

6th EMBO/EMBL Conference on Science and Society

Science and Security

28 – 29 October 2005

at the

European Molecular Biology Laboratory
Heidelberg, Germany

Organising Committee:

Andrew Moore (EMBO, Chair), Halldór Stefánsson (EMBL),
Alessandra Bendiscioli (EMBO), Frank Gannon (EMBO),
Iain Mattaj (EMBL)

Welcome message

In September this year, plans for a new bio-defence laboratory in Montana, USA, were unveiled. In the \$66.5 million facility, researchers will apply similar scientific knowledge to that which makes bio-terrorism or biological warfare a possibility in the first place. The double-edged sword of science application can hardly be more evident. How successfully can we prevent the misuse of research findings that otherwise give us important insights into the workings of nature and prospects of useful applications? What would be the consequences of tackling this problem by constraining research, the mobility of researchers and the funding and publication of their research? Could we, indeed, ever successfully define “research that should not be done”? How much thought should scientists give to the downstream consequences of their work when deciding what to research, or which experiments to do?

In June this year, the USA announced that it would delay the introduction of compulsory biometric passports for travellers from 27 countries in Europe and the Asia-Pacific region until October 2006. But whenever they appear, biometric passports will be part of normal life in the future. In the era of international terrorism, this could, indeed, lead to a safer world; an example of a beneficial use of science. On the other hand, it increases the perception by normal citizens that they are being unnecessarily “watched” by an all-seeing, all-controlling state – the so-called Big Brother of Orwell’s 1984. Could this, paradoxically, lead to a feeling of insecurity and, furthermore, loss of privacy? Biometric data, be they genetic or physical, are collected and stored for a variety of purposes. How can we ensure that their storage is secure, and that no undesirable consequences for normal people or society arise from their use?

The two examples given above are addressed, among others, by the four sessions of this conference. It is no accident that they are from the USA, a country that is at once a world leader in science and technology, and a major target of terrorism. To what extent national security requirements influence global standards and practices is a further question that we will doubtless address. This conference is designed with the aim of promoting greater dialogue, expression of views and understanding between various sectors of society, professional and lay. We wish you an engaging and enjoyable two days of information and discussion.

Andrew Moore, PhD
Manager, EMBO Science & Society Programme
and Chair of the conference organising committee





EMBO was founded in 1964 by European scientists at the forefront of the molecular study of biological entities. Its mission is to promote the life sciences in Europe and neighbouring countries.

Today EMBO has over 1,200 members from all areas of the life sciences, elected annually on the basis of proven excellence in research. The core EMBO activities consists of long-term fellowships for postdoctoral scientists, short-term training fellowships, and courses and workshops in the latest molecular biology results and methods. More recently, Science & Society and a programme of support for young group leaders have also been added to the General Programme. These activities are funded through contributions from the 24 member states of the EMBC (European Molecular Biology Conference). EMBO also runs projects supporting the mobility of researchers within Europe and internationally (EMBO World Activities and the Life Sciences Mobility Portal) as well as a sophisticated search portal for scientific literature (E-BioSci).

EMBO reports, a successful new publication, complements the established and respected EMBO Journal, hosting not only excellent scientific articles, reviews and meeting reports but also a large section on Science & Society, science politics and policy. March 2005 saw the launch of a new open-access, online publication from EMBO and Nature Publishing Group (NPG), Molecular Systems Biology, which is dedicated to the emerging field of systems biology. In general terms, EMBO plays an increasing role in policy-making at European level, having driven discussions on the European Research Council and playing a pivotal role in supporting the European Commission in this area.

EMBO's Science & Society Programme, the main organiser of this conference, develops and organises resources and events that directly or indirectly support the communication of the scientific community with the public, media and policy makers. From international practical workshops for science teachers to the EMBO Award for Communication in the Life Sciences, the programme helps to create a balanced public dialogue on molecular biology and its applications.

More information on EMBO and the Science & Society Programme is available www.embo.org



The European Molecular Biology Laboratory (EMBL) is a basic research institute funded by 18 member states, including most of the EU, Switzerland and Israel. Research at EMBL is conducted by approximately 80 independent groups covering the spectrum of molecular biology. The Laboratory has five units: the main Laboratory in Heidelberg, Outstations in Hinxton (the European Bioinformatics Institute), Grenoble (on the campus of ILL and ESRF), Hamburg (on the DESY site), and an external research programme in Monterotondo, Italy (sharing a campus with EMMA and the CNR.).

EMBL was founded with a four-fold mission: to conduct basic research in molecular biology, to provide essential services to scientists in its Member States, to provide high-level training to its staff, students and visitors, and to develop new instrumentation for biological research. Over its 25-year history, the Laboratory has had a deep impact on European science in all of these areas. EMBL has achieved so much because it is a truly international, European institution, because it has achieved a critical mass of services and facilities which are driven by cutting-edge biological research, and because it regards education – at all levels – as a way of life.

A Science and Society programme has been organized at the EMBL since 1998. The programme offers events and activities dealing with subjects and themes relevant to the ways in which recent developments within the life sciences in general, and within molecular biology in particular, are having a profound impact on people, their societies as well as their cultures. More information can be found at the Science and Society website

www.embl.de/aboutus/sciencesociety/index.html/.

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Programme

Friday, 28 October 2005

08:15 - 08:45 *Registration*

08:45 - 09:00 Welcome addresses:

Iain Mattaj, Director General, EMBL

Andrew Moore, Chair, Conference Organising Committee,
and Science and Society Programme Manager, EMBO

Session I: Preventing the misuse of biological knowledge

Chair **Malcolm Dando**, Department of Peace Studies, Bradford University, UK

Talks:

09:00 - 09:40 **Eckard Wimmer**, Stony Brook University School of Medicine, New York, USA

09:40 - 10:20 **Michael Moodie**, Chemical and Biological Arms Control Institute, USA

10:20 - 10:50 *Coffee break*

10:50 - 11:30 **Jan van Aken**, Study Group on Biological Arms Control, University of Hamburg, and Sunshine Project, Germany

Panel discussion:

11:30 - 12:40 **Jonathan B. Tucker**, Centre for Non-proliferation Studies, Monterey Institute of International Studies, Washington, USA

Richard Guthrie, Stockholm International Peace Research Institute, Sweden

Filippa Corneliussen, Centre for the Study of Bioscience, Biomedicine, Biotechnology and Society (BIOS), London School of Economics, UK

Jeanne Guillemin, MIT Security Studies Programme, and Boston College, USA

12:40 - 14:30 *Lunch*

Session II: Security and the freedom of research

Chair **Dragan Primorac**, Minister of Science, Education and Sport,
Republic of Croatia

Talks:

14:30 - 15:10 **Terence Taylor**, International Institute for Strategic Studies,
USA

15:10 - 15:50 **Philip Campbell**, Nature, UK

15:50 - 16:20 *Coffee break*

Panel discussion:

16:20 - 17:30 **Andrew Marshall**, Nature Biotechnology, USA

Ross Anderson, Foundation for Information Policy Research,
and University of Cambridge, UK

Simone Scholze, UNESCO Social and Human Sciences
Sector, Division of Ethics of Science and Technology, Paris,
France

17:30 - 18:15 **Award ceremony: EMBO Award for Communication in the
Life Sciences 2005**

18:15 - 19:00 *Aperitif*

19:00 - 21:00 *Conference dinner*

Saturday, 29 October 2005

Session III: Science and technology of identification

Chair **Calum Bunney**, International Biometric & Authentication
Consulting (IBAC), France

Talks:

09:00 - 09:40 **David Shenk**, Freelance journalist and book writer, USA

09:40 - 10:20 **Didier Meuwly**, Netherlands Forensic Institute, The Hague,
The Netherlands

