

**FINAL REPORT TO ESF AND ORI
FIRST WORLD CONFERENCE ON RESEARCH INTEGRITY:
FOSTERING RESPONSIBLE RESEARCH
(Lisbon, Portugal, 16-19 September 2007)**

Conference Co-Chairs
Tony Mayer & Nick Steneck
November 2007

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FINAL REPORT TO ESF AND ORI
FIRST WORLD CONFERENCE ON RESEARCH INTEGRITY:
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Summary:

The World Conference on Research Integrity was the **first global forum** convened to provide researchers, research administrators, research sponsors, journal editors, representatives from professional societies, policymakers, and others an opportunity to discuss strategies for harmonising research misconduct policies and fostering responsible conduct in research.

The Conference was initiated and organized by the European Science Foundation (ESF) and the US Office of Research Integrity (ORI, Department of Health and Human Services), with additional support from other Conference partners.* A total of 275 participants from 47 countries attended the four-day event that included a series of plenary sessions, three working groups, formal opening and closing sessions, and other events designed to promote discussion and begin a global exchange about ways to foster responsible research practices.

The evaluations and subsequent correspondence suggest that the Conference was an overall success. It was the first to address the complex and sometimes emotive subject of integrity in research. It attracted worldwide participation and will lead to further actions by others. Based on this success, the Conference Co-chairs propose the following recommendations:

Recommendation 1. ESF and ORI should continue to work with the Global Science Forum (GSF) of the Organisation for Economic Co-Operation and Development (OECD) and other organizations to achieve the common objective of encouraging all countries that support active research programs to develop guidelines for best practice and procedures for responding to misconduct in research.

Recommendation 2. ESF and ORI should take the lead in developing a Global Clearing House for Research Integrity.

Recommendation 3. ESF and ORI should take the lead in initiating planning and fund raising for a second World Conference, to be held in late 2009 or early 2010, following the general recommendations made in the Rapporteur's Report.

It is further recommended that subsequent actions should focus on three crucial needs: 1) for better information about the behaviour of researchers and the factors that influence their conduct; 2) to clarify, harmonize, and publicize standards for best practice and procedures for reporting improper conduct in research; and 3) to incorporate global standards for best practice and policies for responding to misbehaviour into training and research environments.

* Other co-sponsors and funders included: European Commission, Portuguese EU Presidency, Gulbenkian Foundation, Committee on Publication Ethics, European Molecular Biology Organization, UK Research Integrity Office, ICSU, and NATO.

Conference Objectives:

The World Conference on Research Integrity was organized to promote the exchange of information and further discussion of ways to promote research integrity and foster responsible research practices. Research integrity has emerged in recent years as a critical topic in policy research and has gained significant political and public attention worldwide. The Conference aimed at furthering world dialogue on this topic, focusing attention on systemic and institutional issues, including organisational, governance and legal issues. A parallel activity by the OECD GSF studying governmental responses to the issue of research misconduct provided a key input.

Research regulations and commonly accepted research practices vary significantly from country to country and among professional organisations. There is no common definition world-wide for research misconduct, conflict of interest, plagiarism or other key terms that describe acceptable and unacceptable research practices. Even where there is general agreement on key elements of research behaviour, such as the need to restrict authorship to individuals who make substantive contributions to the research or to provide protection for research subjects, the policies that implement this agreement can vary widely from country to country and organization to organization. The research community worldwide has to address these problems in order to retain public confidence and to establish clear best practice frameworks at an international level. It must do so at a time when there are increased pressures on governments, research institutions and research groups to deliver results against increasingly short timeframes, to which funding is coupled. The September 2007 Conference represented an initial effort to establish a framework for continued discussion of research integrity on a global level.

Planning, Organization, and Outcomes:

Planning. ESF and ORI delegated the task of organizing and overseeing the Conference to two co-chairs, Anthony Mayer and Nicholas Steneck, representing ESF and ORI respectively. A high level Planning Committee was then established by ESF and ORI to develop the programme and to advise and assist the two Co-Chairs on Conference planning. (Appendix 1) The Planning Committee met three times: Paris, 25 April 2006; London, 23 October 2006; and Lisbon, 2-3 April 2007. The Co-chairs also travelled to Lisbon in June 2006 to meet with Manuel Heitor, the local host and main representative of the Portuguese EU Presidency.

Support. Initial support for planning and organization was provided by the ESF and ORI. The Portuguese EU Presidency hosted and co-sponsored the event at the Gulbenkian Foundation in Lisbon, Portugal on 16-19 September 2007.

Additional financial support for the Conference was provided by the organising organisations, the European Commission (EC), the Portuguese EU Presidency, the Committee on Publication Ethics (COPE), the European Molecular Biological Organisation (EMBO), and the UK Research Integrity Office (UKRIO). The International Council for Science (ICSU) and NATO provided travel grants for participants from developing countries and from NATO Partner and Mediterranean Dialogue countries. The OECD GSF hosted one Planning Committee meeting and took an active role in programme planning.

Programme. The programme was organized around a series of formal sessions (plenary sessions) and three working groups (parallel tracks). The latter met three times during the Conference. The plenary sessions addressed:

- general global perspectives,
- research misconduct,
- publication issues,
- culture and training, and
- current research on research integrity.

The parallel tracks addressed:

- research misconduct (Track I),
- institutional and societal issues (Track II) and
- publications (Track III).

Track I largely addressed the issues highlighted in the draft report of the OECD Global Science Forum study. The draft report prepared by the Forum was one of the key pre-papers for the meeting. Track III was organised around the activities of COPE and its preparatory studies. Opening and closing sessions that featured a number of policy-makers and one keynote speaker rounded out the programme (Appendix 2).

Attendance. The Conference was attended by 275 participants from 47 countries (Appendix 3). Apart from the speakers and Session Chairs, the Conference Planning Committee, senior staff from both ESF and ORI, invitees of the Portuguese Presidency, and OECD Secretariat staff, the participants were self-selected by application and registration. Their prior experience with research integrity varied considerably, from those with no knowledge of the topic to those in positions of responsibility either nationally or institutionally, to experts in research on the responsible conduct of research. As a first effort to promote global dialogue, getting together so many people from such varied backgrounds and from so many different countries and backgrounds can be counted as a success for the Conference. None of the applicants who clearly had a significant interest in research integrity issues were turned down. About 75 applicants who were accepted did not attend, primarily for financial reasons.

Conference materials. Papers were sought before the meeting and those received in time were made available as a CD-ROM for participants. All papers received before the Conference were made available through the Conference Web site. Papers delivered at the Conference and not sent in advance are now all available at the Web site as a form of “e-Conference Proceedings” together with biographical notes on speakers. The papers, speakers biographies, OECD draft report and other materials are available on the [Conference website](http://www.esf.org/activities/esf-conferences/details/confdetail242.html). (<http://www.esf.org/activities/esf-conferences/details/confdetail242.html>)

Rapporteur's Report. The meeting did not set out with the objective of developing conclusions and recommendations in a formal sense. The Conference did appoint a Rapporteur, Peter Tindemanns, who was charged with producing a summary of the meeting. His report is now available online (Appendix 4) and his conclusions and recommendations have been incorporated into this report.

Conference Evaluations. All participants were asked to complete a Conference evaluation form, not only to seek opinion about the organisation of the Conference but also to gauge opinion as to future actions that should be initiated. The results of the evaluations are summarized in the following section and contained in full in Appendix 5.

Articles and press coverage. Through the journalists/science writers who attended the Conference and the press releases issued by ESF, the Conference received fairly wide notice. *Nature* science writer, Sarah Tomlin, posted a number of "blog" reports during the Conference. There was further coverage in *Science*, *Cell*, and *The Lancet*, as well as on "IQ - Wissenschaft und Forschung" on Bayern2Radio. Information contained in the ESF press releases was reported in newspapers and professional newsletters. (Appendix 6)

Continuing activities. A number of related activities were already in progress or in the planning stages as the Conference ended, including the following:

- The OECD Global Science Forum completed its first report, in the light of the World Conference discussions, which was approved by the Forum at its post-conference meeting. The GSF have a follow up action planned to address the issue of research integrity within international collaborations in research, an initiative led by the US and Canada.
- The ESF, with the support of the European Heads of Research Councils (EUROHORCS), will be developing a compilation of policies from its Member Organisations in Europe and this, together with the Conference report, will form the basis of a Member Organisations Forum.
- The European Commission is planning a number of initiatives following the publication of the report of its Expert Group on Research Integrity, including research integrity in the nanosciences and a Call for Proposals, especially in the area of publications.
- The ORI will be developing various actions, including its forthcoming Conference of Responsible Conduct of Research (RCR) Education (April 2008), which is open to participants from outside the USA.
- COPE will be continuing its activity in research integrity as this relates to scientific publication.

We understand that the Asian Heads of Research Councils will also be taking up the matter of research integrity at one of its forthcoming meetings. Separately, following one of the suggestions made during the Conference, the Nanyang Technological University, Singapore will investigate the idea of a conference on research integrity based on the ASEAN region. Other activities will be posted on the Conference web site, which will remain active in the coming months, to perhaps be replaced by some type of global research integrity clearing-house (discussed below).

Conference Evaluation:

Conference participants were asked to complete a conference assessment form before the closing session. A total of 99 forms were handed in for a 36% response rate. Since some respondents did not complete all questions, the totals for each question do not always equal 99. The Conference assessment Form and summary data can be found in Appendix 6.

As might have been expected, the majority of the respondents are in the 40+ age range, with more than half coming from Europe followed by North America and Asia. While we endeavoured to create a World Conference, and the travel grants provided by ICSU and NATO were very important contributions in this respect, the participation from Latin America was especially disappointing and the level of participation from the countries of the middle-east and African regions was also low. Many Conference participants noted this fact in their written comments. Most respondents were from academia and active either as researchers or research managers.

The responses clearly show that most participants were content with the overall format and atmosphere. Many participants noted that they would have liked to have had more time for discussion. This is shown in the response to question B4. The need for more discussion time was also frequently mentioned in relation to the parallel session, particularly the responses to questions C4. Some participants also felt that a few dominant voices tended to prevail in the discussions with less involvement from the session participants overall (Question C8). The constraints on discussion were partially the result of the large size of the parallel sessions, an artefact of the numbers taking part in the conference and room availability, both of which made it more difficult to establish a good discussion atmosphere.

In terms of management, there was clearly a desire to have more speakers' presentations available before the Conference and to keep speakers on time. Unfortunately, despite reminders, several speakers did not respect their deadlines.

Finally, the great majority of respondents considered that the Conference provided new information and provided an opportunity to form new networks, both of which are regarded as very positive effects. Almost all respondents, as well as from other comments that we have received, have recommended that there should be a second World Conference, ideally in 2-3 years time. For a summary of the additional written comments, see Appendix 5.

Conclusions and Recommendations:

The World Conference marks the first major effort to bring the values that are essential to responsible research into conversations about the globalization of research. As a first effort, the presentations and the conversations that went on around them were exploratory in nature and not designed to set a firm course for the future. Nonetheless, there seemed to be fairly strong agreement on a number of points, which we summarize here and use as the basis for recommendations on future actions.

