agreement on climate change policy has proven particularly difficult. Human choices have the potential to influence climate over a range of time scales, due to the time constants that characterize the inputs to the system (such as greenhouse gases, or aerosols), the uses that lead to emissions of these forcing agents, and the responses of the physical climate system (including the biosphere and ocean). The present mix of anthropogenic radiative forcing agents are slowly forcing the climate system to change. These include carbon dioxide, methane, other greenhouse gases, and aerosols, with lifetimes ranging from centuries to years to days. These each imply a different degree of 'commitment' to future climate change. The climate response to these forcings over the next few decades is expected to depend strongly upon factors such as the time scale for the ocean mixed layer to respond to increases in global mean air temperature. On time scales of centuries and millennia, very slow-responding elements of the climate system include the deep ocean and the polar ice sheets. On the human side, emissions of greenhouse gases arise from a mix of different countries, both developed and developing, with different emissions, infrastructure capabilities and commitments that are among the factors influencing policy discussions. Comparisons will be briefly drawn between the success of policy on ozone depletion (Montreal Protocol) versus the apparent gridlock on climate change, and the lessons that may thereby be learned.

SESSION 2 - ECONOMICAL ASPECTS AND SOLUTIONS

* Carlo Jaeger, *Professor, Postdam Institute for Climatic Impact Research (Germany)*

**The Looming Credibility Crisis of
Global Climate Policy**

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* Rich Richels, *Senior Technical Executive, Global Climate Change Research at the Electric Power Research Institute (USA)*

**The Need for Candor in Describing
Greenhouses Gas Mitigation Cost**

All too often policy makers are led to believe that the costs of making dramatic reductions in Greenhouse Gas emissions will be negligible. This is both misleading and counter productive. Policymakers and the public need to know that there is no "free lunch" but that it is "a lunch well worth paying for". Otherwise they will become disenchanted when they learn that costs will be substantial and they will back away from making the reductions that will be called for. Hence, the key challenge is to convince those in authority that the reductions are well worth the investment. Policy analysts must refrain from being policy advocates and report the true costs of actions. As better information becomes available they can readjust their estimates. If it turns out that costs are lower or higher than are originally estimated, they can adjust their costs accordingly. But it is extremely unlikely that the substantial reductions currently being discussed will come at little cost. This is particularly the case, with proposals to limit temperature increase from preindustrial levels to 2 degrees C. This target may not only turn out to be economically infeasible, but also technically infeasible.

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* Priyadarshi Shukla, *Professor, Indian Institute of Management (India)*

Aligning Energy, Climate and Development Priorities in Emerging Economies

Near-term energy and infrastructures choices in emerging economies have profound impact on long-term global greenhouse gas emissions. The path dependence from lock-ins caused by these choices is overlooked by conventional development models. These models, which assume perfect markets, advocate decoupling of carbon emissions and economy using carbon-centric market

instruments like tax or permits that operate from the margin of economic frontier. But emerging economies are saddled with market imperfections, policy myopia and weak institutions which render marginal instruments ineffective vis-à-vis mainstream development choices that decide long-tem aggregate energy demand and emissions.

An alternate model is to mainstreams development choices using the 'sustainability' principle by aligning energy, climate and development priorities. This approach realizes significant co-benefits from decoupling of economic growth from carbon as well as from several key resources, including energy. Using an analysis for India, we show that the alternate model can achieve the same long-term cumulative carbon mitigation at

significantly lower carbon prices compared to the conventional model. The alternate model proposes a diverse portfolio of policies and measures including carbon pricing mechanism, regulatory interventions like renewable portfolio standards and technology mandates; besides targeted interventions in urban planning, infrastructures and R&D, and the measures to inform and alter consumer choices. Its implementation strategy would involve bottom-up and local decision-making in emerging nations; and a top-down global institutional set-up wherein the governments and firms from developed nations will have key role in knowledge and technology transfers to assist emerging economies in their transition to low carbon, energy secure and sustainable future.

Session 3 - Testimonies from the Front Lines

The issues around sciences and societies are fed by the dialogue or in some cases the lack of dialogue with the front line, and especially with public at large. In order to foster our exchanges, we chose two testimonies, one from the telecommunication area, and the other from the energy domain. In both cases, new, powerful but discrete technologies are implemented, raising questions and concerns. While these are understandable and legitimate, they may be used by other actors, motivated by different and sometimes hidden agendas.