10:20 - 11:00 **John Daugman**, Computer Laboratory, University of
Cambridge, UK

11:00 - 11:30 *Coffee break*

Panel discussion:

11:30 - 12:30 **Henning Daum**, Demonstration center and Evaluation lab for Biometrics, Fraunhofer Institute for Computer Graphics, Darmstadt, Germany

Birgitte Kofod Olsen, Danish Institute for Human Rights, Copenhagen, Denmark

Christophe Champod, School of Criminal Sciences, Institute of Forensic Science, University of Lausanne, Switzerland

12:30 - 14:00 *Lunch*

Session IV: Information technology in the knowledge society

Chair **Regine Kollek**, Research Center for Biotechnology, Society and the Environment, University of Hamburg, Germany

Talks:

14:00 - 14:40 **Ivanka Spadina**, Counterfeits and Security Documents Branch, INTERPOL, France

14:40 - 15:20 **Helen Wallace**, GeneWatch, UK

15:20 - 15:50 *Coffee break*

Panel discussion:

15:50 - 16:50 **Karsten Weber**, Department of Philosophy, European University Viadrina, Frankfurt/Oder, Germany

Meryem Marzouki, LIP6/PolyTIC-CNRS, and IRIS-Imaginons un Réseau Internet Solidaire, France

Robert Dingwall, Institute for the Study of Genetics, Biorisks and Society, University of Nottingham, UK

16:50 - 17:00 Closing remarks:

Frank Gannon, Executive Director, EMBO

17:10 *Conference ends*



Session I:

Preventing the misuse of biological information

In July 2001 the decade-long effort to agree a verification protocol to strengthen the Biological and Toxin Weapons Convention (BTWC) ended in failure. Continuing difficulties led to a year-long suspension of the Fifth Five-Year Review Conference of the BTWC in December 2001, and it was only in late 2002 that the States Parties were able to agree an inter-review conference process for 2003, 2004 and 2005 in the run-up to the 2006 Sixth Review Conference of the Convention. The choice of codes of conduct for scientists as the sole topic of discussion for 2005 has led, over the last year, to a welcome focus on the problem of preventing the hostile misuse of biology by many more scientists and their professional organisations.

Among politicians, the media and the general public much attention has been focused on the possibility of large-scale biological terrorism since the anthrax letter attacks in the USA in the autumn of 2001. It is important to understand that there was a series of major offensive biological weapons programmes in leading states during the twentieth century and it would be foolish to imagine that such state-level programmes could not recur. Compounding the difficulty of preventing state, terrorist or even individual misuse of biology for hostile purposes, of course, are the rapid advances occurring in biology at the present time. These lead many commentators to question whether it is wise to carry out some experiments, to freely publish some results and whether new forms of national and international regulation of the life sciences may be necessary.

It is obvious that considered discussion of these issues is at an early stage, although the June 2005 meeting of the BTWC on codes of conduct indicated that progress is being made in clarifying the problem and potential solutions. However, much more needs to be done to engage the expertise of professional scientists in these debates and the first session of this conference is a contribution to that end.

Malcolm Dando, session chair



Malcolm Dando

**Professor, Department of Peace Studies,
Bradford University, UK**

Malcolm Dando is Professor of International Security in the Department of Peace Studies at Bradford University, UK. Professor Dando trained originally as a biologist and, after a period in Operational Research, joined the Department of Peace Studies in 1979. In Bradford he has worked on issues of arms control, first concentrating on nuclear arms control and then, since 1991, increasingly on biological arms control. He was co-author of the British Medical Association reports on Biotechnology, Weapons and Humanity. In 2002-03 Professor Dando was the International Institute for Strategic Studies Senior Fellow at the Center for Global Security Research in Lawrence Livermore National Laboratory in California. His recent publications include "The New Biological Weapons" (Lynne Rienner, 2001) and "Preventing Biological Warfare" (Palgrave, 2002).

Talk

Test tube synthesis of a human pathogenic virus (poliovirus): societal implications



Eckard Wimmer

Professor, Stony Brook University School of Medicine, New York, USA

In 2002, the de novo chemical-biochemical synthesis of a human pathogenic virus - poliovirus - in the absence of a natural template provoked a highly diverse response. On the one hand the experiment was hailed as a milestone in synthetic biology, on the other it was dubbed both irresponsible and dangerous. Indeed, it was suggested that for the sake of national security the work should never have been published. In addition, the experiment raised ethical questions of whether viruses are living or non-living biological entities, and whether it is possible to create entirely new viruses. Another issue impacts on the global eradication of human pathogenic viruses: Can a virus still be considered irreversibly extinct if the chemical formula (sequence) of its genome is known, and biomedical methods allow this virus to be recreated in the test tube at any time? Due to recent advances in DNA synthesis, all small pathogenic viruses can be synthesized swiftly at low cost, but even the largest human pathogenic viruses can - in principle - be made. Since the information about viral genome sequences and biomedical procedures is in the public domain, research should focus on the prevention (vaccines) and treatment (antiviral drugs, research on innate immunity) of the most dangerous viral diseases. This, in turn, may discourage intentional misuse (bioterrorism), a threat that is inherent to progress in biomedical research and biotechnology.

Born in Berlin, Germany, in 1936, Eckard Wimmer was awarded the doctor *Drerum naturalium* in organic chemistry from Göttingen University, Germany, in 1962. Intrigued by the chemistry of living cells, he shifted his research interests first to biochemistry at the University of British Columbia, Vancouver, in 1964, then to virology at the University of Illinois, Urbana, in 1966. Wimmer started his independent academic career as an Assistant Professor of Microbiology at St. Louis University, St. Louis, in 1968, where he began to study poliovirus, a system that became the scientific pursuit and challenge of his life. In 1974, he joined the Department of Microbiology at Stony Brook University, where he served as Chairperson from 1984 to 1999. In 2002 he was promoted to the rank of Distinguished Professor. Wimmer has published more than 300 papers, among them the first genome sequence and genetic organization of a eukaryotic RNA virus (poliovirus), the discovery of the internal ribosomal entry site (IRES), the mechanism of viral polyprotein processing, and the cell-free synthesis of a virus in a naive cell extract seeded with poliovirus RNA.

Wimmer has always viewed viruses from two perspectives: as biological entities that replicate and can cause disease; and as aggregates of organic compounds. His research, therefore, focuses on mechanisms of pathogenesis and the (bio)chemistry of poliovirus. The latter led to the cell free chemical-biochemical synthesis of poliovirus in the absence of a natural template by his research group in 2002.

Talk

The potential misuse of the Life Sciences – Managing the risks and enhancing security



Michael Moodie

Director, Chemical and Biological Arms Control Institute, USA

The challenges to national and international security posed by the deliberate misuse of the life sciences are changing rapidly and becoming more complex and difficult in the face of the incredible speed at which the underlying science and associated technology is advancing and disseminating around the world. Those challenges focus less and less on relevant material and equipment and more and more on the knowledge that is now coming within the grasp of expanding ranges of people on a global basis. In such an environment, traditional tools of policy for preventing the misuse and managing the risks will not suffice. They must be combined with new thinking and new approaches.

This presentation will explore the demands for conceptual and policy innovations imposed by the constantly and rapidly changing environments – both scientific and security. In particular, it will stress the need for three new elements that will be critical for long-term success – promoting a shift from emphasizing threat elimination to risk management, creating an “intellectual infrastructure” to support and facilitate more effective policy development, and fostering a “culture of responsibility” among all of the critical stakeholders in the life sciences communities, including academia, industry, and government.