1. Need for clear, consistent institutional and national policies. Modern-day research is complex and demanding. Responsible practices in research are not obvious and can confront researchers with conflicting responsibilities. This is particularly true for behaviours that constitute "research misconduct" but apply to all aspects of research behaviour. In its Report, which was circulated before and widely discussed at the Conference, GSF encouraged its national administrators to develop, implement, and publicize national policies for "Best Practices for Ensuring Scientific Integrity and Preventing Misconduct." While not unanimous, this view, tempered with the flexibility and caution urged by GSF, received wide support at the Conference. We therefore recommend that:

Recommendation 1. ESF and ORI should continue to work with GSF and other organizations to achieve the common objective of encouraging all countries that support active research programs to develop guidelines for best practice and procedures for responding to misconduct in research.

2. Global Clearing House for Research Integrity. Conference participants appreciated the information they gained during the Conference but felt that for conversations to continue, ways had to be found to post and share information in a timely manner. To achieve this goal, we recommend that:

Recommendation 2. ESF and ORI should take the lead in developing a Global Clearing House for Research Integrity by providing or helping raise initial resources and staff time to convert the current Conference site into a more general, independent, self sustaining site, build on and maintained by community based (Wikipedia style) input. The site would provide basic information on:

- Each nation's research conduct/misconduct policies
- Each nation's responsible conduct of research training programs
- National and regional conferences and other related activities
- National and organisational research integrity contacts

3. Second World Conference in Research Integrity. 83% of the participants who filled out the Conference evaluation form felt that there should be a second World Conference; 70% felt that the follow-up conference should be held in 2-3 years. In the comments that accompanied these responses, participants strongly recommended that the next conference be more focused and address specific challenging topics, such as conflict of interest, sharing data, authorship and other key topics. We agree and therefore recommend that:

Recommendation 3. ESF and ORI should take the lead in raising the approximately 25,000 Euros need to begin planning and fund raising for a second World Conference, to be held in late 2009 or early 2010, following the general recommendations made in the Tindemans Report.

As plans and next steps are worked out, we would propose that, in addition to the specific areas noted in the Tindemans Report, efforts should be concentrated on three crucial areas.

Information. First, and most importantly, there is a critical need for better information about the behaviour of those engaged in research and the factors that influence their behaviour. It is commonly assumed that a few serious forms of misbehaviour (in the US this is focussed on the conducts defined as fabrication, falsification, and plagiarism) pose the greatest threat to the integrity of research today. However, empirical studies of research behaviour increasingly support the hypothesis that seemingly less egregious questionable practices in designing, interpreting and publishing research can have much greater negative impacts, including undermining the reliability of the research record, wasting public funds, and, at times, even endangering the health and welfare of the public.

Standards. Second, the standards for best practice and procedures for reporting improper behaviours in research must be clarified, harmonized, and publicized. The laws of nature do not change from country to country. Common units of measure and other standards that have been introduced into science have done a great deal to foster international cooperation. Basic standards for responsible behaviour in the conduct of research must be global as well, to foster the trust and sharing that is essential for the advance of knowledge.

Education. Third, to have an impact, global standards for best practice and policies for responding to misbehaviour must be better incorporated into training and research environments. Researchers cannot follow best practices if they are not aware of them. They will not if they feel they are working in settings that tolerate or even encourage lax behaviour in the conduct of research. One recent US study found that while most researchers accepted the long-standing Mertonian norms for responsible conduct, roughly the same number felt that their peers did not. Until the deep-seated institutional issues that underlie these feelings are addressed, the development of best practices and misconduct policies could have little impact.

Conference Co-Chairs, November 2007

Tony Mayer (formerly ESF and now Nanyang Technological University, Singapore)

Nick Steneck (ORI and University of Michigan, USA)

Appendix 1. Planning Committee Members

Jean-Pierre Alix, Paris, FR, Observer
Ligia Amâncio, Lisboa, PT, Planning Committee Member
Ulrike Beisiegel, Hamburg, DE, Observer
Christin Boesz, Arlington, US, Planning Committee Member
Jacques Bordé, Meudon, FR, Planning Committee Member
Megan Davies, Cambridge, UK, Planning Committee Member
Pieter Drenth, Amsterdam, NL, Planning Committee Member
Pegg Fischer, Arlington, US, Planning Committee Member
Yuko Furukawa, London, UK, Planning Committee Member
Andrzej B. Gorski, Warszawa, PL, Planning Committee Member
Manuel V. Heitor, Lisbon, PT, Planning Committee Member
Sabine Kleinert, London, UK, Planning Committee Member
Nige Lloyd, Ottawa, CA, Planning Committee Member
Tony Mayer, Strasbourg, FR, CO-CHAIR and Planning Committee Member
Stefan Michalowski, Paris, FR, Planning Committee Member
Masaki Nakamura, Tokyo, JP, Planning Committee Member
Alex Quintanilha, Porto, PT, Observer
Sally J. Rockey, Bethesda, US, Planning Committee Member
Carla Alexandr, Santos, Lisboa, PT, Planning Committee Member
Carthage Smith, Paris, FR, Planning Committee Member
Andy Stainthorpe, London, UK, Planning Committee Member
Nick Steneck, Rockville, US, CO-CHAIR and Planning Committee Member
Peter Tindemans, Den Haag, NL, Conference Rapporteur
Frank Wells, Ipswich, UK, Planning Committee Member
Peteris Zilgalvis, Brussels, BE, Planning Committee Member

Appendix 2. Final Programme



PORTUGUESE PRESIDENCY
OF THE EUROPEAN UNION



PORTUGAL 2007

MCTES
MINISTERIO DA CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR

FCT
Fundação para a Ciência e a Tecnologia

Initiated & Organized by



**EUROPEAN
SCIENCE
FOUNDATION**
SETTING SCIENCE AGENDAS FOR EUROPE



ORI
OFFICE OF RESEARCH INTEGRITY
U.S. Department of Health and Human Services

In Partnership with



ICSU
International Council for Science



ESF CONFERENCES

A Portuguese European Union Presidency and European Commission Event, Initiated and Organised by the European Science Foundation (ESF) & the US Office of Research Integrity (ORI), in Partnership with the International Council for Science (ICSU) & the North Atlantic Treaty Organisation (NATO)

ESF-ORI First World Conference on Research Integrity: Fostering Responsible Research

Calouste Gulbenkian Foundation, Lisbon, Portugal
16-19 September 2007

Chairs: **Mr. Tony Mayer**, European Science Foundation (ESF), Strasbourg, FR & **Professor Nick Steneck**, Office of Research Integrity (ORI), Rockville, US

www.esf.org/conferences/researchintegrity

With Additional Support from:

- European Molecular Biology Organization (EMBO)
- Committee on Publication Ethics (COPE)
- Portuguese Ministry of Science, Technology and Higher Education (MCTES)
- Portuguese Science Foundation (FCT)
- Calouste Gulbenkian Foundation (FCG)
- UK Research Integrity Office (UKRIO)



www.esf.org

Conference Programme

Last updated 13 September 2007

SUNDAY, 16 SEPTEMBER

- 14.30-18.30 Registration (*Hotel Marriott Lisboa - Hotel Lobby*)
18.30-22.00 Opening Ceremony (*New York Meeting-Room*), Reception (*Outside, near the Swimming Pool*) & Informal Buffet Dinner (*Citrus Restaurant*)

MONDAY, 17 SEPTEMBER

- 08.30-09.00 Registration (*Gulbenkian Foundation*)

09.00-09.10 Conference Opening (*room: Auditorio 2*)

- **Tony Mayer**

European Science Foundation & Conference Co-chair, Strasbourg, FR
Origins and Organization of the World Conference

- **Nicholas Steneck**

Office of Research Integrity & Conference Co-chair, Rockville MD, US
Definitions, Goals, and Outcomes

09.10-10.40 Opening Session (*room: Auditorio 2*)

Chairs: **Manuel Heitor**, Secretary of State of Science, Technology and Higher Education, Lisbon, PT
João Caraça, Calouste Gulbenkian Foundation, Lisbon, PT

Opening Talks

- **Jose-Mariano Gago**

Portuguese Minister of Science, Technology and Higher Education, Lisbon, PT

- **Janez Potočnik**

European Commissioner for Research, European Commission, Brussels, BE
European Research: Towards Highest Standards of Integrity

- **Angel Gurría**

Secretary-General, Organisation for Economic Co-operation and Development (OECD), Paris, FR

- **Tim Hunt**

Cancer Research UK, South Mimms, UK and European Molecular Biology Organization (EMBO)

Keynote Address

- **Paul David**

Oxford University, UK & Stanford University, Palo Alto CA, US
Trust and Deviance in 'Open Science': Analytical and Empirical Perspectives on the Problem of Scientific Misconduct

Closing Remarks

- **Jose-Mariano Gago**

Portuguese Minister of Science, Technology and Higher Education, Lisbon, PT

- 10.40-11.20 Coffee Break

11.20-13.00 **Plenary I - Global & Institutional Perspectives on Research Integrity** (*room: Auditorio 2*)
Chairs: **Ian Halliday**, President, European Science Foundation (ESF), Strasbourg, FR
Antonio Coutinho, Gulbenkian Institute for the Sciences & Lisbon Academy of Medical Sciences, Lisbon, PT

- **Howard Alper**
University of Ottawa, CA & Co-Chair, InterAcademy Panel, Trieste, IT
Research Integrity: Best Practices for the Benefit of Society
- **Guitelle Baghdadi-Sabeti**
World Health Organisation (WHO), Geneva, CH
Promoting Good Governance for Medicines
- **Ayse Erzan**
Istanbul Technical University, TR
Developing and Applying Integrity Policies in a Global Context

Discussion

13.00-14.30 **Lunch** (VIP Zurich)

14.30-16.10 **Plenary II - Integrity in Publication: Expectations, Problems, Solutions** (*room: Auditorio 2*)
Chairs: **Roger Elliott**, International Council for Science (ICSU), Paris, FR
Luís Magalhães, Portuguese Knowledge Society Agency, Porto Salvo, PT

- **Anthony Komaroff**
Harvard Medical School, Boston MA, US
Public Understanding and Trust of Biomedical Research
- **Joao Lobo Antunes**
Hospital de Santa Maria, Lisbon, PT
To Publish or not to Publish: Communicating Science in a New Global and Financial Environment
- **Philip Campbell**
Nature, London, UK
Misconduct in Research Publishing: Who is Responsible for What?
- **Sabine Kleinert**
The Lancet, London, UK & Vice-Chair, Committee on Publication Ethics (COPE), London, UK
How Can Good Publication Standards Influence Research Integrity?