* Luc de Marliave, *Coordinator Changements climatiques, Groupe Total (France)*

**The Total Carbon Capture and Storage
Pilot Scheme in the Lacq Bassin**

* Peter Wiedemann, *Director of the Program Group MUT (Humans, Environment and Technology), Federal Research Center Juelich (Germany)*

**Risk Potentials from Mobile Telephony,
Precaution Taking and Risk Perception**

Possible adverse health effects due to electromagnetic fields (RF EMFs) from cellular phones and base stations present a major public health issue across Europe as well as in other parts of the world. Because scientists cannot exclude that EMF's might cause health problems, the application of the precautionary principle is debated heavily. By considering precautionary measures, political decision-makers hope (1) to avoid potential adverse health effects and (2) to attenuate public fears about EMFs. The latter expected but unproven effect builds the focus the research presented in the paper. The research refers to two experimental studies conducted in Austria and Switzerland which indicate that precautionary measures may trigger concerns, amplify EMF-related risk perceptions, and may decrease trust in public health protection management. Such impacts, questioning common expectations, should be considered in decisions about precautionary measures.

Climate warming is a very special case of "science in society" with a sort of scientifically proved diagnosis contesting nothing but our life styles. What does this diagnosis mean? What are the consequent difficulties? What are the responses and evolution of the public opinion?

* Daniel Boy, *Research Director, Centre d'étude de la vie politique française (CEVIPOF), Sciences-Po (France)*

Public Perception of Climate Change

Since the year 2000, ADEME (Agence de l'environnement et de la maîtrise de l'énergie) has been carrying out an annual inquiry into the French population's perceptions of global warming by means of survey. The report presented here will outline the main results of this series of surveys by underlining changes in opinion on the following points: how does the public view the phenomenon of the acceleration in the greenhouse effect? What causes and consequences are envisaged by the public? To what extent does public opinion accept public regulatory measures? What changes in private behaviour are considered acceptable to contribute to creating sustainable consumption?

* Jacques Grinevald, *Professor, Institut des hautes études internationales et du développement, Genève (Switzerland)*

Historical Perspective on the Overheating of Development: from the Thermo-Industrial Revolution to the Anthropocene

The socio-epistemological approach proposed here will be an attempt to put the global warming affair, or the anthropogenic greenhouse effect drift, into a socio-historical and global ecological context. My approach summarizes many epistemological and historical studies about the technological and scientific development of the West and development economics to thinking the energy-climate-society problématique on the scale of the Earth as an evolving living planet. This sketch will emphasize the thermodynamical and biogeochemical aspects of the world industrial metabolism since the Industrial Revolution, associated with the current geological epoch newly named the Anthropocene (P. Crutzen, "Geology of Mankind", *Nature*, 3 January 2002, 415, p.23; J. Grinevald, /L'effet de serre de la Biosphère : de la révolution thermo-industrielle à l'écologie globale/, SEBES, 1990, on line; and /La Biosphère de l'Anthropocène : climat et pétrole, la double menace/, Georg Editeur, 2007).

Health

Session 1 - The Societal Challenges on Stem Cells Research

Embryo stem-cell research remains controversial, with tension between the hope placed in regenerative medicine and fears surrounding the possible instrumentalisation of human beings. But, is there really a controversy?

With what opposition, either explicit or supposed, are the experts' discourse and demands confronted? By which schools of thought, lobbies or organised public debate was the authorities' decision informed? This session compares the French situation – which is cloaked in an ambiguous mix of stated principles and actual dispensations – with the much more liberal British approach.

 * Marina Cavazzana-Calvo, *Head of the Department of Biotherapy, Hôpital Necker (France)*

Stem Cells - from Basic Research to Applications: the Society Expectations

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* Austin Smith, *Director, Wellcome Trust Centre for Stem Cell Research, University of Cambridge (Great Britain)*

Pluripotent Stem Cells from Embryos and Adults

Stem cell research has provoked moral outrage over use of human embryos for research, countered by exaggerated promises of miracle cures. Stem cells are objects of scientific wonder and mystery. They are the basic building blocks of human life. Unlocking their secrets will illuminate our under standing of fundamental processes in biology and disease. Most remarkably, in the past two years scientists have discovered how to recreate embryonic stem cells from adult cells. This brings new prospects for regenerative medicine although major hurdles have still to be overcome.

SESSION 2 - SAFETY AND HEALTH CRISES

The public-health tragedies that occurred at the end of the twentieth century changed both perceptions of health risks and public expectations. The emergence of the notion of "health security" led to the introduction of a large number of health-watch, assessment and risk-management systems. What are the mechanisms? What roles do the various players (health authorities, experts, associations, industrial entities, etc.) now play in these processes? How do the tensions between Science and Politics manifest themselves where the prevention and management of health crises are concerned? What are the determining factors and under-currents?