Michael Moodie is co-founder and President of the Chemical and Biological Arms Control Institute. In this capacity, he is responsible for all aspects of the Institute's activities, including oversight of programs, design and implementation of projects, outreach, administration, and publications. He brings to this role more than 30 years of experience in addressing national and international security issues in government, the policy research community, and academia.

In government, Mr. Moodie served as Assistant Director for Multilateral Affairs at the U.S. Arms Control and Disarmament Agency (ACDA), where he was responsible for, among other issues, chemical and biological arms control. He has also served as Special Assistant to the Ambassador and Assistant for Special Projects at the U.S. Mission to NATO.

In the policy research community, Mr. Moodie has held senior research positions at the Foreign Policy Research Institute, the Institute for Foreign Policy Analysis, and the Center for Strategic and International Studies, where he was also Senior Advisor to the President. He has been a Visiting Lecturer at Georgetown University's School of Foreign Service and a consultant to the President's Foreign Advisory Board, the U.S. Navy, and ACDA.

Talk

The Good, the Bad and the Ugly: dancing the thin line between biological defensive and offensive research



Jan Van Aken

Study Group on Biological Arms Control, Hamburg University, and Sunshine Project, Germany

The rapid development of the life sciences is a major challenge for the global ban on biological weapons. In many countries, the biotechnology revolution generates the material prerequisites for the development and production of biological weapons. At the same time, new biochemical weapons become a possibility that is fuelling new interest in chemical and biological weapons even in countries that so far advocated a ban on them.

Modern biotechnology can clearly contribute to make classical biowarfare agents more effective. It can facilitate access to them, enable the construction of novel BW agents, and it opens the avenue for a broad array of new types of weapons. It is of crucial importance for scientists and policymakers alike to address the increasing threat and prevent the misuse of biological knowledge.

An area of specific concern is biodefense research. Under the Biological Weapons Convention, research and development for defensive purposes is explicitly allowed. Some countries, however, abuse this exemption for projects with little defensive, but clear offensive applications. Under the cover of 'defense', genetically engineered pathogens with enhanced offensive potential and even new types of delivery systems for biological weapons had been developed. Governments should restrict themselves in their biodefense programs to areas that are of clear defensive value and add little to a country's

offensive capabilities. Engineering pathogens to increase treatment resistance, environmental stability or pathogenicity, for example, should be entirely off-limits for biodefence programmes.

But similarly, life scientists need to restrict themselves as well. Research restrictions, which are an inherently more effective approach than imposing limits on publication, should apply in a limited number of situations, such as cases where a military abuse appears to be imminent, where no effective multilateral arms control is presently feasible, and where other technical avenues to reach the same scientific goal are (potentially) available. It can be anticipated that only few research projects would fall into this category, but in these specific cases, clear limits on basic research should be implemented.

Currently head of Hamburg University's 'Study Group on Biological Arms Control', Jan van Aken has worked for more than twenty years to analyse the implications of genetic engineering to human relations, health and the environment. He holds a PhD in cell biology from Hamburg University, where he worked on a variety of projects pertaining to the risks of genetically engineered crops and the implications of pharmacogenetics at the University's 'Research Center for Biology, Society and Environment' (FSP BIOGUM). A former genetic engineering campaigner and scientific advisor to Greenpeace, in 1999 he co-founded the Sunshine Project, an international research and advocacy group on biological arms control. Jan van Aken is a member of the Pugwash Study Group on the Chemical and Biological Weapons Conventions, a member of the Scientific Advisory Board of IPPNW Germany, and a trained biological weapons inspector on the roster of the United Nations Monitoring, Verification and Inspection Commission (UNMOVIC). He is married and has three children.

Panel discussion

chaired by Malcolm Dando



Jonathan B. Tucker

Senior Researcher, Centre for Non-proliferation Studies, Monterey Institute of International Studies, Washington, USA

Jonathan B. Tucker, Ph.D., is a senior research fellow specializing in biological and chemical weapons and biosecurity issues in the Washington, D.C. office of the Center for Nonproliferation Studies (CNS) of the Monterey Institute of International Studies.

Dr. Tucker is the author of “Scourge: The Once and Future Threat of Smallpox” (Atlantic Monthly Press, 2001) and “War of Nerves”, a book on the history of chemical weapons that will be published by Pantheon Books in early 2006. He also edited “Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons” (MIT Press, 2000).

Prior to joining CNS in March 1996, Dr. Tucker served for six years with the U.S. government, including positions at the Department of State, the congressional Office of Technology Assessment, and the Arms Control and Disarmament Agency. He was a member of the U.S. delegation to the Chemical Weapons Convention preparatory commission in The Hague and served on a UN biological weapons inspection team in Iraq in February 1995.

Dr. Tucker earned a B.S. in biology from Yale University and a Ph.D. in political science with a concentration in defense and arms control studies from the Massachusetts Institute of Technology. He has received fellowships from the Robert Bosch Foundation, the Ford Foundation, the American Association for the Advancement of Science, the Hoover Institution at Stanford University, and the United States Institute of Peace. In spring 2004, he was a visiting lecturer at Princeton University’s Woodrow Wilson School of Public and International Affairs.



Richard Guthrie

**Project Leader, Stockholm International
Peace Research Institute (SIPRI), Sweden**

Richard Guthrie (United Kingdom) is the Leader of the SIPRI Chemical and Biological Warfare Project and editor of the SIPRI Chemical & Biological Warfare Studies series (commonly known as the "Scorpion volumes"). Before joining SIPRI he was an independent consultant dealing with defence and security issues with a specialization in the control of materials and technologies used to make nuclear, biological and chemical (NBC) weapons. He has worked extensively with inter-governmental bodies, governments, NGOs and academic units.

His current research work at SIPRI includes: a compilation from open sources of a detailed chronology of events relating to Iraq and CBW, to be published as Scorpion volumes; examining what might be done to promote a positive outcome from the 2006 Review Conference for the Biological Weapons Convention; investigating means and methods to reduce vulnerabilities in civil society to pathogens and toxic materials; and studying lessons that may be learned for enhancing security of pathogens and toxic materials from measures designed for health & safety or environmental purposes.

Richard has interests in emergency management in the voluntary sector and has been a fully-qualified member of the University of Sussex Rescue Team which provides fire rescue, first aid and chemical spill services on the university campus and was a founder member of Wiltshire Search and Rescue. He qualified as a Search Manager with the Mountain Rescue Council of England and Wales in 2001.



Filippa Corneliusson

**Postdoctoral Research Fellow, BIOS Center,
London School of Economics, UK**

Dr Filippa Corneliusson is a postdoctoral research fellow at the Centre for the Study of Bioscience, Biomedicine, Biotechnology and Society (BIOS) of the London School of Economics. Before joining BIOS, she completed a one-year postdoctoral fellowship at the LSE Centre for Analysis of Risk and Regulation and a one-year visiting fellowship at the Centre for the Study of Law and Society at the University of California, Berkeley.

Her research interests broadly focus on the social, political and economic impacts of developments in the life sciences and biomedicine, and the oversight mechanisms put in place to deal with these. Currently, she is working on a Wellcome Trust funded research project entitled “Social and Ethical Aspects of Governing Dual-Use Biomedical R&D”.

As part of this project, Dr Corneliusson is looking at regulatory measures aimed at preventing the techniques and knowledge generated through biomedical work with biological agents from being misused, and exploring what impact these measures have on the biotech industry. In investigating the ground-level impact of dual-use regulatory measures, she is drawing primarily on a number of semi-structured interviews with researchers and managers in US- and UK-based firms.