Discussion

16.10-16.50 **Coffee Break**

16.50-18.30 Concurrent Sessions I

Track Ia - Research Misconduct - Current Policies and New Initiatives (room: Auditorio 3)

Chairs: **Stefan Michalowski**, Global Science Forum, Paris, FR

Jun Fudano, Kanazawa Institute of Technology, Nonoichi, JP

Salla Lötjönen, National Advisory Board on Research Ethics, Helsinki, FI

▪ **Nigel Lloyd**

Natural Sciences & Engineering Research Council Canada (NSERC), Ottawa, CA
GSF Working Group on Research Misconduct and Pending Report

▪ **Lida Anestidou**

The National Academies, Washington DC, US
Overview of Current Policies and Policy Development

▪ **Pieter J.D. Drenth**

ALL European Academies (ALLEA), Amsterdam, NL
Strengths and Weaknesses of Current Policies and Practices

Discussion

Track IIa - Institutional and Societal Issues - Challenges for Global Research (room: Sala 1)

Chairs: **Megan Davies**, UK Medical Research Council (MRC), Cambridge, UK

Carmo Fonseca, Institute of Molecular Medicine (IMM), Lisbon, PT

▪ **Amaboo Dhai**

Steve Biko Centre for Bioethics, Parktown, ZA
Preserving, Protecting and Improving Research Integrity in Africa: Challenges and Recommendations

▪ **Tom Kirchhausen**

Harvard Medical School, Boston MA, US
Challenges Faced by the Leading Investigator to Foster Responsible Research

▪ **Shamila Nair-Bedouelle**

UNESCO, Paris, FR
COMEST's Role in Fostering Integrity in Research

Discussion

Track IIIa - Publication - The Role of Editors and Journals (room: Sala 2)

Chairs: **Ana Marusic**, Zagreb University, HR & Council of Science Editors (CSE), Reston MD, US

Sabine Kleinert, The Lancet, London, UK & Vice-Chair, Committee on Publication Ethics (COPE), London, UK

▪ **Liz Wager**

Publications Consultant, Buckinghamshire, UK and Council Member, Committee on Publication Ethics (COPE)
Current Best Practices: Conflict of Interest, Trial Registration, and other Codes

▪ **Katrina Kelner**

AAAS, Science, Washington DC, US
Science Magazine's Response to the Changing Face of Science

▪ **Michael Rossner**

Executive Director, The Rockefeller University Press, New York NY, US
The Role of the Journal Editor in Assuring the Integrity of Research Data

Discussion

19.30-22.00 Conference Dinner (*Hotel Marriott Lisboa - Mediterranean Ballroom*)

Chair / Introduction

▪ **João Sentieiro**

Portuguese Science and Technology Foundation, Lisbon, PT

Keynote Address

▪ **M.G.K. Menon**

Indian International Center, New-Delhi, IN

TUESDAY, 18 SEPTEMBER

08.30-09.00 Registration (*Gulbenkian Foundation*)

09.00-10.40 **Plenary III - Confronting Research Misconduct: Policies, Standards and Guidelines** (*room: Auditorio 2*)

Chairs: **Chris Pascal**, Director, Office of Research Integrity, Rockville, US

Nigel Lloyd, Natural Sciences & Engineering Research Council Canada (NSERC), Ottawa, CA

▪ **Christine Boesz**

National Science Foundation (NSF), Washington DC, US

Legal Aspects of Investigations and International Cooperation

▪ **Herbert Gottweis**

University of Vienna, Vienna, AT

Hwang-gate: Lessons for Science Governance

▪ **Motoyuki Ono**

President, Japan Society for the Promotion of Science (JSPS), Tokyo, JP

The Development of Codes, Standards, and Guidelines in Japan

▪ **Ulrike Beisiegel**

University Medical Center, Hamburg-Eppendorf & DFG Ombudsman, Hamburg, DE

Safeguarding Good Scientific Practice - Recommendations of the German Research Foundation

Discussion

10.40-11.20 Coffee Break

11.20-13.00 **Concurrent Sessions II**

Track 1b - Research Misconduct - Reporting, Investigation, and Adjudication (*room: Auditorio 3*)

Chairs: **Frank Wells**, European Forum for Good Clinical Practice (EFGCP), Ipswich, UK

Sylvia Rumball, Committee on Freedom and Responsibility in the Conduct of Science (CFRS), ICSU, Paris, FR & Massey University, Palmerston North, NZ

Masaki Nakamura, National Institute of Science and Technology Policy, MEXT, Tokyo, JP

▪ **Chris Pascal**

Office of Research Integrity (ORI), Rockville MD, US

Managing Cases of Research Misconduct

▪ **Andrew Stainthorpe**

UK Research Integrity Office (UKRIO), London, UK

Approaches to Case Handling

Track IIb - Institutional & Societal Issues - Educating for Responsible Research

(room: Sala 1)

Chairs: **Philippe Galiay**, European Commission, Brussels, BE

Phil Langlais, Old Dominion University, Norfolk VA, US

- **Ian Halliday**

President, European Science Foundation (ESF), Strasbourg, FR

Integrating Responsibility: The Research Student Perspective

- **Fernando Lopes da Silva**

University van Amsterdam, NL

Integrity in Biomedical Research: The Role of Education

- **Elizabeth Heitman**

Vanderbilt University, Nashville TN, US

The Need for Global Strategies for Training Students in RCR

Discussion

Track IIIb - Publication - The Role of Publishers, Funders and Research Institutions

(room: Sala 2)

Chairs: **Katrina Kelner**, AAAS, Science, Washington DC, US

Liz Wager, Publications Consultant, Buckinghamshire, UK and Council Member,
Committee on Publication Ethics (COPE)

- **Michael Farthing**

University of London, Vice Chancellor, University of Sussex, Brighton, UK and UK Research Integrity Office (UKRIO), London, UK

Institutional Perspectives on Integrity in Publication

- **Chris Graf**

Publisher, International Journal of Clinical Practice, Wiley-Blackwell Publishing, Oxford, UK

What are Publishers Doing about Publication Ethics?

- **Peteris Zilgalvis**

European Commission, Brussels, BE

Role of Funders in Publication Ethics

Discussion

13.00-14.30

Lunch (VIP Zurich)

14.30-16.10 **Concurrent Sessions III**

Track Ic: Research Misconduct - International Cooperation (room : Auditorio 3)

Chairs: **Jacques Bordé**, Centre National de la Recherche Scientifique (CNRS) Paris, FR
William Gardner, The Ohio State University, Columbus OH, US

▪ **Peggy Fischer**

US National Science Foundation (NSF), Washington DC, US

Investigating Allegations of Research Misconduct across International Borders: Principles and Practices

▪ **Matthias Kaiser**

The National Committee for Research Ethics in Science and Technology (NENT), Oslo, NO

Scientific Integrity on the Agenda – What are the Next Challenges?

▪ **Paul David**

Oxford University, UK & Stanford University, Palo Alto CA, US

Andrea Pozzi

Stanford University, Palo Alto CA, US

Empirical Realities of Scientific Misconduct in Publicly Funded Research: What can be Learned from U.S. Data Published by the ORI?

Discussion

Track IIc: Institutional and Societal Issues - Public Perceptions and Responsibilities (room: Sala 1)

Chairs: **Ligia Amâncio**, Portuguese Science and Technology Foundation, Lisbon, PT

Andrew Gorski, Polish Academy of Sciences and Medical University of Warsaw, PL

▪ **Lawrence Bell**

Museum of Science, Boston MA, US

Who Do You Trust: Science Museums as Forums for Conversations between Scientists and the Public

▪ **Carlos Fiolhais**

University of Coimbra, PT

Scientific Integrity and Scientific Culture: Telling the Truth to the Public

▪ **Paul Caro**

Académie des Technologies & CNRS, Paris, FR

Science and the Show Society

▪ **Vladimir de Semir**

University Pompeu Fabra, Barcelona, ES

Citizenship and Scientific Culture

Discussion

Track IIIc: Publication - The Challenges Faced by Smaller Journals (room: Sala 2)

Chairs: **Arian Poldermann**, EASE, Woerden, NL

Vedran Katavic, Croatian Medical Journal, Zagreb, HR

▪ **Annette Flanagin**

Journal of the American Medical Association (JAMA), Chicago IL, US

▪ **Muza Gondwe**

Malawi Medical Journal and Malawi College of Medicine, Blantyre, MW

African Journal Partnership Project

▪ **Ana Marusic**

Zagreb University, Zagreb, HR & Council of Science Editors (CSE), Reston MD, US

Education for Responsible Publication

▪ **Herbert Stegemann**

World Association of Medical Editors (WAME), London, UK & President, Asociación de Editores de Revistas Biomédicas Venezolanas (ASEREME), Caracas, VE

The Potential of Local Editors Associations in Promoting Ethics in Publication. The Experience in Venezuela with ASEREME

Discussion

16.10-16.50 Coffee Break

16.50-18.30 Plenary IV - Science Culture and Training for Responsible Research Conduct (room: Auditorio 2)

Chairs: **Jean-Pierre Alix**, Ministry of Research & Centre National de la Recherche Scientifique (CNRS) Paris, FR

Ana Noronha, Ciência Viva, National Agency for Science Culture, Lisbon, PT

▪ **Helena Illnerova**

Academy of Sciences of the Czech Republic, Prague, CZ

Trust in Research and the Importance of Training

▪ **Alex Quintanilha**

Institute for Molecular and Cell Biology, Porto, PT

Individual Integrity and Institutional Trust

▪ **Sally J. Rockey**

National Institutes of Health (NIH), Bethesda MD, US

Integrating Integrity into the Research Process through Training

▪ **Melissa S. Anderson**

University of Minnesota, Minneapolis MN, US

Educating Competent, Responsible, and Successful Researchers

Discussion

18.30 End of day's session. No formal dinner planned. Enjoy Lisbon with colleagues...

WEDNESDAY, 19 SEPTEMBER

08.30-09.00 Registration (*Gulbenkian Foundation*)

09.00-10.40 Plenary V - Factors Affecting Research Behavior and Integrity

(*room: Auditorio 2*)

Chairs: **Maurizio Salvi**, European Commission, Brussels, BE

David Vaux, La Trobe University, Melbourne, AU

▪ **Nicholas Steneck**

Office of Research Integrity (ORI), Rockville MD, US

What Do We Know? Two Decades of Research on Research Integrity

▪ **Brian Martinson**

HealthPartners Research Foundation (HPRF), Minneapolis MN, US

Social and Psychological Factors Influencing Research Behavior

▪ **Gün Semin**

Free University of Amsterdam, Amsterdam, NL

Enhancing the Self-monitoring Function of Science and its Contribution to Integrity in Research

▪ **Renzong Qiu**

Chinese Academy of Social Sciences (CASS), Beijing, CN

Research Integrity Issues in China

Discussion

10.40-11.20 Coffee Break

11.20-13.00 Closing Session: Public Policies and Strategies Fostering Research Integrity

(*room: Auditorio 2*)

Chairs: **Peteris Zilgalvis**, Research Directorate, European Commission, Brussels, BE