*Paul Dorfman, *Senior Research Fellow at the NHS Centre for Involvement, University of Warwick (Great Britain)*

Radiation Risk, Rationality, and Citizen Involvement

Despite the key nature of the debate, the definition of radiation risk is by no means agreed. In fact this risk definition remains controversial and open to critical analysis. This is because there are a number of key uncertainties in the risk estimates for both radiation biology and radiation epidemiology.Thus, low energy beta particles, Auger electrons, and alpha particles pose particular challenges, as does genomic instability and bystander effect. Moreover, recent epidemiological studies by the German Childhood Cancer Registry carried out on behalf of the Federal Office for Radiation Protection point to further uncertainties in current risk estimates. In this context, public concern about policy decision-making on issues involving nuclear risk is a defining issue. Disputes concerning nuclear risk are profoundly complex debates within which the reification of positions is set in the context of deeply held value-laden belief systems, and the dominance of natural-science discourse within the policy process. One way to address this problem of mistrust is through greater citizen involvement - in order to arrive at a democratic and balanced view. Here, the practice and purpose of this public dialogue, and the models of engagement to enable it, is core to the relationship between government and the public in a modern democracy.

This paper provides examples of 'better practice', and 'lessons learned' from UK public dialogue processes including: 1. the Ministry of Defence ISOLUS (Interim Storage Of Laid-Up Nuclear Submarines) dialogue concerning the de-commissioning of UK's current nuclear powered submarine fleet, 2. SAFEGROUNDS (Safety and Environmental Guidance for the Remediation of Nuclear and Defence Sites) – a multi-stake-

holder forum involving government departments, regulators, MoD, local authorities, non-governmental organisations, community-based organisations, and academics, and 3. the recent Sellafield low level radioactive waste stakeholder workshop programme.

* Michel Setbon, *Research Director, CNRS, Head of the Centre Interdisciplinaire sur le Risque et sa Régulation (CIRR), Ecole des Hautes Etudes en Santé Publique (France)*

Risks and Crises in the Nuclear Industry: the La Hague Model

Civil nuclear power, which is a major source of danger, is regularly the focus of alarming events and the way in which these are handled highlights its exceptional status. Reactions to a statement identifying health risks in the vicinity of a nuclear site have an unprecedented impact which is proportionate to what is at stake and to the perception which this technology creates. The crisis which had a long-term impact on the nuclear waste reprocessing plant at La Hague (1997-2000) is a tangible example of this on more than one level. Firstly, on account of the way in which the information was conveyed: the publication in a scientific journal of the results of an epidemiological survey which concluded that waste from the plant was to blame for the higher than normal incidence of leukae-mia among people in the 0-24 age group living in the vicinity. Secondly, on account of the turmoil and strong emotions aroused by this information, leading to a protracted and turbulent process of checking the basis of these claims by experts. Finally, the unusual methods used by the experts, both in terms of scientific and technical involvement and in openness to anti-establishment associations, which resulted in the nuclear industry being cleared, thus bringing the crisis to a (provisional) close. The scale of this crisis and its consequences mean that it can be viewed as a model and as a turning point for the way in which expert analysis of nuclear risk is considered and organized in France. These two aspects will be highlighted in a summary and in an analysis of the process used to tackle the crisis, in which the end result is less important than the lessons learned along the way by different stakeholders with irreconcilable values.

Session 3 - The User in the Health System

For many years, those receiving medical treatment were expected to remain within the bounds of their roles as patients, to have confidence in their doctors' expertise and to follow their instructions. They now have greater expectations, and wish to have a say in decisions, and to become stakeholders in the organisation of a system, which is still, essentially, controlled by doctors and public management entities. This session explores the interactions between the various players, and looks at how it might be facilitated, taking account of users' experience, and comparing the situations in France and elsewhere in Europe.

* Johan Hjertqvist, *President, Health Consumer Powerhouse (Sweden)*

Europe of the Healthcare Consumer

In the immense flow of healthcare information there is a missing link: the care consumer! To make healthcare advance from hierarchy to service industry the consumer must become a partner. Such a transformation requires a revolution of rights, access and participation. Performance outcomes must be measured – and measured regularly and publicly. The incentives must change to support personalised service provision and funding. The different Health Consumer Indexes reveal a European lack of equality in healthcare and shortage of consumer information demanding immediate improvement. EU policy action should give priority to improving the flow of knowledge to support health care excellence in different ways.

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Knowledge, a Value in Itself?

SESSION 1 - WHAT IS THE VALUE OF KNOWLEDGE?

While technoscience has become the main driving force of power in all of its forms – economic, political and military – does its very efficiency not have a deep effect on the performance and purpose of scientific activity, giving credence surreptitiously to the notion that the value of knowledge is to be measured only in the light of the potential concrete fallout?