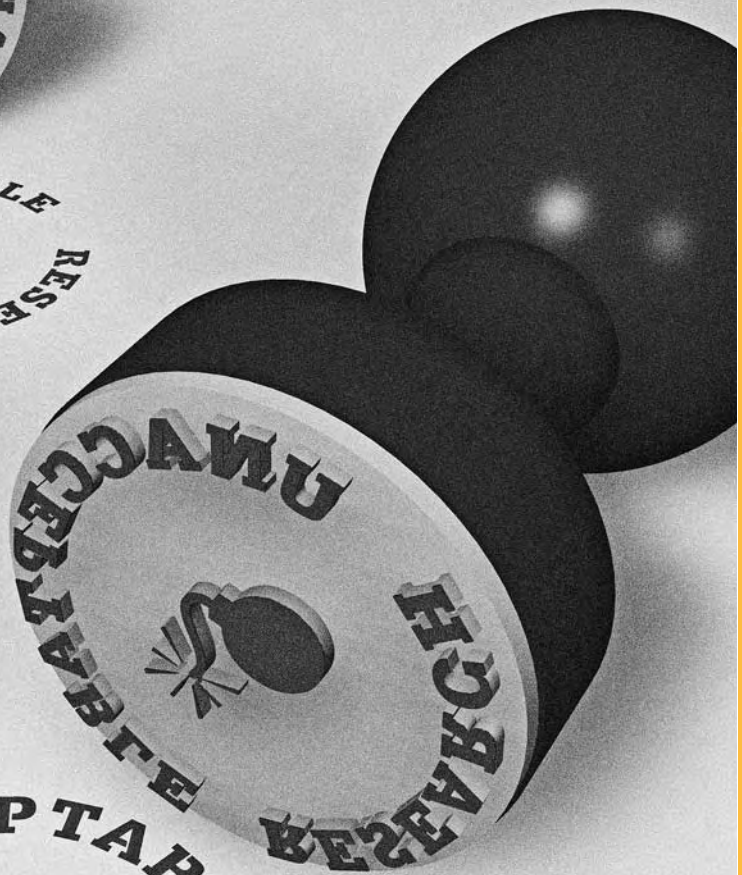
One regulatory measure finding particular currency at the present time is some form of a code of conduct or a code of practice. In her work, Dr Corneliusson is exploring what impact codes of this nature have on biotech firms and assessing how effective such codes would be in preventing the misuse of biological knowledge.



Jeanne Guillemin

**Professor, MIT Security Studies Program,
and Professor of Sociology, Boston
College, USA**

Jeanne Guillemin is a senior fellow at the Security Studies Program, MIT, and also a professor of sociology at Boston College. She has published widely on medical technology and biological weapons issues. She has been a US Congressional Fellow, working with the Senate Finance Committee, as well as a fellow at the Dibner Institute at MIT, and is currently an associate of the Harvard Sussex Program for the study of chemical and biological weapons policy. In the aftermath of the 2001 anthrax postal attacks, she appeared frequently on television and radio and continues to consult for the national media. Her book “Anthrax: The Investigation of a Deadly Outbreak” (University of California Press) was published in 1999. It documents her participation in solving the question of the source of history's largest recorded epidemic of inhalational anthrax, which happened in 1979 in the Soviet city of Sverdlovsk. Her epidemiological research led to the discovery that an accidental release of spores from a local military facility caused the outbreak. Professor Guillemin's most recent book, “Biological Weapons: From the Invention of State-sponsored Programs to Contemporary Bioterrorism” (Columbia University Press), appeared earlier this year.



Session II:

Security and the freedom of research

Scientists have always played a distinguished role in increasing and mobilizing human resources in the service of the advancement of knowledge. One could, therefore, come to the conclusion that it is appropriate for the research results, funded by public finances, to be made known to the public. Is this always the case? What of situations in which widely publicized research results are used to the detriment of mankind?

Examples from history, such as the atomic bomb, or the release of viruses from laboratories, show that there is a realistic threat to our societies. What about misuse of forensic databases – particularly DNA data from individuals – by unauthorized people or undemocratic Governments? Can we be sure that the results of scientific research would not be abused if they were revealed only to a select few? Can we establish criteria/mechanisms that would limit either the areas of research or the use of their findings to applications resulting in the improvement of quality of life?

From one perspective, limiting the freedom of publicly funded research may, theoretically, be possible. However, it may not comply with notions of scientific independence, and it would most certainly lead to a different problem of misuse: defining what is “acceptable” and what is “unacceptable” research. Also, measures such as restriction of mobility of scientist and their research finding may affect scientific productivity in general, if by no other means, then by diminishing their motivation and devotion to scientific research. In the long run, it would definitely dissuade some people from becoming scientists.

Even if we agree that, theoretically, publicly funded scientific research can be controlled, what about the dangers of privately funded scientific research, which cannot be controlled by the general public? This may well cause threats to our national, regional and global securities.

How can we solve these problems?

Firstly, this requires general agreement on the kind of society we want to leave in the 21st century. Science and technology should be an essential

component of effective strategies for reducing poverty in the world. This can be achieved only by active participation of the international scientific community supported by national and international authorities. Governments must be able to rely on scientific results and opinions in their decision making processes.

Public funding of scientific research is very important, but it cannot be separated from public responsibility. There should be different degrees of public responsibility as well as different instruments available for exercising such responsibility. A balance must be struck between science and national interests. This issue is even more complex when considered from the point of view of small nations and developing countries. We have to find the instruments that will enable small nations, economically weak states and undeveloped communities, to improve their economies. However, no entity – however big or small – should be in a position to use scientific results as an instrument of terrorism or threat.

Democratic culture, access to research results, financing, equal opportunities for all citizens and regulations are some of the key words to be discussed.

In addition to civil society in general, scientists must assume a special role in these discussions on how to reach sustainable development and global peace.

Dragan Primorac, session chair



Dragan Primorac

**Minister of Science, Education and Sport,
Republic of Croatia**

A medical doctor specialized in Paediatrics, Dragan Primorac has been Minister of Science, Education and Sport of the Republic of Croatia since 2003. Before becoming a minister he spent some years in the USA, first as a Postdoctoral fellow at the Department of Paediatrics, University of Connecticut, where he later became Faculty instructor. In 1994 he was a trainee at the Division of State Police, Forensic Sciences Laboratory, State of Connecticut. In 1997 he received professional training at the Armed Forces Institute of Pathology, DNA Identification Laboratory, in Rockville, and at the Analytical Genetic Testing Center in Denver.

He is the co-founder of the Clinical and Forensic Genetics Department at the Split Clinical Hospital in Croatia, which he directed from 1994 to 2003, and was Head of the European Group for Validation of new procedures and technologies in forensic genetics in 2000. He is a member of the American Academy of Forensic Science, the American Society for Human Genetics, and the Croatian Society for Human Genetics. Dr Primorac's distinctions include the Life Time Achievement Award (awarded by the New Haven University, Dr. H. C. Lee Institute of Forensic Science in 2002), the Contribution to the Development of Forensic Science Award (awarded by the Connecticut State Police, Forensic Sciences Laboratory in 1996), and the Young Investigator Award, Maurice Attie Memorial Award (awarded by the American Society for Bone and Mineral Research in 1992).

Talk

Governance of research – The international dimension



Terence Taylor

President and Executive Director, International
Institute for Strategic Studies, USA

The rapid advances in the life sciences, while clearly bringing enormous benefits, have raised concerns among legislators and the public, who feel that ethical boundaries are put under pressure. This is further complicated by security concerns that in their application the advances might be misused by terrorists or even by some governments for weapons programmes. An explicit effort needs to be made by the multi-disciplinary science community to understand fully the risks involved and to explain them to the public in a balanced and objective way. Only by doing this can we ensure that public confidence in this scientific area is not undermined, and that sensible and practical regulations are developed and effectively implemented where they are needed. This effort needs to be conducted at an international level and requires leadership from the scientific community itself, if governments are to have any chance of enhancing public safety and security against risks arising from natural or man-made causes. Support for a new organisation, the International Council of the Life Sciences, effectively a 'network of networks', would be an important contribution to achieving this objective.