Sally Rockey, National Institutes of Health (NIH), Bethesda MD, US

Diogo Lucena, Calouste Gulbenkian Foundation, Lisbon, PT

Conference Summary

▪ **Peter Tindemans**

EuroScience, Strasbourg, FR

▪ **Ovid Tzeng**

National Yang Ming University, Taipei, TW

Closing Remarks

▪ **Par Omling**

Swedish Research Council & EUROHORCS, Stockholm, SE

▪ **Joel Hasse Ferreira**

European Parliament, Brussels, BE

▪ **Manuel Heitor**

Secretary of State of Science, Technology and Higher Education, Lisbon, PT

Official Conference Closing

▪ **Tony Mayer**

European Science Foundation (ESF) & Conference Co-chair, Strasbourg, FR

▪ **Nicholas Steneck**

Office of Research Integrity (ORI) & Conference Co-chair, Rockville MD, US

Appendix 3. Participants List

By country:

Argentina (1)	Germany (6)	Romania (2)
Armenia (2)	India (6)	Russian Federation (5)
Australia (2)	Indonesia (1)	Serbia (1)
Austria (3)	Ireland (2)	Singapore (2)
Azerbaijan (1)	Israel (1)	Slovak Republic (2)
Belgium (11)	Italy (1)	South Africa (4)
Brazil (1)	Japan (5)	Spain (2)
Canada (4)	Luxembourg (1)	Sweden (5)
China (2)	Malawi (1)	Switzerland (4)
Croatia (6)	Montenegro (1)	Taiwan - Province of China (2)
Czech Republic (3)	Netherlands (8)	Turkey (2)
Denmark (6)	New Zealand (1)	Ukraine (2)
Estonia (2)	Norway (6)	United Kingdom (29)
Finland (4)	Poland (2)	United States (60)
France (27)	Portugal (28)	Venezuela (1)
Georgia (1)	Republic of Korea (6)	

Individuals:

Lizbeth Adams, Bastyr University, United States
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Leslie Alexander, Bryn Mawr College, United States
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Rita Almeida, Computational Neuroscience Group, Spain
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Elizabeth Wager, , United Kingdom
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Appendix 4. Tindemans Report

An action-oriented Summary of the First International Conference on Research Integrity, Lisbon 16 – 19 September 2007¹

Credibility and integrity are science's essential attributes

Scientific research, technology development and innovation are the foundations on which virtually all sectors of society rest. They have generated the applications, the goods, the elements of vital infrastructures, the medical treatments or the evidence-based procedures and policies that pervade modern societies. Scientific research in particular contributes also in another way, hardly less important. It serves as the training ground for next generations of people that societies need to serve as their leaders and fill the professions and the multitude of public and private organizations.

Throughout this summary science and research will relate to all fields of knowledge, in short the natural sciences, mathematics, the life and medical sciences, as well as the social sciences and humanities. Wherever there is a need to refer to the scientific enterprise as something broader than merely research (there may be a need, for example, to extend the discussion to education or scientific institutions), the term 'science system' will be used.

Credibility and integrity of the science system are key to its usefulness. They must therefore be top on everyone's agenda. As a matter of fact there has been and still largely is an implicit covenant between the public at large and the science institutions. Large amounts of public funding and a quite some self-regulation are entrusted to the science system, and science and scientists on the whole are among the most trusted institutions and professions in society. The basis is to be found in the belief that science 'delivers' but also in the association of the scientific endeavour with truth.

Also today self-regulation can be an important part of the governance of the science system. But one has to recognize that the world has changed enormously over the last 50 years. Some main dimensions are:

- The strongly increased size of R&D budgets and the overall science system;
- Globalisation in a way has always been a hallmark of science, but it is now no longer limited to the individual scientists and students; on top one witnesses a globalization of national science systems;
- Societal expectations have been soaring, though (global) risks and uncertainties are rapidly becoming part of the science-society nexus;
- Commercialization is encroaching upon academia, as well as other pressures (political interference, military research. etc);
- The very high visibility of science in areas such as health or recently the global warming issues, requiring wider and more open discussions with the public and the media.

Hence there is a need to extend the classical value system of science and incorporate a broader societal value system. The governance of the science system will be affected

¹ Peter Tindemans, conference rapporteur. Contributions from Pieter Drenth, Stefan Michalowski, Frederic Sgard, Ovid Tzeng are gratefully acknowledged.

accordingly, and several checks and balances will have to be added to make the self-regulation model fit for modern times. These will include regulations and procedures in crucial areas, ranging from finances to ethics. The consequence does not need to be bureaucracy and it is possible to do justice to the freedom science and its institutions need by using for example sample auditing in the financial domain. If new governance models are based on an overall science system perspective, there is a good chance that science *and* society will benefit.

Research Integrity: broad or small

The presentations and discussions during the Conference have resulted in a very broad idea of Research Integrity. That is fair enough for it enables one to emphasize different but valuable aspects of the notion of Research Integrity. One could argue that certainly from a policy perspective a too limited view does not guarantee integrity and credibility of the science system as a whole. Indeed, suppose one could on the one hand root out all fabrication and plagiarism; but if one would on the other hand allow commercial interests to ‘take over’ universities (as some are afraid of) would that represent a science system that most scientists and many in society regards as credible and displaying integrity? Or to introduce difficult moral issues: isn’t the integrity of the scientific endeavour at stake when scientist, their institutions and their funders too easily accept rationales to develop weapons of mass destruction, a historical case having been the hydrogen bomb? The argument works the other way around as well: would scientific institutions operating true to their mission with private and political interests kept duly at bay but allowing fabrication and plagiarism, not do serious harm to the credibility of science in the eyes of the public?

However, if the perspective and desire is to identify which practical actions should be taken it makes sense to divide the very broad range of the notion of Research Integrity in a small number of clusters within each of which more easily agreement can be reached on:

- The operational meaning of Research Integrity in the cluster;
- Who are the primarily responsible actors;
- What is the relevant set of national and international rules and guidelines;
- What are the most urgent and feasible actions or measures, if any, which should be undertaken on top of existing ones.

What is the evidence about prevalence and motives and causes?

The common view is that misconduct in all its variety is rather rare. That certainly seems to be true for conspicuous cases of misconduct. But there are indications that at a more mundane level fabrication and other forms of fraud, plagiarism and so on are more frequent than one usually assumes. Several NIH studies were cited as well as academic studies about cheating in education from all over the world from undergraduate studies to faking PhD theses which are quite alarming. The number of investigative cases at the German Research Council Deutsche Forschungs Gemeinschaft (300 inquiries per year) and the US National Institutes of Health (some 200 allegations per year) is relatively small but in absolute numbers not at all insignificant. Buying Phd degrees and similar cases of perverting the academic system are on the rise, in developed countries, but not in the last place in developing countries and countries in transition. The peer review system comes under scrutiny as well, as more cases are reported of reviewers using ideas and information from reviewed papers without acknowledging their origin.

In assessing the seriousness of this situation one has to admit that pathological cases will always occur, also in science. Scientists are human beings, too, subject to the same temptations and pressures many people are prone to use as an excuse for being slightly easygoing with the truth. But is the huge pressure really an excuse? And are cultural differences sometimes invoked to explain cases of less serious misconduct, acceptable to smooth over such behaviour?

Yet, it remains important to distinguish cases of serious misconduct from smaller ones. And the fact that only 0.02% of the papers on PubMed is retracted seems to indicate that the impact of misconduct on science is slight, though maybe the real impact on society through non-science publications, where retraction of the underlying scientific article often will have no influence, is yet to be seen. What definitely needs consideration is how to reduce the pressure on especially young researchers to publish. The quantitative requirements, not the qualitative ones, are here to blame and contribute no doubt to unwanted behaviour.

Overall, the conclusion must be that more and better empirical information on the prevalence of various kinds of misconduct, and their impact on the scientific endeavour, is highly desirable.

Four actionable clusters

Four clusters can usefully be distinguished within the broad notion of research or scientific integrity.

- The first is research misconduct properly. This would cover both the more limited view that focuses on plagiarism fraud and fabrication (PFF) and the broader view that includes questionable research practices (QRP). Personal motives of the researcher may be at the origin of misconduct, but also internal system pressures, that is pressures closely linked to the way the science reward system works, such as national expectations to earn Nobel prizes.
- A largely different category concerns all types of infringements of bioethical regulations and guidelines for scientific research.
- A third category is formed by cases where external pressures on researchers and scientific institutions leads to misrepresenting or hiding research outcomes, overemphasizing findings etc. Such pressures are known to arise at the interface of research and political, economic or for example military interests.
- The integrity of institutions is at the core of a fourth area, and the issue here is which government and institutional policies are suitable to enable universities or research institutes to be true to their mission, responsibilities and independent role.

Of course these four clusters are linked and the borders are blurred, as a few examples demonstrate. The famous 'Hwang' case was initially about ethical infringement as regards obtaining embryos, but later the bigger issue turned out to be research misconduct: fraud and fabrication. Governments, funding agencies and universities themselves increasingly insist on accountability and adherence to strict career requirements deemed to follow from the nature of an institution. These instances of policies referred to in the fourth cluster may easily result in unhealthy pressure and liability for misconduct. Clinical trials represent an example of a diffuse boundary between infringements on ethical rules and research misconduct when reporting results moves from selective representation to withholding information and outright data manipulation. The pressures resulting from entrepreneurship being on the increase in

universities can lead in a direct way to distortions in the way universities function, the lack of open cooperation may also induce more risk taking and eventually research misconduct.

Yet, the types of activities to maintain the integrity of the science system are sufficiently different for each of these four categories to be considered separately. In one aspect, however, there is something underlying all of them. A balance must be found between a value-based and a compliance-based approach. A value-based perspective is characterised by helping students and researchers to internalise integrity through training, by adopting integrity as a key value in devising rules and procedures for self-regulation, but also by stressing and conveying the positive values of scientific research such as reliability, objectivity, honesty and impartiality. Engaging in Socratic dialogues and having senior researchers set examples are effective ways to instill research practices that meet high standards of integrity. However, it is necessary to complement this with a perspective that puts compliance with rules centre stage. In many countries nowadays bodies have been explicitly sanctioned by governments, funding agencies, or universities to apply definitions, rules and procedures to deal with allegations of misconduct. The goal is to protect society and to ensure that public money is spent correctly.

Actions in cluster 1 ‘Misconduct’

Several areas for action stand out to combat or prevent research misconduct.

- Funding agencies, governments and universities and research institutes are well-advised to review some of their rules for funding research and for academic careers. Currently there is much pressure on especially young scientists to produce papers or meet other quantitative targets. It would seem possible to maintain an emphasis on quality and at the same time relax some of the quantitative requirements.
- Training in Responsible Conduct of Research (RCR) is being offered now on some scale. It will remain important, but to have an impact in must be very high-quality training as studies have shown. Even then, it may well be true that Socratic dialogues and positive examples are as or more effective. When considering education and training one should not forget that attitudes towards integrity have their basis in the experience of students when they visited primary and secondary schools.
- In handling allegations of misconduct in research universities and research institutes have a key primary role. An agreed standing national mechanism that is not overly complex, remote or bureaucratic offers benefits and might receive allegations, monitor, guide or occasionally take on investigations as defined in an agreed national scheme between funders (including government), universities, academies and professional bodies.
- However, it is crucial that universities and research institutes handle misconduct cases more seriously and openly. They are often not very keen on pursuing such matters openly or even at all, afraid as they are for the reputation of their institutions. A next conference on research integrity should make it a point to invite and address Vice-Chancellors, Rectors, Presidents and Deans.
- In carrying out research involving for example human beings or animals it is customary and fully appropriate to have scientists obey strict rules and guidelines. But there was unanimity that turning the scientific profession into a legally regulated profession is not the way to improve integrity. It would only stifle the pursuit of knowledge.
- While research integrity in the more narrow sense denoted by PFF may be set apart from proper practice, including proper ethical behaviour, there are indications that

trust in science and scientific research is also built on the assurance that questionable research practices are ruled out. And trust is in the end the basis of the implicit covenant between science and society.