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Annexes

* Pierre-Henri Gouyon, *Deputy Director of the Department of Teaching and Research in Biology, Muséum national d'histoire naturelle (France)*

Biology: the Temptation of Daedalus

Some high-ranking scientists have been seen to oppose the introduction of the precautionary principle in the Environment Charter appended to the Constitution of the French Republic. The reason for this position was that this principle could slow down "Progress". Concern for the environment and adopting a cautious attitude could apparently slow down progress! But what is progress? It is high time that scientists and decision-makers realize that the progress in question in these views is an outdated and false concept. One might have hoped that technical progress would resolve problems of inequality or world hunger. It was possible to believe in this utopia in the nineteenth century. However, as the twentieth century moved on, it became apparent that there was no option but to abandon this belief.

From eugenics to weapons of mass destruction, technical progress has by contrast demonstrated itself to be capable of the very best and the very worst. Today, it is becoming clear that technical progress without moral or social progress will only lead to the downfall of mankind. Faith in technical progress for its own sake is represented in mythology by Daedalus, the champion of blind endeavour in which technology causes problems which he tries to resolve with further technical solutions. The idea of a headlong technical rush creating ever more serious problems is not therefore new.

It is essential for human beings to try to regain control of their destiny and to stop believing that letting competition between people, companies and states manage the future of mankind and the planet is a good thing, simply because "laisser faire" guarantees a maximum amount of progress. Only within this framework can we hope to see constructive thinking emerge, based on a fundamental knowledge of the phenomena governing the fate of the planet, its biodiversity and mankind.

* Pierre Léna, *Head of Education and Training, Académie des sciences (France)*

**Knowledge and Acknowledgement:
How are they Being Born?**

This title might seem pretentious. It simply aims to clarify several issues relating to science raised by the Lisbon Programme: building a knowledge society. Since science and technology are singled out by this programme to become one of the assets of the Europe of the future, it is legitimate to wonder what this programme means for them. The economic aim which is most often adduced is that innovative companies are in pursuit of world rankings. This goes without saying, but carries the risk of distancing us from a more profound vision which is closer to our European genius. The knowledge society requires us to share in the birth of a new world in which the spirit of creativity is nurtured in everybody. Teaching, which transmits science, is obviously implicated first and foremost, not by creating a scientific and technological culture as is too often repeated today, but by acknowledging the way in which science and technology are fully rooted in culture and acknowledging also the place of others today in parts of the world which science and technology are leaving ever further behind. When all is said and done, acknowledgement is an expression of gratitude, which can bind generations in mutual admiration of a legacy and treasure which will bear fruit.

An attempt will be made to draw concrete consequences from this vision of our scientific education and of the challenges presented by teacher training. Will we be able to take advantage of the universality of science, to make a success of European education?

Modern science was born in Europe, and it was there that it progressed most until the Second World War. It has now become global. Has European research maintained its particular "style" in this broader context?

* Helga Nowotny, *Vice-President, European Research Council, Chair of the Scientific Advisory Board University of Vienna (Austria) and Professor emeritus of ETH Zurich in Social Studies (Switzerland)*

Is there any European Specificity in Science?

There is no such thing as a unique way of doing science. Scientific ideas and practices are partial and incomplete. Science is nowhere near its limits. Science belongs to humanity and it is open to all who can learn and do it. Its powerful motivational driving force is curiosity. But science is also a cultural activity and therefore embedded in society. At times science clashes with religious or political authorities and beliefs. Science depends on society to put resources at its disposal and to create a space of (relative) autonomy in which scientific curiosity can thrive. There is no Western or Eastern way of doing science, just as there is no French or German, Islamic or African science. But there are different constellations in the relationship between historical and contemporary societies and their science.

In my presentation I will reflect on one historical example in which scientific and technical curiosity has flourished under very different societal conditions in ancient China and Greece. I will then move towards an analysis of current specificities of science in Europe compared to the US. I will conclude with a brief outlook on the European Research Council and its European specificities.

Agronomy

SESSION 1 - THE CHALLENGES OF AGRONOMIC RESEARCH IN A GLOBAL CONTEXT

Everywhere in the world, food results from soils, oceans, energy, fresh water, human skills and work. What consequences for the research? Is it definitely flat or several trends should be observed? It must cope with many deals: a dramatic demographic growth, limited professional capacities, a world financial crisis with a fast poverty development, the degradation of the environment, the resources exhaust and the climate change. Would such deals be taken over by the scientific research? Would results be successful enough?