Terence Taylor is President and Executive Director of the International Institute for Strategic Studies - US (IISS-US), and Assistant Director of the IISS in London. He leads the Institute's project on the International Council of the Life Sciences. His research focuses on international security policy, risk analysis, scientific and technological developments and their impact on political and economic stability worldwide. He is one of the Institute's leading experts on issues associated with nuclear, biological and chemical weapons and their means of delivery, and is responsible for all issues affecting public safety and security in relation to biological risks and advances in the life sciences.

Terence Taylor was one of the Commissioners to the UN Special Commission on Iraq, for which he also conducted missions as Chief Inspector. As a Research Fellow on the Science Program at the Center for International Security and Co-operation at Stanford University, he carried out studies on the implications for government and industry of the treaties and agreements on weapons of mass destruction. He has also carried out consultancy work for the International Committee of the Red Cross on the implementation and development of the laws of armed conflict, and for private companies on political risk analysis (both regional and country-specific). He is chairman of the Permanent Monitoring Panel on Risk Analysis for the World Federation of Scientists and served as a career officer in the British Army on operations in many parts of the world, including counter-terrorist operations and UN peacekeeping. His publications include monographs, book chapters and articles for, among others, Stanford University, the World Economic Forum, SIPRI, the Crimes of War Project, International Herald Tribune, Wall Street Journal, the International Defence Review, the Independent (London), Tiempo (Madrid), the International and Comparative Law Quarterly, The Washington Quarterly and other scholarly journals including unsigned contributions to IISS publications.

Talk

Empowerment and constriction in scientific communication



Philip Campbell

Editor in Chief, Nature, UK

Central to the freedom to conduct research is the freedom to disseminate and access information. This talk will focus on the changing nature of scientific communication enabled by the internet and the threats to dissemination arising on the grounds of security concerns.

I will anticipate changes to the internet and its functionality and to the types of content by which researchers communicate and work with each other.

There has been much agonising in the US government about what types of restriction might make sense in connection with specific publications that have caused alarm. I will review incidents in which publications became the focus of government scrutiny. I will also discuss restrictions proposed by various people outside government.

Dr Philip Campbell has been the Editor-in-Chief of Nature since December 1995.

He has a BSc in aeronautical engineering from the University of Bristol (1969-72), an MSc in astrophysics from Queen Mary College, University of London (1972-74), and a PhD in upper atmospheric physics from the University of Leicester (1974-79). Following postdoctoral research, he worked at Nature from 1979 to 1988, first as Assistant Editor (Physical Sciences) and then as Physical Sciences Editor (1981-88).

He was the founding editor of *Physics World*, published by the UK's Institute of Physics, from 1988 until his return to Nature as its Editor-in-Chief in 1995. He is a director of the Nature Publishing Group, having overall responsibility for the editorial quality of all Nature publications.

He is a Fellow of the Royal Astronomical Society (1979) and a Fellow of the Institute of Physics (1995). He was awarded an honorary DSc by Leicester University in 1999, and was the first person to be given the European Science Writers Award by the Euroscience Foundation, a prize inaugurated in 2001.

His publications include scientific papers, and countless articles in *Physics World* and *Nature*. He has written many articles for general publications such as national newspapers, *New Scientist* and *The Economist*, and has frequently been interviewed for the BBC in the UK and on the World Service. In 1999 he was an adviser to the UK government's Office of Science and Technology on the public consultation on the regulation of biosciences and biotechnology. He is a trustee of Cancer Research UK.

Under his editorship, Nature has won several prestigious publishing awards from the Periodical Publishers' Association, including International Magazine of the Year (1998). Nature's circulation has grown continuously since 1996, and has the highest impact factor of multidisciplinary journals.

Panel discussion

chaired by Dragan Primorac



Andrew Marshall

Editor, Nature Biotechnology, USA

Andrew Marshall has been Editor of Nature Biotechnology since 2000. As well as frequently speaking on biotechnology issues at international meetings, he also regularly organizes conferences and symposia for the Nature Publishing Group on biotechnology. He has over 12 years of experience in scientific publishing, and was previously Editor of Current Opinion in Biotechnology from 1992 to 1996. He has written over 100 articles and editorials on science and technology for the popular media, including The Economist and Popular Science, and for trade publications. In January 2003, he launched Bioentrepreneur (www.nature.com/bioent), a free-access web portal that provides practical information and advice on the challenges of starting a biotechnology company. He obtained his PhD and postdoctoral experience in molecular biology and microbiology at King's College London and was the recipient of the Helen White Prize.



Ross Anderson

Chair, Foundation for Information Policy Research, and Professor, University of Cambridge, UK

Ross Anderson is Professor of Security Engineering at the University of Cambridge Computer Laboratory. He was one of the pioneers of peer-to-peer systems, of micropayments, of information hiding systems, of API attacks on cryptographic processors, and of the study of hardware tamper-resistance. He has also written extensively on security failure, and has analysed attacks on systems ranging from bank cash machines through medical record databases to tachographs.

He became involved in policy issues during the “crypto war” of the 1990s, when governments tried first to ban cryptography, and then to regulate it. Later, when the UK government proposed to extend export controls on dual-use technologies from physical equipment to information, which meant that many scientific exchanges with colleagues overseas would be subject to licensing, he led a campaign that successfully amended the Export Control Act to exempt scientific researchers from most of the new controls.

Recently he was one of the founders of the study of information security economics, and he also chairs the Foundation for Information Policy Research.



Simone Scholze

UNESCO Social and Human Sciences Sector, Division of Ethics of Science and Technology, Paris, France

Simone Scholze is Brazilian by birth, and a lawyer by training, with post-graduation in Law. She is a Member of the Brazilian National Order of Science Merit and former Member of the Brazilian Technical Commission on Biosafety (CTNBio). Among her studies and publications on the legal and ethical impact of science and technology, intellectual property rights, biosafety, access to biodiversity and politics of science and technology, she has also published the book “Patents, Transgenics and Cloning – legal and bioethics implications”. She is a legal and policy counselor assisting the Minister of Science and Technology of Brazil in issues related to legal and ethical aspects of S&T, mainly modern biotechnology, such as intellectual property rights, traditional knowledge protection, GMOs biosafety, sustainable use of biodiversity, bioethics information and communication technologies (ICTs), transfer of technologies as well as incentive laws to S&T and technological innovation.

She participated as Brazilian delegate in several international negotiations related to science and technology, in many multilateral contexts such as at WTO, WIPO, UNEP, UNIDO, UNESCO and MERCOSUL, as well as at bilateral level, with the USA, the European Union and with Latin American institutions in the field of international cooperation in science and technology and intellectual property rights. She joined UNESCO in March 2003 as Program Specialist at the Division of Ethics of Science and Technology.

EMBO Award for Communication in the Life Sciences 2005



2005 Winner:
Edoardo Boncinelli

The European Molecular Biology Organization launched this award in 2002 in order to give recognition to the huge efforts that some scientists make to communicate their science to the public while remaining active in research.

The winner of the 2005 edition of the Award is Professor Edoardo Boncinelli of the University Vita-Salute San Raffaele in Milan, Italy. Boncinelli receives the award in recognition of his outstanding efforts in science communication. Since 1994, he has published 18 science books on topics such as genetics, aging, neurobiology and public health. The full-time professor of biology and genetics –a founding figure in the field of developmental biology of higher animals and humans–is also active in the public arena, regularly communicating with the general public and the media.