Several actions pertain to scientific journals.

- Clearer rules and statements on co-authorship responsibility are needed. One option is to explicitly state a PI's responsibility for a paper's entire veracity, or to identify a core group among the authors to bear such responsibility.
- Technical tools to combat plagiarism and image manipulation become increasingly available, and should be used widely as their user-friendliness grows.
- An important development will be the establishment of public digital repositories for primary research data with links to the published articles. In the USA an Inter Agency Working Group on Digital Data has been set up to propose such a repository system. In Europe an Alliance for Permanent Access to the Digital Records of Science has been created by major stakeholders in science and science information to help establish a European Digital Information Infrastructure.
- While the suggestion was made to create an independent authority to which journals could report suspicious cases, it was strongly felt that journals should inform institutions, and the latter are to act in the first place.

There is a clear need for more harmonisation of rules and procedures and for more international collaboration in combating research misconduct not only to avoid re-inventing the wheel, but in the first place because international collaborations are now commonplace in carrying out research projects and the peer review mechanism is to a very large degree an international mechanism. Harmonisation and collaboration across both disciplines and journals are needed. Obvious parties to be involved or take the initiative are the OECD Global Science Forum, the Interacademy Panel, ICSU, UNESCO and the Association of STM Publishers. Several expressed a willingness to take the initiative that should lead to a general International Code of Conduct. Subsequently more detailed arrangements might follow.

Actions in Cluster 2 'Bioethics'

Bioethics issues are an area where scientific research has to comply with clear regulations. A wide array of such regulations, guidelines and codes of conduct exist at national levels, but also internationally. Many national, institutional and international bodies have been created to ensure compliance. There is, however, definitely room for additional action.

- With respect to Clinical trials there exists a set of agreed guidelines under the auspices of the Internal Conference on Harmonisation (of the conduct and regulation of clinical trials), one section of which refers to good clinical [research] practice. These guidelines were effectively adopted throughout the world as they were agreed by the drug regulatory bodies of the USA, Europe and Japan. They require that clinical trials be properly monitored and audited - and it is as a result of such monitoring and auditing that many episodes of fraud or misconduct in clinical trials have been identified and dealt with. Yet, concern was expressed that tighter controls and monitoring may be needed for clinical trials carried out in developing countries, such as ensuring compliance to home-country rules in developing host-countries. There may as well be a need to review some of the regulations to ensure that clinical trial design reflects less the unequal power of large companies and developing countries.

- As regards experiments involving human beings, there is a need to review the arrangements for ‘informed consent’ in experiments involving human beings as the commercial use of data obtained in this way is no longer infrequent, which may not be accepted by experimental subjects. Commercialisation and internationalization together have led to practices that need to be curbed. One example is the growing practice of paying persons brought into research projects. Another concerns medical practitioners who have been condemned in one country and are wandering around freely in other countries.
- Concern was voiced over the often minimal amount of ethical education and training for (bio)medical students. Universities and professional medical associations should require (bio)medical schools to provide more than just minimal training. The training should, moreover, be non-routine, and of high quality with Socratic interrogation types of teaching methods identified as good practice.

Actions in Cluster 3 ‘Conflicting interests’

The issues emerging in this context are less clear-cut actions. They identify areas for policy discussions which may give rise to such actions.

Much of the discussion on research integrity has concentrated on researchers in the ‘open’ public sector (universities, institutes for fundamental research etc), or at least funded from public purse. Yet there are good reasons to try and see to which degree researchers in the private sector, in contract research organizations (which often have some public funding, but whose purpose is usually to work for industry or other organizations on proprietary knowledge) or in the public defence laboratories. After all, the integrity of the science system as a whole will be affected by clear cases of misconduct or inappropriate practices.

The advancement of science and the generation of wealth require the co-existence of a system of public knowledge and a private system where proprietary knowledge plays a much larger role. Important questions arise at the interface where the two universes meet, and they do meet increasingly on campus. What is acceptable behaviour? Taking out patents on publicly sponsored research clearly is; it is being stimulated by governments all over the world. Should researchers personally share in licensing income? Should one accept and even promote the establishment of start-up companies on campus? Current practice clearly goes in this direction. Yet, it seems important to keep stressing and safeguarding some values at the core of academia, such as a fully open exchange of information of those working on campus. The combination of financial interests in companies (such as equity in start-ups) with academic work raises difficult questions. The fact that one third of the lead authors in biomedicine articles has financial interests, illustrates the size the problem has taken. Very different answers from different institutions and governments are being given, some trying to adhere strictly to the traditional academic ethos, others trying to adopt much more leniency. The OECD continues to be an effective forum for exchanging information and charting possible courses of action on these issues.

Science is not immune to political and religious interference. Unwelcome research results occasionally (or more often?) tend to be disregarded and opposing free and independent research is sadly a second nature of some political and religious institutions. Fake research is supported for ideological reasons and attempts are made to influence research, not only in history but also today. Ultimately the integrity and credibility of the scientific endeavour are at stake by these ways to interfere with the normal process of science as well. Some

governments take a firm stand, others waver, and in religious communities it is not different. Academies of Science, but also professional organizations and grass-root organization in science, have traditionally been a strong safeguard to speak up for science and condemn such practices. It is important that such organizations supported by individual scientists, remain vigilant.

Actions in cluster 4 ‘Institutional integrity’

In most countries governments play a considerable role in creating universities and research institutes which are the key players in performing research and training next generations of researchers. Governments also create the boundary conditions within which these key players operate. Accountability frameworks, evaluation schemes linking performance to funding, mission definitions, funding mechanisms and institutions to implement such mechanisms are widespread examples. Identifying priority areas is a different way of creating boundary conditions as they concern the direction in which science is supposed to develop. Yet another area concerns the norms governments implicitly or explicitly set for what is acceptable or desired behaviour of individuals and institutions. Accepting ‘industry’ on campus has been one important example of a norm that many governments have embraced. Two issues stood out to promote responsible behaviour of institutions and people within institutions.

- The first one is to introduce ‘intelligent’ ways of enforcing accountability. Procedures should be solid on the numbers financially, but at the same time put centre stage quality and substance in research and education, when it comes to assessing the performance of institutions.
- A science system consists of many actors, from the government down to individual faculty members and students. In the end it has to be recognized that only when all actors accept responsibility, when careful checks and balances are introduced, when power is deliberately and rationally divided between government, funding agencies, universities, faculty or students, a system results in which trust, credibility and integrity are perceived to be the crucial values not only by the parties directly involved, but also by society in general.

Cross-cutting issues

A few cross-cutting issues have emerged that deserve ample attention when promoting research integrity. The first one deals with the way issues are perceived variously in developed nations on the one hand and other nations in different stages of development on the other. The second raises the general problem of awareness about science.

- Challenges in promoting the integrity of the science system are in many ways fundamentally different for developing countries, countries in transition or emerging economies. The conference benefited enormously from the presence of so many from all over world. Many problems are much more interwoven and acute in these countries, one reason being the ‘smallness’ of the science system: the number of researchers is small, their journals, if existing at all, are small, there is a limited tradition of building institutions for science, etc. It became equally clear, however, that many capabilities exist. Important actions are being undertaken to support research integrity. So the question is what the international community can do to help. The smallness of their systems and the limited tradition with modern science-based approaches should not be an excuse to stop by politically correct actions. Everyone will stand to benefit ultimately from courageous steps.

- Awareness of the importance of science, often expressed as the presence of a science culture among the public at large, is a crucial precondition for societies to have trust in science. But importance is inextricably linked to credibility and integrity. Hence the science system needs to be seen to tackle the various challenges in all four clusters having to do with integrity in a sincere and open way, not shirking discussions on limits to and uncertainties surrounding scientific knowledge. A heavy responsibility weighs on all actors to engage with the public in this regard.

Appendix 5. Analysis of Feedback Forms

The Conference was attended by 275 (participants from 47 different countries plus a variety of international organisations (governmental and non-governmental). All were asked to complete a feedback assessment form. We received 99 responses, which is a quite high rate of return (36%). In completing the form, not everyone answered all the questions and, in some cases, people may have ticked two boxes for the same question. The questions asked on the form and responses are summarized below.

As might have been expected, the bulk of the respondents are in the 40+ age range, with more than half coming from Europe followed by North America and Asia. While we endeavoured to create a World Conference, and the travel grants provided by ICSU and NATO were very important contributions in this respect, the participation from Latin America was especially disappointing and the level of participation from Arab countries and from Africa was also low. This is reflected in the feedback forms and in some of the comments received.

As can be seen, the bulk of the respondents are from academia, who tend to be active researchers or research managers.

The responses show that most people were reasonably content with the overall format and atmosphere but, from other comments received, participants would have liked to have had more time for discussion. This is shown in the response to question B4.

In response to the questions on the parallel sessions, the discordant notes come from the response to question C4, again a demand for more discussion time, and question 8, which indicates that a few dominant voices tended to prevail in the discussions with less involvement from the session participants overall. This reflects the large size of parallel sessions, an artefact of the numbers taking part in the conference and the room availability, both of which inhibited a good discussion atmosphere.

In terms of management, there was clearly a desire to have more speaker's presentations available before the Conference. Unfortunately, despite reminders, several speakers did not respect their deadlines.

Finally, the great majority of respondents considered that the Conference provided new information and provided an opportunity to form new networks, both of which are regarded as very positive effects. Almost all respondents, as well as from other comments that we have received, have recommended that there should be a further World Conference, ideally in 2/3 years time.

Comments received:

Many comments again referred to the lack of adequate discussion time and also commented on the poor quality of the Keynote and After-dinner speakers and the multiple chairing of both Plenary and parallel sessions. The choice of these speakers and the chairing arrangements were at the insistence of the Portuguese Presidency which hosted the meeting. There were also comments about the intrusive nature of the photography, again something arranged by the hosts. It was commented on that the Steneck paper should have been the Keynote talk. Unfortunately, this proposal which was in the original

programme was vetoed by the Presidency. The need to ensure a better gender and geographical balance were other criticism made in the comments section.

Comments re-emphasised the need for a further World Conferences, possibly with regional conferences and preparatory working groups producing “White Papers” for Conference structuring and discussion.

A clearly identified need is for information about systems for dealing with misconduct in different countries in the light of increasing international research collaboration. Some have asked for databases (which is a non-trivial task in maintaining as an up to date and therefore valuable asset). The OECD follow up activity on international collaboration and research integrity may be significant in this regard.