* Bernard Chevassus-au-Louis, *National Agricultural Inspector (France)*

Rethinking the Relationship between Science and Society: an Additional Constraint or an Asset for Taking up the Challenge of Feeding the World?

Agricultural and food issues are back in the front line of political agendas on a national, European and international level. This resurgence of interest is accompanied by a newly defined set of "terms and conditions" which will be presented briefly and which can be summed up by the triptych: more production, different production and alternative production. There is also the prospect of climate change which will force many agricultural systems and all eco-systems globally to adapt to new and stringent constraints, especially in the intertropical zone.

Compared to these major and complex challenges, establishing new relationships between science and society, might appear to be an extra constraint which is likely to slow down the innovation dynamic and to impose an extreme vision of the precautionary principle, or to steer research towards local, short-term objectives.

The opposite argument will be put forward, namely that more interactive approaches, linking a variety of stakeholders to different stages of the research process and breaking with the strict distinction between "producers" and "consumers" of innovation can prove to be extremely fruitful. This is especially true if they are evaluated against criteria for sustainable development and if we do not only consider the time required to produce an invention, but also the time from the genesis of this invention, right up to its actual use in a society. It will be demonstrated that this approach is particularly relevant in the case of the objectives of agronomic research, whether this be food, creating improved varieties or the production of ecosystem services.

* Arthur Mol, *Chair and Professor in Environmental Policy, Department of Social Sciences, Wageningen University (Netherlands)*

Agricultural Research: Moving beyond Agriculture

Over the last decades agriculture has profited to a large extend from science and scientific research, not only in Europe but globally. But increasingly questions are raised regarding the agricultural sciences and their contribution to the 'advancement' of agriculture. Environmental pollution, and landscape and biodiversity degradation have been worries for some time; GMOs, biofuels and the social consequences of large-scale, capital intensive monocultures in OECD countries for small farmers around the world are examples of more recent problems.

Hence, it is increasingly recognized that the agricultural research agenda needs to be widened, beyond a simple modernization path of increased agricultural production and efficiency. But what are the new challenges for the agricultural research agenda? Who should decide on that agenda? At what level should these questions be set in times of globalization? And can this agenda remain limited to agriculture now that the social systems of agriculture, energy and industry become so heavily intertwined?

The presentation will use the example of biofuels to illustrate that there are no longer any simple answers for the future of scientific research and advancement: biofuels can neither be glorified nor condemned. Any way forward with science will mean a growing involvement of society. But we have to remain aware that society is always fragmented and divided and that procedural improvements may not solve agro-scientific controversies.

Session 2 - Some Trends for the Agriculture Research Policies: Stakes and Implied Responsibilities

This session will study the communication and regulation ways to be developed between the scientific offer and the political and economical decisions at the regional stage (namely the European one) as well at the global world scale. Several fields should be considered for the agriculture research: good and controversial practices (such as the GMO), international markets (for grains, oils, animal proteins, etc.) and local markets (for basic food), and the world food programme. Are the agriculture research issues followed by the useful innovations? What kind of new responsibilities the scientists are faced with? Is there any European specificity among these various questions?

* Larry Busch, *Professor, Lancaster University (Great Britain) and Michigan State University (USA), Former President, Rural Sociological Society, Former President, Agriculture, Food, and Human Values Society*

What Kind of Agriculture do We Want? What Might Science Deliver?

Until recently, nearly all agricultural research was unified by a focus on increased production. Often, even questions of productivity were pushed to the side to make room for production increases. Arguably, the production subsidies in Europe and the US made that approach viable. But today, paradoxically, we are faced with both growing fragmentation and integration in agricultural research. No longer does the public sector set the agenda; nearly everywhere the private sector is in charge. Moreover, public expectations about agricultural research have changed. Agricultural research is claimed as the solution to problems of global warming, rural development, environmental improvement, economic growth, sustainability, and even public health. On the one hand, we can discern the outlines of a new integration of food, pharmacy, diet, and health. But, on the other hand, we can also see a considerable, perhaps growing, gulf between the molecular approaches to biology – genomics, proteomics, metabolomics, among others – and the older fields such as systematics, and plant and animal breeding. And, this is paralleled by a shift from a single set of public standards focused largely on safety, to a proliferation of sometimes conflicting standards for sustainability, worker rights, fair trade, and organic, among others. What appears to be missing is any attempt to ask what kind of food and agriculture we want. We need to begin to answer this fundamentally ethical question if we are to ensure that investments in agricultural research yield improvements.