The international EMBO jury applauded Boncinelli for his unique ability to see the big picture in science. “Boncinelli’s books really tell the whole story. They cover multiple disciplines and combine areas such as philosophy, history and psychology to examine the social impact of scientific advances. He manages to find the perfect balance between hard scientific facts and a social context.”

Not one to shy away from public discourse, Boncinelli often takes part in public debates and visits local schools. The breadth of his scientific knowledge and natural communication skills also make him a trusted sounding board for the Italian media. A regular contributor to leading Italian daily, *Il Corriere della Sera*, on issues such as cloning, stem cells and GMOs, Boncinelli is also a sought-after source for TV and radio interviews.

The award consists of the sum of 5,000 Euro and a handcrafted gold and silver medal.

This year, as part of the Award for Communication, EMBO presented an additional prize for the best single initiative in science communication. This special discretionary award went to Russian scientist, Dr. Alexander Vershinin, for his outstanding schools project and innovative book on marine biology, “Life of the Black Sea” (<http://black-sea.orlyonok.ru/>).



Session III:

Science and technology of identification

The title of this session directs our enquiry towards two important aspects in the history of human identification: the science and the technology. While we focus on human identification some of the discussion could well be extended to other living creatures, although humans are unique in the creation and maintenance of identification systems for use on other species and – more contentiously – for use on themselves. Such boundary issues between ours and other species appear to be as the ethical centre of our deeper concerns over where identification technologies are being directed in practice. Does a ‘good’ use for identification imply a ‘good’ technology founded on ‘good’ science? At each level different criteria seem applicable and, as of today, are emergent rather than acknowledged.

A third aspect, perhaps of less immediate appeal to those at the forefront of science, is the ‘Business of Identification’. In setting the scene for this session we might say that the Science has been accruing for hundreds of years; that the Technology is now emerging quickly; and that the Business of identification is developing with a hungry opportunism, fed by recent developments in the automated recognition of identifiers such as biometric characteristics. Were we inclined to offer some hierarchy complementary to this approach then we might risk a generalisation, and say that the Science deals with the principles of identification; the Technology with the tools of identification; and the Business with the requirements for identification. Considering the escalating level of confidence in biometric identifiers then we have to ask ourselves whether all three aspects are moving in step, and indeed, whether this actually matters.

The inter-relationships between these dimensions do not seem entirely linear. For example, the requirement for identifiers such as biometrics might make direct appeal to the science without taking as necessary the involvement of any mediating technology; the choice for use of a fingerprint identifier might be driven by scientific credibility in its uniqueness, leading to the use of this identifier as a irrefutable credential. We might suppose

that these inter-relationships are more triangular in type, and it might follow that to understand the responsibilities and the opportunities for science will involve greater insight into the identification delivery technologies and the driving needs for identification.

Calum Bunney, session chair



Calum Bunney

**International Biometric & Authentication
Consulting (IBAC), France**

As a consultant Mr Bunney has been involved in the tracking and development of biometric technologies and solutions since 1997. The growth of interest in these technologies for identification and identity verification has grown massively in this time, and Mr Bunney has worked both with developers and users of biometrics to design and establish effective solutions. His particular areas of expertise include biometric evaluation and development for the aviation, transportation, and national identity markets. He has managed a number of projects in these fields, including recent work within the UK's National Identity Card Programme.

*Mr Bunney was editor of industry journal *Biometric Technology Today* from 1997-1999; he founded the Elsevier Biometrics Conference in 1998; and he has authored numerous articles and reports on biometrics and other ID technologies.*

Mr Bunney holds an honours degree in Philosophy from King's College, University of London.

Talk

Watching you - Humanity hurtles toward total surveillance



David Shenk

Freelance journalist and book writer, USA

With all possible speed we are hurtling toward constant electronic scrutiny of the enemy and of ourselves. Increasingly, ours is a world of ID checks, surveillance cameras, body scans, fingerprint databases, e-mail sifters, and cell phone interceptors designed to ensure that electronic trails don't grow cold. Add to that more mundane gadgets like nanny-cams, wireless heart monitors, swipe-in school and workplace IDs, and E-ZPass, and one begins to get a whiff of an emerging electronic vigilance, an ever-examined, ever-watched landscape of Total Surveillance.

Total Surveillance is inevitable. Given that, what are the implications for civil liberties and for democracy? How can technologists and policymakers work together so that privacy intrusions are minimized and security is maximized?

David Shenk is an award-winning, national-bestselling author of four books, and a contributor to *National Geographic*, *Harper's*, *National Public Radio*, *Gourmet*, *The New Yorker*, *The New Republic*, *Wired*, and *The American Scholar*. He has written about music, technology, food, politics, bioethics, the brain, corporate malfeasance and kids' toys.

In November, 2003, he wrote the *National Geographic* cover story, "Watching You: The World of High-Tech Surveillance."

His most recent book, "The Forgetting" (Doubleday, 2001), won First Prize in the British Medical Association's Popular Medical Book Awards, and was called "A remarkable addition to the literature of the science of the mind," by *The Los Angeles Times Book Review*.

"Data Smog" (HarperCollins, 1997) was hailed by *The New York Times* as an "indispensable guide to the big picture of technology's cultural impact." The book, profiled on *60 Minutes*, was named a finalist for the McGannon Award for Social and Ethical Relevance in Communication Policy. In 1998, Shenk co-founded "Technorealism," a movement encouraging balanced consideration of technology's effects on humanity. "The end of Patience" (Indiana University Press, 1999), a collection of Shenk's essays and commentaries was praised by Sven Birkerts as, "Exhilarating to read...a startling glimpse of where we are." Earlier on, he co-wrote "Skeleton Key" (Doubleday, 1994) with Steve Silberman.

He was raised in Ohio, graduated from Brown University in Rhode Island in 1988, and now lives in Brooklyn, New York, with his wife and two children. His next book is a social history of chess.

Talk

Forensic human individualization from biometric data



Didier Meuwly

Project Manager, Netherlands Forensic Institute, The Hague, The Netherlands

The aim of this presentation is to convey the progress in forensic research towards developing and validating a logical inference framework – based on likelihood ratios – for individualization of humans from biometric data. As it is independent from the particular biometric used, the framework can be applied to the various biometric data that are present in forensic trace material, e.g. fingerprints, the characteristics of the face, speech and the shape of the ears.

At the end of the 19th century, the pioneers of forensic science developed forensic anthropometry and dactyloscopy. In so doing, they ushered in the usage of biometric data for human individualization. Following that, the development of computer technology gave rise to the automated capture of biometric data, their comparison and their discrimination or classification. The field of forensics has contributed to this technological evolution via the development of automatic fingerprint identification systems (AFIS) in the 70's and, from 1985 onwards, to the development of the human individualization based on DNA-profiles. Individualization via DNA-profiles has significantly contributed to the development and use of this logical inference framework, which is based on Bayesian likelihood ratios.

Current forensic research focuses on the integration of various biometric technologies such as speaker recognition, face recognition and the ear

recognition. There are many challenges, from feature selection to scalability, but a crucial one is to develop a uniform inference framework to quantify the weight of different pieces of evidence.

This presentation will describe the inference framework currently used in forensic research, and describe the efforts that have been made towards its empirical validation in the fields of speaker recognition, fingerprint recognition and DNA profiling.

Didier Meuwly is born in 1968 in Fribourg, Switzerland. After a classical education (Latin/philosophy) in Fribourg, he graduated from the School of Forensic Science (IPS) of the University of Lausanne. From 1993 to 2000 he was research assistant at the IPS, where he obtained his PhD in the field of forensic automatic speaker recognition.

From 1999 to 2002 he was responsible for the biometric research group of the IPS, developing a research activity in the fields of fingerprint detection, forensic automatic speaker recognition and information technology. During this period he also taught a pre- and postgraduate course on human individualization.