Other issues raised in the comments were the need to focus on specific issues rather than have a general further Conference. These included having more précis guidance on conducting misconduct cases, procedures for investigation of accusations, harmonisation and best practice for such procedures and underlying policies and responsibilities. Another point raised was to have some common guidelines as to how to handle whistleblowers.

More interestingly, several comments stressed the need to have university and research institute leaders involved in future events in order to both educate them and for them to adopt research integrity policies and “make them stick”.

There was a demand to have a greater social sciences content, especially psychology, behavioural sciences and also justice systems as well as consideration of the role of politics in research. The involvement of professional ethicists was another request from one respondent.

Several responses concerned the cost of implementing research integrity policies and saw this as another aspect to be considered at a future Conference.

A number of comments recommended the topic of publications as an even more significant issue for a future Conference, linked to integrity and peer review considerations.

There was a request for internationally accepted codes of conduct to be established. This will be dealt with by the OECD follow up group. Another request, repeated in several comments, was for the establishment of a web site and also a database of policies, procedures and codes. This is a non-trivial task and while the former can be addressed, the latter is a matter for a major international organisation to take the lead.

Several respondents disliked the emphasis given in some of the talks on biomedicine and pharma. while, at the same time, stressing the importance to have a greater industry presence at future meetings.

The role of the scientific/professional societies and their involvement in matters of research integrity is an interesting observation as, formally, only ALLEA, representing

the European academies of sciences, was involved. The suggestion is very pertinent and needs to be considered in any future conference.

Finally, the largest number of comments sought more on education, training and mentoring in the responsible conduct of research and saw this as a key theme for any future conference

Tabulation, Conference feedback form

Participant Profile:

Total: 95		Total: 91	
Age Group		Country	
20s	4	Europe	49
30s	16	North America	20
40s	22	Latin America	1
50s	30	Africa	3
60s	17	Asia	15
70s+	6	Australasia	3
Gender: 94		Function: 86	
Male	52	Researcher	30
Female	42	R Admin/Manager	34
Employer/Occupation: 94		HR	3
Academic	61	P-Maker	12
Industry	2	Legal	4
Government	14	Others	3
Other	17		

A. CONFERENCE FORMAT AND ATMOSPHERE

1. The conference was more than “just a meeting” or collection of lectures
2. The atmosphere was conducive to the easy exchange of information
3. The schedule allowed ample time for informal discussion
4. There was adequate representation of all national groups
5. There was an adequate balance of professional experience and background
6. Please add comments on specific sessions on the back of this page or additional pages

Format & Atmosphere	Q-A1	Q-A2	Q-A3	Q-A4	Q-A5
Agree Completely	42	46	32	23	29
Mild Agreement	43	38	39	50	33
Neutral	4	6	14	16	13
Mild Disagreement	4	5	9	12	6
Disagree Completely	2	0	1	4	2
TOTAL	95	95	95	95	83

B. PLENARY SESSIONS

1. Themes and aims were timely
2. Themes and aims were communicated to conferees
3. Stated conference aims were realised
4. There was sufficient time for formal discussion after Plenary sessions
5. Please add comments on specific sessions on the back of this page or additional pages

Plenary Sessions	Q-B1	Q-B2	Q-B3	Q-B4	Q-B5
Agree Completely	54	38	28	20	
Mild Agreement	33	45	40	23	
Neutral	2	4	19	8	
Mild Disagreement	3	4	4	26	
Disagree Completely	2	1	0	7	
TOTAL	94	92	91	84	

C. Parallel Sessions

1. Themes and aims were timely
2. Themes and aims were communicated to conferees
3. Stated conference aims were realised
4. There was sufficient time for formal discussion after Plenary sessions
5. The parallel track sessions stimulated discussions
6. Session Chairs stimulated the discussion, not simply managed them
7. Discussions allowed for a good exchange and explored new issues
8. Discussions involved the whole group and were not dominated by a few individuals
9. There was enough time for informal discussions outside formal Plenary and parallel sessions
10. Please add comments on specific sessions at the bottom of this page or additional pages

Parallel Sessions	Q-C1	Q-C2	Q-C3	Q-C4	Q-C5	Q-C6	Q-C7	Q-C8	Q-C9	Q-C10
Agree Completely	54	41	29	33	43	31	36	24	33	
Mild Agreement	37	46	46	33	38	37	36	31	36	
Neutral	4	5	14	10	7	14	8	21	14	
Mild Disagreement	0	2	5	16	5	10	9	16	7	
Disagree Completely	0	0	0	2	1	2	1	2	3	
TOTAL	95	94	94	94	94	94	90	94	93	
Research Misconduct	55		Institutional & Societal Issues				40	Publication		30

Management and Organisation

1. Administration before the conference
2. Adequacy of site information
3. Administration during the conference
4. Helpfulness of ESF staff on site
5. Adequacy of the Web site
6. Access to Speakers' presentations before the conference

MANAGEMENT & ORGANISATION	E	G	S	U
Administration before Conference	61	28	4	1
Adequacy of Site Information	52	34	5	3
Administration during Conference	66	22	6	
Helpfulness of ESF Staff on Site	65	25	2	
Adequacy of Website	50	34	6	3
Access to Speakers' Presentations before Conference	21	37	14	5

BENEFITS & ADDITIONAL QUESTIONS

- New information that will help in raising awareness/setting up systems for
- New networks which will assist your work in the future
- Other, please elaborate on the back of this page or additional pages

New information that helped in dealing with matters of research integrity	77
New networks which will assist in future	69

ADDITIONAL QUESTIONS?

What follow up is needed apart from a Conference report?

Should there be more detailed follow up workshops on topics dealt with at the conference?

Yes: which topics No

Should this World Conference be repeated? YES/NO

If YES at what interval? every 2-3 years 5 years more than 5 years should not be repeated

Repeat Conference?	YES	NO	2-3years	5years	>5years	No repeat
Total	79	16	67	12		16

Appendix 6. Articles and Press Coverage

From *Nature Blogs*

Integrity: Zero tolerance in Portugal

Posted by Sarah Tomlin on September 17, 2007 11:52 PM

It's the end of the first day of the [World Conference on Research Integrity](#) in Lisbon and there has already been a lot of talk about responsible research, misconduct, questionable behaviours by scientists and what to do about it all.

Some of the most interesting discussions at a meeting like this happen during Q&A sessions after talks and during gossipy coffee breaks. I've already met one attendee who got into research policy as a consequence of her advisor publishing her PhD work under his name. And the best excuse yet for an author not supplying the original data requested by a journal editor? White ants ate my data.

'Talk' is the main goal of the first ever world conference on research integrity: an opportunity to bring together 300-plus scientific managers, policy makers, funders, editors and academics for open and frank discussions of this difficult and sensitive topic. Supported by the US Office of Research Integrity and the European Science Foundation, the hopes are high for a meeting that, some say, could not have happened even 5 years ago. Whether any concrete actions will emerge is yet to be seen.

Indeed, since arriving in Lisbon the most direct action on integrity I've witnessed is the 'zero tolerance' policy on the city's electric trams. Boarding a tram yesterday, several tourists made the mistake of forming a second queue, and so cutting in front of an unhappy Portuguese matron. This lady began berating the hapless tourists – and you did not need to speak Portuguese to understand that there were a few choice words about the Portuguese way of doing things and having respect for your elders. The tirade did not end when the lady found a seat, or when the tram began lurching its way up the hill, continuing for another 10 minutes into the journey.

It's not often you witness such an outspoken public defence of what is seen to be fair and right and I couldn't help wondering if more researchers were to follow the example of this Portuguese grandmother then perhaps the sloppy and fraudulent behaviour we were here to discuss would be less prevalent.

There is at least one concrete proposal making the rounds this week. The OECD's Global Science Forum (GSF) has issued a draft report on Best Practices for ensuring Scientific Integrity and Preventing Misconduct. The report is a follow-up to a workshop held in Tokyo in February this year, and the report's authors are hoping for feedback from this meeting before presenting the final draft for review by the Global Science Forum in 2 weeks time. They hope it will become a useful document for nations that are planning to review or modify their misconduct policies. You can read the current draft [here](#).

Comments

I've read these posts about the world conference on research integrity.

They are great !

congratulations to Dr. Tomlin!

Posted by: Alberto Contreras | [September 28, 2007 04:24 PM](#)

Integrity: codes, clubs and copying

Posted by Sarah Tomlin on September 18, 2007 04:35 PM

There are some clear divisions emerging in the discussions this week. One question that gets people fired up is the issue of whether science should be a profession - similar to medicine or law - with a professional code of conduct, an accreditation body and most importantly the ability to kick misbehaving scientists out of the club.

Proponents of this view include Ray Spier from the University of Surrey and the editor of Science and Engineering Ethics. As he argued following a discussion about national and international codes of behaviour for scientists: a code of conduct without an institutional ``anchor`` would not be worth the paper its written on.

Others worry that a formal professional body does little to address the underlying cultural issues faced by science, where too little is done by too few to challenge misbehaviour. Brian Martinson of HealthPartners Research Foundation in Minneapolis is one who believes that integrity has to come from within the community rather than being imposed externally.

The code of conduct recently proposed by the UK science advisor David King was held up at the meeting by Lida Anestidou from the US National Academies as a particularly bad example - its 7-point commandments form a do-and-dont checklist rather than formulating a guiding ethical principle or concept that would foster responsible behaviour.

Another conflict has emerged on the question of how serious plagiarism is, especially when related to the other two misconduct biggies: falsification and fabrication. These three travel together by the jaunty name of FFP. Although plagiarism seems to be one of the most prevalent misbehaviours some view self-plagiarism in particular as a ``victimless`` crime. What they argue is that plagiarism is a crime against other scientists whereas F&F harm science itself.

But others worry that tolerance of plagiarism - and a vice chancellor warns that it starts earlier and earlier with students in his university - encourages other questionable behaviour and slowly erodes the good practice of science. However, scientific norms vary widely across disciplines: why are six pages of plagiarism tolerated in some fields, whereas six paragraphs would be viewed as egregious in another? Christine Boesz, the inspector general for the US National Science Foundation and therefore responsible for misconduct investigations in that agency, would like to know the answer to that one.

Integrity: What did we learn from Hwang?

Posted by Sarah Tomlin on September 18, 2007 08:58 PM

So what did the science community learn from the biggest scandal in recent years?

Herbert Gottweis, a political scientist from the University of Vienna, tried to summarize the lessons learned for the attendees in Lisbon. Gottweis arrived in South Korea just 3 weeks before the scandal broke and admits he was as shocked as everyone else by the revelations. He was there to meet the successful star of human embryonic stem cell research for a book he was writing. Instead, he found himself witnessing an unfolding drama.

Gottweis identified five lessons from what he calls Hwang-gate:

- 1) hyping science can lead to fraudulent behaviour
- 2) peer review is no substitute for good science governance
- 3) research integrity is increasingly a matter of the integrity of research networks (including hospitals, ethical review boards, foreign collaborators...)

and on more positive notes:

- 4) the globalization of science may lead to greater globalization (or harmonization) of research integrity
- 5) once misconduct is uncovered its important to act quickly and decisively with the right institutions

On this last point Gottweis praised the final report of the committee of the Seoul National University that investigated Hwang. What did the Koreans think of Gottweis' talk? I asked one representative from SNU for her perspective, and she generally welcomed the analysis. It would have been good to hear more from the Korean delegation - there were six of them in Lisbon - but none of them were invited to give presentations. Mores the pity.