* Hans-Jörg Lutzeyer, *Scientific Officer, European Commission, DG Research, Directorate E (Biotechnologies, Agriculture, Food) (European Union)*

Mechanisms for European Co-ordination of Agricultural Research

The renewed Standing Committee on Agricultural Research (SCAR) plays a major role in the coordination of agricultural research efforts in Europe. The term "Agricultural Research" is used in its wide definition, beyond the narrow confines of research relating to production and embracing the so-called "fork-to-farm" concept, including non-food uses, biodiversity, forestry and rural development. The SCAR process also opens new opportunities for the dialogue of science with society – on the level of Member States and on European level. A major initiative was the SCAR Foresight Process which formulated possible scenarios for agricultural futures in Europe: Climate shock, energy crisis, food crisis, co-operation with nature. Stakeholders were part of the process in a workshop and an international Conference on 26-27 June 2007. It builds on an earlier series of Science and Society conferences which the European Commission organised jointly with EURAGRI.

On a project level, EU funded agricultural research projects are encouraged to work with civil society organisations and stakeholders as full participants. They have a chance to influence the research agenda and work in a joint effort on the project objectives.

Satellite Workshops

Indicators of the Science-Society Relationship

The relationship science-society is historically and geographically variable; this relationship can be observed in various arenas such as mass media, museum, festivals and deliberative exercises on controversial issues, but also in everyday life of citizens and consumers. The session will open a discussion on how to define suitable indicators for this relationship in a global perspective. The papers will present survey evidence of public understanding of science in a longitudinal perspective for Europe (1989-2005), and in a cross-sectional perspective for India-Europe (2004/05). The discussion shall focus on the strength and weaknesses of these existing survey indicators and the potential of complementary data streams to assess the science-society relationship as a one of relative distance and quality.

* Martin Bauer, *Professor, London School of Economics (Great Britain)*

Scientific Culture - Indicators for the Variable Science-Society Relationship

World-Wide countries now routinely collate statistics on science indicators such as R&D expenditure, bibliometrics, high-tech employment, and high-tech consumer goods and trade balances. In parallel there have been various, but often isolated, attempts to define complementary "public understanding of science"(PUS) indicators including scientific literacy, public imagination, interest, engagement and attitudes. These have been globally successful by controversial: there are clearly limits in interpreting the science-society relationship in terms of a public deficit; more fruitful is a notion of a "relative distance" between science and society which varies in time and space. A discussion is needed on how to define a suitable and globally portable metric of this distance. For this purpose existing databases should be revisited and interpreted in a new light.

For example, Eurobarometer has been asking questions pertaining to public sentiment regarding science and technology since the late 1970s; similar French efforts reach back to early 1970s. A series of eight related EB surveys have recently been integrated to form a single database (sample size over 60,000 observations and 60 variables), and thus constitutes a unique resource to compare the dynamics of the culture of science across Europe EU-12, EU-25 and EU-28. Comparable questions include items on knowledge, interest, trust, and attitudes to science, always related to education, age and gender. The session will demonstrate the potential of such databases, which hitherto for various reasons are largely unexploited. Europe is well suited to lead the way in the comparisons of subjective scientific cultures.

* Kristina Petkova, *Professor, Institute of Sociology, Bulgarian Academy of Science (Bulgaria)*

The Changing Images of Science: Geographical and Historical Comparison

We examine the impact of birth cohort, net gender, education and age on attitudes toward science in Bulgaria and UK in late 20th and beginning of 21st century. To do so, the authors have made use of the Eurobarometer surveys of public understanding of science and a comparative representative survey in the two countries. Considering the long term campaign launched by the European Commission to acquaint people with science and change the way new generations perceive science and to the extent that the effect of cohort on attitudes reveals the impact of the unique societal factors which are characteristic for a given generation, it can be expected that there will be observed a common tendency of more positive relation to science which is cohort dependent. To test these expectations the authors build several factorial ANOVA models. In these models, dependent variables are the different facets of attitude to science. The independent variable is always the cohort. The results show some differences but also common tendencies for the examined attitude facets. For the UK, we obtained data that indicate a significant decrease in belief in science and in support for science. For Bulgaria, is obtained data that indicate a significant increase in distrust in scientists, a decrease in interest in science and a decrease in support for science. We conclude with some speculation on this withdrawal from science.