From 2002 to 2004, he was a senior forensic scientist within the digital technology research group of the Forensic Science Service (FSS), an executive agency of the British Home Office, where his research activity was focused on the development of forensic services based on biometric data (speech, fingerprint and DNA).

Since July 2004, he has been a project manager within the chemistry department of the Netherlands Forensic Institute (NFI). He is currently responsible for a national research project on forensic individualization based on fingerprint statistics.

He is a founding member of 2 working groups of the European Network of Forensic Science Institutes (ENFSI): the Forensic Speech and Audio Analysis Working Group (FSAAWG) – founded in 1997 – and the European Fingerprint Working Group (EFPWG) – founded in 2000. He is also a member of the International Fingerprint Research Group (IFRG) and of the UK Government Biometric Working Group (UK gov-BWG).

Talk

Recognising persons by their iris patterns: 200 billion iris comparisons



John Daugman

Computer Laboratory, University of Cambridge,
UK

Iris recognition provides real-time, high confidence identification of persons by analysis and encoding of the random patterns that are visible within the iris of an eye from some distance.

Because the iris is a protected, internal organ whose random texture is epigenetic and stable over life, it can serve as a living password or passport that one need not remember but is always in one's possession. Recognition decisions are made with confidence levels high enough to support rapid exhaustive searches through national-sized databases. The principle that underlies these algorithms is the failure of an efficient test of statistical independence involving more than 200 degrees-of-freedom, based on phase sequencing each iris pattern with quadrature 2D wavelets. Different persons always pass this test of statistical independence, but images from the same iris almost always fail this test of independence. The combinatorial complexity of phase sequences enables operation always in one-to-many "identification" mode, which is more demanding and useful than just one-to-one "verification" mode in which each person must always first assert an identity that is then merely verified.

The benefit is cardless, PIN-less, hands-free identification, with database search speeds of about 1 million persons per second per CPU. The search engine is intrinsically parallel, and allows parallelisation to national scales.

Data will be presented in this talk from 200 billion iris cross-comparisons between different eyes. The database consisted of 632,500 iris images acquired in the United Arab Emirates, in a national border-crossing security programme that uses the Daugman algorithms for iris recognition. A total of 152 different nationalities were represented in this database, which is the largest iris database in the world. Statistical analysis of the 200 billion iris cross-comparisons allows conclusions to be drawn about the numerical decision policies that should be implemented in large-scale identity searches using these algorithms, both to ensure the absence of False Matches and to calculate confidence levels, given the size of an enrolled database and the frequency of independent searches across it.

John Daugman received his degrees at Harvard University in the USA and then taught in the Harvard faculty before coming to Cambridge University, UK. He has held visiting Professorships at the University of Groningen (the Johann Bernoulli Chair) and the Tokyo Institute of Technology (the Toshiba Endowed Chair). His current areas of research and teaching are Computer Vision, Statistical Pattern Recognition, Information Theory, and Neural Computing. Dr Daugman is the inventor of iris recognition - the automatic identification of persons by the random patterns visible in the iris from a distance of up to a meter - and his algorithms are used in all current deployments of this biometric identification method.

His iris recognition algorithms won the Information Technology Award and Medal of the British Computer Society, the "Millennium Product" Award of the UK, the Smithsonian Award USA, and the "Time 100" Innovators Award.

Panel discussion

chaired by Calum Bunney



Henning Daum

Head, Demonstration center and Evaluation lab for Biometrics, Fraunhofer Institute for Computer Graphics, Darmstadt, Germany

After receiving his degree in information technology from the Technical University, Darmstadt, in 2000 Henning Daum became a staff member in the Department of Security Technology at the Fraunhofer Institute for Computer Graphics Research IGD, where he had been working as student researcher since 1996.

As head of the biometrics group, he is the coordinator of the project series BioIS, BioFace and BioFinger. These projects are being carried out on behalf of the German Federal Office for Information Security (BSI), and deal mostly with the testing and evaluation of biometric methods in general, and performance measures and security issues in particular.

Henning Daum is head of the demonstration center and the evaluation lab for biometrics at the Fraunhofer-IGD, and from 2001 he has held a lectureship at the Technical University, Darmstadt, in the area of biometrics.



Brigitte Kofod Olsen

**Head, Danish Institute for Human Rights,
Copenhagen, Denmark**

An expert in human rights, Brigitte Kofod Olsen's research area also includes privacy protection in the information society, and the interplay between privacy and prevention of terrorism.

After obtaining a BA and a PhD at the Faculty of Law, University of Copenhagen, she joined the Danish Center for Human Rights in Copenhagen, where she was first a junior and then a senior researcher from 1994 to 2002. She is currently the Director of the National Department of the Danish Institute for Human Rights, and an external senior lecturer at the Faculty of Law, University of Copenhagen.

She is member of several professional bodies, among others of the Committee of Jurisdiction of the Danish Ministry of Justice, and the Editorial Committee, Review on EU-Law and Human Rights in Copenhagen.

She participates in numerous networks, such the European group of National Human Rights Institutions, the EU Network of Independent Experts on Fundamental Rights, the International Coordination Committee for National Human Rights Institutions, and the European Migration Dialogue, Brussels.



Christophe Champod

**Professor, School of Criminal Sciences,
Institute of Forensic Science, University of
Lausanne, Switzerland**

Christophe Champod received his M.Sc. and Ph.D. (summa cum laude) in Forensic Science from the University of Lausanne, in 1990 and 1995 respectively. He then remained in academia, reaching the position of assistant professor in forensic science. From 1999 to 2003, he led the Interpretation Research Group of the Forensic Science Service (UK), before taking a professorship position at the School of Criminal Sciences (ESC) / Institute of Forensic Science (IPS) of the University of Lausanne. He is in charge of education and research on identification methods (detection and identification), and is member of the International Association for Identification. In 2004 he was elected a member of the FBI-sponsored SWGFAST. Christophe Champod's research is devoted to the statistical evaluation of forensic identification techniques, the value of fingerprint evidence being his core interest.



Session IV:

Information technology in the knowledge society

In modern societies, knowledge is one of the most important sources of productivity; it has become constitutive not only for technological development and economic growth, but also for social relations, social cohesion and integration. Therefore, the production of knowledge and access to it are fundamental to the functioning and the future evolution of global communities. Knowledge production is greatly enhanced by modern technologies. Among the ones that have a major impact on human interaction and individual options in a given society are information and communication technologies (ICT) and technologies developed in the context of molecular genetics/genomics. The ongoing confluence of both innovations greatly enhance their individual capabilities to produce, process and analyze data and to make transparent the functions and relationships underlying complex systems like the human body or human societies. Massive expansion of genetic testing and screening becomes possible and radically new areas of application are opened up. For such reasons, huge collections of (personal) data and/or biological material are being collected for many different purposes, including science, public health, and crime protection. They are attractive resources, because they can be mined not merely for the purpose for which they have been collected, but also for other ends. In this context, many important questions arise:

- Have human rights and privacy concerns been met adequately by current regulations?
- Is it justifiable to use sensitive data without consent for improved maintenance, control, and development of health and security infrastructures for the whole population?
- Are current laws and juridical provisions an unacceptable impediment to scientific research?
- Do we need new policies for the governance of DNA-Databases or biobanks, in light of additional emerging uses?
- Can we anticipate the effects of new knowledge on social relations? Can we control its impact?