Integrity: conference bingo

Posted by Sarah Tomlin on September 19, 2007 07:42 AM

There are a bewildering number of acronyms, and their representatives, at the research integrity meeting in Lisbon. Many I had never heard of. So during a more pedestrian session I started playing conference bingo: could I construct the words 'research integrity' from the organisations in attendance?

After all, one goal of the conference is more joined-up thinking and dialogue between attendees. Could they, by getting together (even just fleetingly on my notepad), address the challenges of research integrity more effectively? Let's see how I did.

We have the conference organisers: ORI and ESF. Plus their supporters and partners: EMBO, ICSU (the international council for science), UKRIO (the UK integrity office) and COPE (committee on publication ethics).

Indeed, when it comes to publishing organisations there were more than I could imagine: as well as COPE, there is EASE (european assoc of science editors), CSE (council of science editors), WAME (world assoc of medical editors) and STM (the international assoc of scientific, technical and medical editors). Phew!

At the global level, where some attendees are looking for leadership on questions of harmonization and setting community standards, there is ICSU, but also UNESCO and its commission on the ethics of science and technology (COMEST). At the European level there is ALLEA (All European Academies) and EUROHORCS (the research councils).

How am I doing? I still need a G and a Y. Well there is that report from the OECD's Global Science Forum (GSF) perhaps they can provide the 'why' for future activity by all these groups...

Comments

Ha! Plane tickets of some attendees were paid by NATO, as I learned in Lisbon. Not many people recall what this acronym stands for. And is there any information about the "why" for NATO's future activity in any report?

Posted by: [Erik von Elm](#) | [September 22, 2007 04:31 PM](#)

Integrity: the dark-side of mentoring

Posted by Sarah Tomlin on September 19, 2007 02:23 PM

The final morning of the research integrity meeting began with a question that should probably have come earlier in the meeting: what do we know for certain about bad research behaviour? Is misconduct actually on the rise? Sure, there are more scientists than ever, and competition between them is rising, factors that you think would contribute to more misconduct. There are also worrying signs from the young that internet 'research' at school and university is becoming a substitute for real academic work. But does that mean this is a problem that is only going to get worse? And what can the science community do about it?

Nick Steneck from the US Office of Research Integrity summarized two decades of US research in this area, and highlighted areas that still need more investigation: what is the harm done to science by questionable research practices? Things like refusal to share data, ghost authorship, misleading citation practices and poorly managed conflicts of interests. We have anecdotes, but what about the evidence?

One policy question on which some new data was presented at the meeting is whether ethics training and education works. Training in responsible conduct of research is one of the most popular solutions proposed for scientific misbehaviour - and though no-one expects an ethics class to stop a dedicated fraudster, the hope is that it somehow raises the general level of ethical awareness.

The sobering news from Melissa Anderson and her colleagues at the University of Minnesota is that such training does not work as we might hope. You can access her talk [here](#); the results also appear in the September issue of Academic Medicine.

Melissa analysed data from a 2002 survey of US biomedical scientists who were asked about the amount of formal instruction and informal mentoring in ethics they had received - and how that had affected their subsequent behaviour. There were some positive benefits of instruction - in some cases it improved scientists' knowledge of good conduct but didn't seem to change their behaviour. The bad news is that some types of

mentoring actually made things worse. In particular, mentoring by an advisor in research 'survival skills' actually increased misbehaviour in seven areas that Melissa studied - overwhelming any benefits from formal training.

Melissa thinks we need to train the trainers better. Sometimes the job is left to university compliance officers who have no background in science. Or to online instruction tools that replace proper discussion with a box-ticking exercise. As for mentoring, young researchers still need mentoring in personal, financial, and research ethics - and in the art of survival - but she suggests collective mentoring discussions are a better way to reinforce good behaviour over bad. Scientists are often lousy teachers of ethics, Melissa admits, but she thinks they can do better. Lets hope so, the future generation of researchers is in their hands.

Analysis

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High-profile cases of scientific misconduct such as that of disgraced South Korean stem cell researcher Hwang Woo Suk have focused new attention on efforts to promote ethics in scientific research. At the time that Hwang published his now infamous research, South Korea lacked a formal policy for reporting scientific misconduct, and the country had no policies in place to protect whistle blowers, says David Resnik, a bioethicist at the National Institute of Environmental Health Sciences in Durham, North Carolina. With science becoming an increasingly global pursuit, international efforts to promote research integrity have gained momentum. “There’s no need to panic or say the sky is falling,” says Stefan Michalowski, executive secretary at the Organization for Economic Cooperation and Development (OECD) Global Science Forum in Paris, France. “But on a practical level, there’s a need to acknowledge the international dimension of the problem,” he says. The OECD’s Global Science Forum (GSF) comprises science policy officials from OECD countries who cooperate at a government level on issues related to basic scientific research. In an effort to encourage organizations and governments to consider implementing standard protocols for dealing with scientific misconduct, the GSF has prepared a draft report to provide a starting point for discussions (<http://www.oecd.org/sti/gsf>). This report helped to catalyze organization of the first world conference on research integrity, which was held last month in Lisbon, Portugal (<http://www.esf.org/conferences/researchintegrity>). Co-organized by Nicholas Steneck at the Office of Research Integrity (ORI) of the U.S. Department of Health and Human Services in Rockville, Maryland and Tony Mayer of the European Science Foundation (ESF) in Strasbourg, France, the conference brought together representatives from 52 countries around the globe. “It was the first time we’ve gathered this many people together to discuss integrity in research,” says Mayer. “We had people from all walks of life in the research world—funders, universities, administrators and researchers.” Sponsored by ESF and ORI, the meeting was also supported by other prominent organizations including the International Council for Science (ICSU), the North Atlantic Treaty Organization (NATO), the European Molecular Biology Organization (EMBO), and the Committee on Publication Ethics (COPE).

Promoting Cross-Border Communication

The aim of the Lisbon meeting was not to produce a one-size-fits-all approach to solving issues of scientific Misconduct — there was widespread agreement that solutions must be individualized to the needs of each country and institution. Instead, the forum focused on jumpstarting cross-border discussion of the problem, says Mayer. “Science, as it’s practiced, is increasingly international and a lot of research structures are international, so if misconduct occurs, it can easily have international implications,” says Michalowski. “You need to get data and testimony and you need to get the facts and that may require getting those data from another country,” he says. Investigating misconduct can be difficult enough in one’s own country, but the problem becomes even more challenging when the misconduct involves researchers from another country. “Someone may have authority to investigate misconduct in their own country, but they have no such authority

in other countries and they may not know who to talk to,” says Michalowski. Meeting attendees all concurred on certain tenets, notes Mayer. “Everyone can agree that fabrication, falsification and plagiarism is wrong—that goes across cultures.” Likewise, there was wide agreement that those types of blatant scientific misconduct are rare, he says. But other forms of scientific misconduct are less easy to define, says Mayer. Pressure to publish and new technology have made it easier and perhaps more tempting for scientists to push the envelope a bit. “People sort of touching up their gels—things like that are a lot easier now than it used to be,” says Tim Hunt of Cancer Research UK, a speaker at the meeting. “There’s a bell curve with absolutely exemplary practice at one end and misconduct at the other and a big bell in the middle representing degrees of questionable practice,” says Mayer. “How do we address that? How do we ensure that people don’t slide down one side of the bell into the misconduct side?”

Ordinary People, Extraordinary Pressure

One proposed solution that is becoming clear is the need to make changes to the research environment. “There are environmental factors that have a bearing on the way researchers behave, and these factors are definitely addressable and changeable,” says ORI’s Steneck. As an example, Resnik points to grant review processes that pressure researchers to produce preliminary data, which he says can encourage researchers, especially those who depend on soft money, to lie or stretch the truth on grant applications. “Pressure is probably at an all-time high, and a lot of [misconduct] is probably people responding to this pressure,” says Resnik. Convicted fabricators often point to external pressures as the tipping point for their misdeeds. Eric Poehlman, who fabricated and falsified nearly a decade’s worth of work while at the University of Vermont, explained his behavior by saying he felt pressure to continue securing grants so that he could fund the numerous postdocs and graduate students who depended on his support to continue their careers. While many, like Hunt, argue that a lab leader would have to be crazy to commit an ethical breach with so much at stake, Resnik believes that most cases involve ordinary people who gave in to extraordinary pressure. “There’s evidence that if you make small compromises that leads to larger compromises,” says Steneck. “Some people get caught in the timing of submitting things and they rush, and because they rush they take shortcuts that they might not otherwise take,” says Peggy Fischer, associate inspector general of the National Science Foundation in Arlington, Virginia. Institutions can relieve pressure or provide guidance on how to cope with it, but this won’t entirely eliminate the problem, says Fischer. Effective solutions depend on leadership, says Fischer. “An individual has to believe that that system has integrity. You have to have a culture where people feel the administration feels, breathes and walks integrity,” she says. “There’s no magic solution,” agrees Michalowski. “But you need strong leaders,” he emphasizes. Likewise, vigilant, meaningful education must be built into the system. “You should have clear rules where people understand what’s expected and required,” says Fischer. Furthermore, people must be familiar with the rules and trust them to work. One priority discussed in the OECD GSF draft report is the need to strengthen the first link in the chain of response to scientific misconduct. “If you’re a graduate student and you’re working late in the lab and going through the data and you’re beginning to suspect that your esteemed research advisor is faking data, what do you do?” says Michalowski. Unless a person who detects misconduct feels safe blowing the whistle, the problem may go unreported.