* Rajesh Shukla, *Professor, National Council of Applied Economic Research (NCAE) (India)*

A Conceptual and Methodological Framework of Construction of Science Culture Index

The business of science indicators has come a long way, both in terms of methodological scrutiny as well as the level of institutionalisation. Rajesh Shukla and Martin Bauer (2007) attempted to integrate STS performance indicators such as R&D expenditure, science publications, citations, etc., and "public understanding of science" (PUS) indicators including concepts such as scientific literacy, public sentiment, interest, and attitudes. The index embodies three aspirations: a) it integrates objective STS statistics with PUS indicators into a single culture index; b) it takes account of the context specific relationship between level of literacy and attitudes (the relation is curvilinear and hence requires a conditional transformation; in high knowledge contexts negative attitudes count more than positive ones). c) it combines literacy, attitude strength,

interests and engagement activities into an subjective index expressing. This exercise draws conceptual and methodological material used in the construction of such a composite index based on a combined data base of EU (32 countries) and India (23 States). The current paper is aimed to share some of the experiences related to theoretical and analytical options considered and decisions made, particularly in regard to integration of two data sets, identifying and defining indicators, constructing composite indices and finally its validation which we suppose is of a great interest to researchers in this area.

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Indicators of the Science-Society Relationship

Young People and Science

Few people will challenge the fact that there is a declining interest in science among the young generation. But what evidence do we have? Are we talking of a lack of interest in science or rather a disinterest for science studies and careers? Can we identify good experiences and good practices in Europe trying to bridge the gap between science and the young? Do we need to radically change the way science is taught at school, as recommended by the Rocard report published by the European Commission in June 2007?

* Michel Claessens, *Deputy Head of Unit, European Commission and Editor-in-Chief, Research*EU (European Union)*

What do Young Europeans Think about Science and Technology?

The presentation will summarise the results of a new "Eurobarometer" opinion survey carried out in the EU from 9 to 13 September 2008. Almost 25,000 randomly selected young people (aged between 15 and 25) were interviewed across the 27 Member States. The results show that young Europeans (aged 15-25) put great trust in science and technology (S&T). Young Europeans tend to be more positive than adults about S&T. 82% agree that S&T bring more benefits than harm. However a large majority of young people are not interested in studying engineering or a scientific discipline. The main reason is that most of them said to have already chosen their profession; only 3% of interviewees invoked low salaries in the scientific careers.

* Karin Hermansson, *Research Director, Vetenskap & Allmänhet, VA (Public & Science) (Sweden)*

How to Raise Young People's Interest in Science?

Science catches young people's interest when they perceive it as meaningful and view it in a context. This is the main conclusion from studies and experiences made by the Swedish association Vetenskap & Allmänhet, VA (translates Public & Science). Young people are often looked upon by older people as ignorant and having "bad attitudes". In many countries there are worries about declining interest in science studies. In a study conducted by VA, young Swedes'

attitudes to science and researchers were investigated. The study consists of quantitative as well as qualitative parts. In addition, evaluations from a selection of science mentoring projects were analysed.

The analysis shows that education and background has a larger influence on people's attitudes than age. Still, young people often have attitudes different from older people. In Sweden, the young seem less positive to scientific and technological development than older people, whereas the opposite is true in many other countries. However, the Swedish boys and girls interviewed stated that they find interested and enthusiastic persons well worth listening to. Good teachers, mentors and role models are key success factors in inspiring young people to study science. Choosing relevant topics

and considering science in a context is also crucial.

These findings are in line with experiences from science dialogues, such as "Science Cafés" and similar activities between young people and researchers. VA has arranged such dialogues for several years. VA also coordinates the Swedish science events during the European Researchers' Night.

Dialogues should be arranged in unconventional forms and informal venues, the starting-point being what actually interests the target group. The participating scientist is a key to success and must be a good communicator open to discussion. In this presentation, I will share our best practices on how to reach young people while communicating science.

* Mudite Kalnina, *Senior Officer, National Youth Initiative Centre of Ministry of Education and Science (Latvia)*

The Role of Out of Class Education in Promoting the Interest of Youth in Science

A significant role in science teaching in Latvia is played by extra curricular work which is done at school and out of school. A recognized activity to raise pupils' interest in science is the organization and managing of pupils' research on three levels: school, region and state. The organization of pupils 'research activity is set up by the regulation

of Ministry of Education and Science. The research work is done by senior form pupils (aged 16-19) of secondary schools. The pupils can choose the field in which to carry out the research work themselves or they do it encouraged by their teachers. The majority of pupils' research works are carried out at school and the leaders of their research works are teachers, but research projects can be carried out also in science and culture centres, research institutes, establishments of higher learning, enterprises, etc. super-

vised by relevant specialists. Senior form pupils do research in exact sciences, social sciences and humanities (22 domains are offered). About 500 research projects are submitted to the Conference-Contest which is held at the University of Latvia every year. The authors of the best research projects are matriculated at the University of Latvia. Training courses for the teachers, the leaders of pupils' research works, are organized. The summer school–seminar "Alfa" has been organized for 41 years running in some school in a picturesque country place. The participants of the school–seminar are the pupils (aged 16-18) who have achieved good results in science. The summer school–seminar "Alfa" is organized with the aim of enhancing pupils' knowledge in the chosen field of science. The educational forms in "Alfa" are lectures, practical work, research work (individual and in teams). The classes are run by the teachers of the University, research institutions and guest lecturers from abroad. The pupils gain from meeting equals in age who are interested in science, they gain from talking to scientists, playing sports together. A number of former participants of the summer school-seminar "Alfa" have joined the ranks of the scientific community, some have become leading persons in various fields of social life in Latvia but all of them have become able to engage critically with science in their lives.