Regine Kollek, session chair



Regine Kollek

**Research Center for Biotechnology,
Society and the Environment, University of
Hamburg, Germany**

Regine Kollek, PhD, received her doctoral degree in molecular biology from the University of Würzburg in 1979, and then spent two years as a postdoctoral fellow at the medical school of the University of California, San Diego. From 1981 through 1984, she was senior researcher at the Heinrich-Pette Institute, University of Hamburg, before joining the scientific staff of the Enquete-Commission on „Chances and Risks of Gene-Technology“ of the German parliament. In 1988 she became a member of an interdisciplinary working group at the “Hamburg Institute for Social Research”. Since 1995 she has been professor for Biomedical Technology Assessment and head of a research group dedicated to the study of the social and ethical implications of modern biotechnology in medicine at the University of Hamburg. Since June 2001, she has been a member of the German National Ethics Council. In March 2002, she also became a member of the UNESCO International Ethics Committee.

Talk

Biometrics and secure travel documents



Ivanka Spadina

Forensic analyst, Counterfeits and Security Documents Branch, INTERPOL, France

Text not available at time of printing.

A forensic expert on documents and handwriting, Ivanka Spadina was appointed as Project Manager of the Interpol Stolen Travel Documents Database (STD) Project at the beginning of 2005. The project aims at implementing integrated solutions that enable first line law enforcement officers or governmental officers to access Interpol databases.

She joined the International Criminal Police Organization (Interpol) in June 2000, as forensic analyst in the Counterfeits and Security Documents Branch of the Operational Police Support. Since September 2000, she is also a member of the ICAO (International Civil Aviation Organization) New Technologies Working Group, which aims at developing international standards for the use of biometrics for machine-readable passports. Before joining Interpol, she worked for nine years as forensic expert at the Forensic Institute of the Ministry of the Interior in Zagreb, Croatia.

Born in Zagreb, Croatia, she graduated in Mechanical Engineering from the University of Mechanical Engineering and Naval Architecture in Zagreb.

Talk

The UK National DNA Database: balancing crime detection, human rights and privacy



Helen Wallace

Deputy Director, GeneWatch, UK

The UK National DNA Database (NDNAD) is the oldest, largest and most inclusive national forensic DNA database in the world. Now in its 10th year of operation, it contains DNA samples and profiles from more than 2.5 million individuals and is expected to expand over the next few years to include some 5 million people, nearly 10% of the population. The database includes information on people convicted of a wide range of crimes, including serious violent crimes and minor public order offences, as well as many people who have never have been convicted or charged with any criminal offence.

In England and Wales, DNA profiles and samples are now kept permanently from anyone arrested for any recordable offence, whether or not they are charged or convicted.

Other countries are now interested in expanding these so-called “criminal” databases and there are indications that the policies, trends and practices adopted in the UK are likely to be globalized.

The DNA Database is an important tool for criminal investigations and brings some major benefits – including helping to identify some murderers and rapists. However, there are questions about the extent to which all the DNA samples

and profiles taken should be kept indefinitely. New technologies and policies are also beginning to raise privacy issues. Existing practices that raise human rights and privacy concerns are:

- retaining DNA samples, rather than just the DNA profiles used for identification;
- using the Database for genetic research without consent;
- retaining people's records permanently on the Database regardless of the nature of their offence;
- including people permanently on the Database who have been arrested but not charged, or who have been acquitted.

This presentation describes the National DNA Database, its role in tackling crime, and the need to balance crime detection, human rights and privacy. It asks whether better safeguards could be introduced without compromising the role of DNA databases in tackling crime.

Helen Wallace is Deputy Director of GeneWatch UK, where she is responsible for GeneWatch's work on human genetics, including DNA databases. GeneWatch UK is a not-for-profit group that monitors developments in genetic technologies from a public interest, environmental protection, human rights and animal welfare perspective. GeneWatch believes people should have a voice in whether or how these technologies are used and campaigns for safeguards for people, animals and the environment.

Helen has worked at GeneWatch for 4 years. Previously she was Senior Scientist at Greenpeace UK, working mainly on issues related to nuclear waste and marine pollution. She has a degree in physics and a doctorate in mathematics (oceanography) and worked for four years in industry (writing computer models of coastal erosion).

Panel discussion

chaired by Regine Kollek



Karsten Weber

**Research Scientist, Department of
Philosophy, European University Viadrina,
Frankfurt/Oder, Germany**

Karsten Weber's research is focussed on the interaction of individuals with society, and on technology, in particular information and communication technology (ICT). In the project „Mobile Internet Services and Privacy“ he is currently investigating how mobile ICT affects the attitudes of users with regard to privacy, and how public space is altered by technologies like Ubiquitous Computing.

As well as being a member of the scientific staff of the Department of Philosophy at the European University Viadrina in Frankfurt/Oder, he is a speaker of the working group “Informatics and Ethics” of the German Informatics Society, director of the project „Mobile Internet Services and Privacy“ (funded by the Federal Ministry of Education and Research (BMBF)), and a member of the Young Scientists Network of the Center of Interdisciplinary Research (ZiF), University of Bielefeld.

Since 2005, he has been Editor of the International Review of Information Ethics (IRIE:<http://www.i-r-i-e.net>), and together with Rafael Capurro, Thomas Hausmanninger and Michael Nagenborg, he is a member of the International Center for Information Ethics team (ICIE, <http://zkm.icie.de>).

Karsten Weber was born in 1967 in Hanau, Germany. After having worked for some time as software engineer and system administrator, he studied Philosophy, Informatics, and Sociology at the University of Karlsruhe, and obtained a PhD in Philosophy at the same University in 1999.



Meryem Marzouki

**Senior Researcher, LIP6/PolyTIC-CNRS,
and President, IRIS-Imaginons un Réseau
Internet Solidaire, France**

Meryem Marzouki is a senior researcher with the French National Public Research Center (CNRS), currently with the Computer Science Laboratory of Paris 6 (LIP6). Dealing with relationships between ICTs, public policies and the public space following a multi-disciplinary approach, her current research interests include Internet governance and the transformation of the rule of law, privacy and personal data protection issues and communication usages in a mobile campus.

Meryem Marzouki is the author of several publications and talks on Internet governance, human rights and democracy, as part of both her scientific and NGO activities (human rights and fundamental freedoms in the information society). She holds a PhD in Computer Science and an Habilitation à diriger des recherches, both from the National Polytechnic Institute of Grenoble, France (INPG). Prior to switching to her current research field in 2002, she has conducted extensive research in Computer Science and Microelectronics, dealing with Test and Diagnosis of Heterogeneous Systems.

Meryem Marzouki is the President of the French NGO IRIS (Imaginons un réseau Internet solidaire) and has co-chaired the Civil Society Human Rights Caucus at the World Summit on the Information Society.



Robert Dingwall

Professor and Director, Institute for the Study of Genetics, Biorisks and Society, University of Nottingham, UK

Robert Dingwall is Professor and Director of the Institute for the Study of Genetics, Biorisks and Society at the University of Nottingham. He received a PhD in medical sociology from the University of Aberdeen in 1974 and has worked at the Centre for Socio-Legal Studies at the University of Oxford and, as a visitor, at the American Bar Foundation in Chicago, before moving to Nottingham in 1990. Within the law and society field, he has carried out research on agency decision-making in child abuse and neglect, medical negligence and asbestos disease litigation, the legal profession, and divorce mediation, funded by various UK foundations and government agencies. Since 1997, he has been directing a research and graduate centre for the study of the social and legal implications of biological science and technology, including the new genetics. His own work within this team has included projects on bioethics and the governance of science, on representations of the Human Genome Project, and on the presentation of evolution in popular TV wildlife programming. He is currently leading projects on the incorporation of genetic medicine into the UK National Health Service, and on the implications for public health early warning systems of national responses to the August 2003 heatwave in France and the UK. He is now developing new studies on the social implications of developments in neuroscience.

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