Communication and Scientific Integrity

Communicating one's results is an integral part of scientific enterprise. When publishing his results, the researcher not only allows everyone to have access to new knowledge, but also gives to his fellow scientists the opportunity to compare and validate these results. Can this necessary communication drive the scientist to breach his duty for research integrity, under external pressure or for notoriety?

* Pieter Drenth, *Honorary President of All European Academies (ALLEA) (Netherlands)*

Fair Communication and Scientific Integrity

Trust is the most important pillar on which science rests. Colleagues as well as the public at large should be able to rely on the honesty of the researcher. Cases of scientific misconduct, particularly if fully emphasised in the press, create much indignation and negative publicity for science. Such cases include fabrication of data, falsification of results, and plagiarism in reviewing or re-porting research. It can be maintained that –in addition to poor communication– scientific misconduct is an important reason for increasing distrust and scepticism concerning developments in science and technology on the part of the general public and (some) media. Empirical data suggest that misconduct seems anything but rare. Counter-acting such misbehaviour, whether value-based, or compliance-based, is an important and challenging task awaiting the scientific community.

* Emilio Bossi, *President, Swiss Academy of Medical Sciences (Switzerland)*

The pressure of the research system and the impact that this pressure may have on integrity"

The question I was asked to discuss is: "Are the actual financing system and the evaluation of researchers compatible with scientific integrity?" My answer is: of course they are! It's not the financing system or the evaluation of researchers that is not compatible with integrity – it's a certain number of researchers who do not live up to scientific integrity.

Due to the reality of human ambition and of limited funds, competition in research is unavoidable; it is even one of its stimuli. Competition calls for evaluation. Where there is evaluation, there is pressure. Fact is that

publications are a main parameter for evaluation. War against the reality of pressure and against publication as a tool for evaluation is a Don Quijote attempt.

However, there are prophylactic measures that can be taken to avoid scientific misconduct, even in the context of the actual system of evaluation and funding. By improving the methodology for weighing publications the perception of their value would increase, which could decrease the feeling of pressure. For young scientists, the inclusion of the topic of scientific integrity in teaching would help understand the mechanisms of misconduct and consequently help to avoid it. For senior scientists, the acceptance of a fundamental aspect of good research, namely that originality, accuracy, reliability and relevance are more important than rapid results and a large number of publications would make their judgment of scientific performance more adequate, which in turn would increase the acceptance of the judgements, consequently decrease a feeling of injustice and thus diminish pressure. Senior scientist should also be aware of the importance of their role as examples and as mentors. Finally, the installing of a standing organization dealing with scientific integrity in research institutions would make clear that scientific integrity is taken seriously in that institution.

Towards Public Involvement of Science: Interactive Exhibitions and Informal Education

The effort for public understanding of science have often limited into the introduction of the results of the science. Only very few attempts have been capable to show the process of science and empirical methods of research. Also the impact of the science and technology to the everyday lives of the citizens and society has not been clear. Informal learning sources have nowadays an essential role in this process.

* Per-Edvin Persson, Director, HEUREKA (Finland)

Science Changing The World: The European Exhibition, Expertise & Everyday Lives

Four European science centres in France, Netherlands, Portugal, and Finland, are preparing A major touring exhibition "Science Changing the World".

The interactive exhibition is describing the most influential discoveries in science during the last 100 years. Planning this type of exhibition is a challenge starting with large scale background work by experts both in science and research as well as in science communication and public understanding of science.

* Sofoklis Sotiriou, *Manager of Research and Development in Ellinogi Germaniki Foundation School in Athens (Greece)*

Science Centres and Museums Linking Europe

The movement of modern interactive science centres and museums has become visible all around Europe during this decade. These hands-on exhibitions and institutes have nowadays millions of visitors, and they have become part of a large movement of "Science in Society" promoting public enga-

gement of science. The aim of science education is not solely to produce more scientists and technologists; it is also to produce a new generation of citizens who are scientifically literate and are thus better prepared to function in a word that is increasingly being influenced by science and technology. Here, some results of the latest results of using inquiry based science learning in Europe are presented.