Dealing with Misconduct

The Lisbon meeting did not attempt to find an ideal method for handling misconduct but instead provided a forum for delegates to exchange ideas for how to deal with it. Some countries still lack a formalized, documented, publicized process for dealing with misconduct. “They deal with this problem in an ad-hoc basis and when an allegation is made, maybe it gets into the press, then people scramble and they put together a committee composed of trusted prestigious people, and they deliberate and make some sort of decision,” says Michalowski. Other countries have formal processes for receiving and handling allegations. “There really is a spectrum of systems, from improvisation to a quasi-legal system,” he says. But even if a formal process for dealing with misconduct exists in the country or institution of the scientist suspected of misdeeds, that scientist’s culture may not consider the behavior unethical. For instance, some Asian countries don’t view individuality and individual rights and responsibilities in the same way that Western countries do, and this difference of values can create problems regarding authorship and plagiarism, says Resnik. “Some people may think it’s a common piece of research and it doesn’t matter so much who takes credit for that.” Likewise, “some countries don’t have the same regard for human rights as we do and while we have international codes and standards for human research it’s not always clear how well other countries are adhering,” says Resnik. “Politics is always a potential factor here.” Steneck considers culture gaps a surmountable obstacle. “There are cultural differences that are going to make the process difficult but every country needs to think about what their cultural differences are, and whether they can be justified,” he says. “You will hear, for example, that we have different attitudes toward authorship in [the US]—we tend to give senior people more credit,” he says. “But you wouldn’t say, well in our country, we just don’t believe in double blind experiments. Does authorship fall into the same realm? It is misleading to put someone on a paper who really didn’t contribute anything, and I don’t think that cultural differences should stand in the way of this,” Steneck says. Perhaps even more challenging than cultural differences is a shared tendency to view science as a noble pursuit immune to fraud. Many countries and organizations still subscribe to the notion that science is a brotherhood of gentlemen who can’t lie, says Michalowski. “This idea goes back to when science was a much smaller institution and it has survived long after science changed,” says Michalowski. “We don’t believe that science is a special case — in any profession you can have some dishonesty.” Resnik says that much of the misconduct that turns up in science is simply spill over from problems facing society as a whole. “Surveys consistently show that the incidence of cheating in high school and college is very high, well over 50 percent and it’s unreasonable to expect that these people who were cheating in college will never cheat again,” says Resnik. “It’s not surprising that you find fraud in science—scientists are people too—but we tend to hold scientists up on a pedestal,” he says. Even with the apparent rise in high-profile cases of research misconduct, many in the scientific community have been reluctant to discuss the problem publicly. “I honestly think it’s better to just quietly deal with a person than to bring in the SWAT team and start some huge public investigation,” says he says, reinforces the idea in the public’s mind that scientists are dishonest. “Every time the whistle is blown, the public says scientists can’t be trusted,” says Hunt. Michalowski disagrees with this argument. “People may worry that even if your motives are pure, you risk doing harm to the system by exposing fraud, but when the public learns that data were faked in a drug trial, the damage is even greater,” he says. Those who handle scientific misconduct report a rise in the number of

cases in recent years, but this may be a sign of better surveillance, rather than an increase in actual incidence. “Our numbers have gone up significantly in the past few years, but we don’t know what the baseline is,” says Fischer. Misconduct can easily slip under the radar if whistle blowers don’t feel safe reporting it, she says. “The system has to have a way to receive allegations in which the person submitting the allegation feels comfortable doing that, so that the fears inherent in reporting – like losing funding or retaliation are reduced to the lowest level possible,” she says. Fischer believes that misconduct is underreported but says that no good comprehensive studies of scientific misconduct exist and without them, it’s difficult to quantify the number of actual cases.

International and National Solutions

The Lisbon meeting and GSF draft report provide first steps toward international cooperation on maintaining scientific integrity and preventing research misconduct. However, individual countries are also moving forward with their own policies. For example, Germany has implemented an innovative ombudsman system meant to address problems before they blow up. The system consists of ombudsmen at both the national and institutional level, says Ulrike Beisiegel, chair of the DFG Ombudsman. The national ombudsman is an independent, neutral person trained to mediate and navigate ethical challenges. “Every researcher in Germany can contact us if he has information about someone who might have done something wrong,” says Beisiegel. The ombudsman can advise whistle blowers, conduct preliminary investigations, and try to mediate the problem and settle it in an amicable way, if possible. So far, the national ombudsman office has handled about 60 to 70 cases per year, says Beisiegel. The system has safeguards in place to protect both the whistle blower and the alleged perpetrator of the misconduct. “Our goal is to go in early,” says Beisiegel. “Most of the people come to us too late. If it’s an authorship issue, it’s after the paper is published. So we’re setting up a curriculum for students so they know how they should behave and what they should do,” says Beisiegel. The Lisbon conference has encouraged decision-makers to think about the big issues facing them. “The conversations have started, and now we can continue these conversations— that’s what we’re hoping will come out of the world conference. It’s a first step,” says Steneck. During the meeting, some suggested that the logical next step should be a series of regional meetings, for instance a group of Asian nations coming together to discuss scientific integrity, says Mayer. “There is a feeling we need to come together again, but where and when is still up for debate.” “I’m optimistic,” Steneck says. “Five or six years ago there was very little global interest and that’s changed. I think there are significant components of the research community who realize we do need to take these issues seriously.”

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Research integrity: collaboration and research needed

Who likes to clean up the backyard if not absolutely needed? Most vice-chancellors of research, when asked about scientific misconduct, pretend this is a rare occurrence and not a problem in their university. Only when evidence accumulates that staff are under suspicion do scientific institutions start to worry about the unhappy triad called FFP: fabrication, falsification, and plagiarism. Then they call for self-regulation within the scientific community to put the balance right again. However, after the important cases of recent years,^{1,2} the question arises of why scientists start to violate the principles of responsible conduct of research at some point in their career. The shockwaves from the scandals clearly show that a comprehensive approach to research integrity and some coordinated action is now needed.

Last month, the European Science Foundation and the US Office of Research Integrity (ORI) jointly convened the First World Conference on Research Integrity in Lisbon, Portugal.³ Academics, policymakers, funders, and journal editors discussed how research integrity can be fostered effectively. Organiser Nicholas Steneck (ORI) said that, despite some US\$15 million spent since 2001 for his Research on Research Integrity programme, much more work is needed to rise to this challenge. It is good news that European money from the 7th Framework Programme will also become available for such research. FFP grows on excellent culture media in the established research nations where it is vital to academic careers to publish and win new grants.⁴ Herbert Gottweis, political scientist at University of Vienna, illustrated what happens in countries in transition that bet on a few top-notch scientists to achieve their high goals.⁵ When he met Hwang Woo-suk in 2005, the stem-cell researcher was the pride of Korea, but soon thereafter had to admit fabrication of most results he had published. Hwang-gate, as Gottweis called the incident, showed that research is often intertwined with the commercial sector. Scientists do not only compete for priority in discovery but also for patents. In biomedical research, financial conflicts of interest are frequent and affect the reporting of results.⁶ In the private sector, a research setting not controlled by funding agencies, it is even less clear how scientific misconduct and selective reporting can be prevented. “Research must be based on trust and community norms”, said Katrina Kelner, deputy editor of *Science*. The same is true for peer review, the method mostly used to decide on allocation of grants and publications. But science is now larger and more complicated than in the past; it is increasingly done in large international networks. The long author bylines of research articles no longer tell us who is responsible for what part of the work. Some journals require a description of each author’s individual contribution, after a call to overcome the old concept of authorship a decade ago.⁷ This call is even more appropriate today. Indeed, with full disclosure of contributions investigating committees would have an easier job with publications found to be based on fraud. Further, integrity networks were proposed to help exchange important information about suspicions across borders confidentially and quickly. While investigators are busy trying to identify contact persons in foreign institutions, laboratory notebooks or other important material might disappear. Today, even an experienced agency such as the ORI finds it difficult to pursue allegations across borders. It is not only countries affected by scandals that should ask the “what if” question well in advance. As Renzong Qiu (Chinese Academy of Social Science) pointed out, investigators can be taken aback by a case’s complexity when members of a prestigious university become suspect. Almost overnight, scientists can have to examine their colleagues’ past activity. Further, not only researchers can be suspected of misconduct, but also influential businessmen and politicians. Of course, many codes of conduct have been adopted at levels from single institutions to supranational bodies. However, such statements do not penetrate into the microcosm of research laboratories easily to bring about change.

As ORI-funded education researcher Melissa Anderson (University of Minnesota) showed, the effect on later behaviour is small even when scientists receive training in responsible conduct of research.⁸ Personal mentoring may have a more sustained effect to prevent questionable research practices. But mentoring requires senior researchers to spend more time on teaching — not a popular demand. Instead of education some call for more regulation and control. For instance, data cooking would become more difficult if all original research data were to be made publicly accessible, at least after publication. However, electronic data repositories would still need to be created in many research fields. With well publicised science scandals, society’s trust in science is at stake. Even if only small fractions of

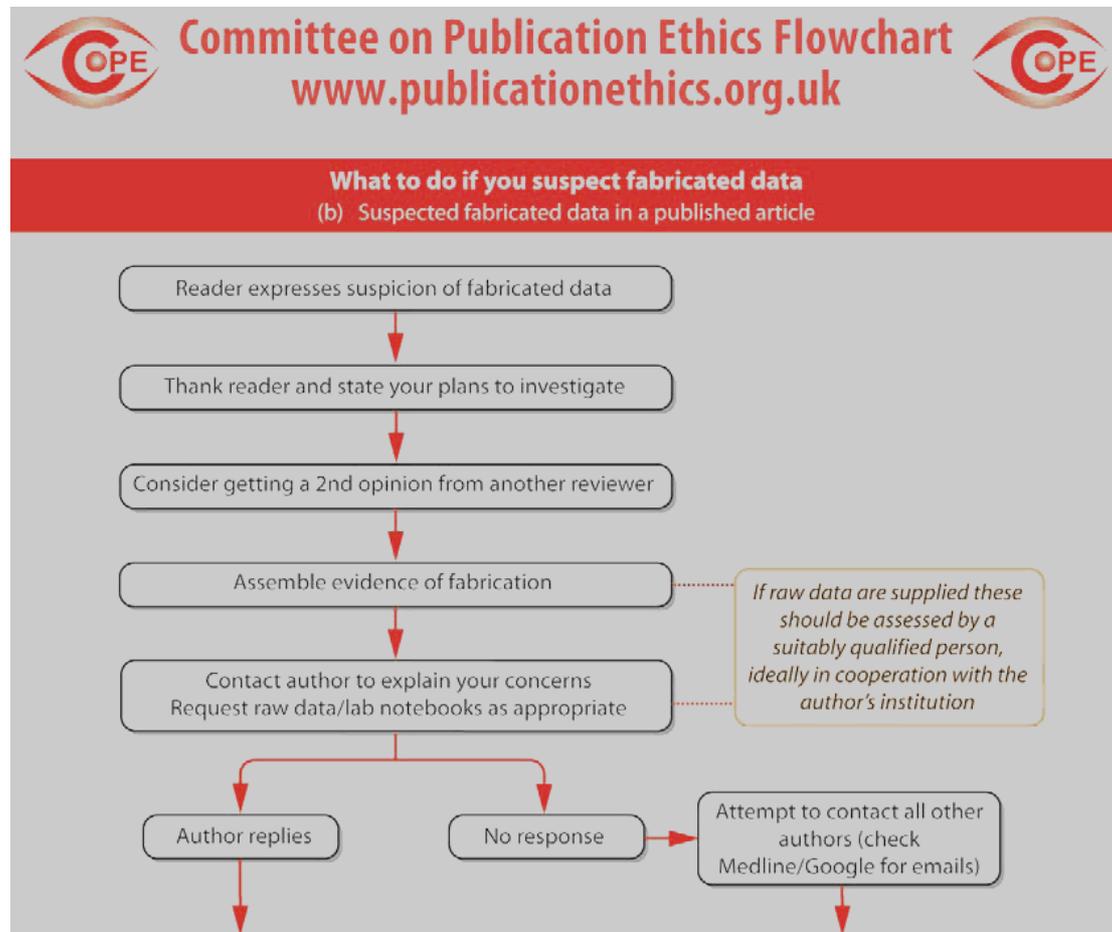
the entrusted money are misappropriated, it becomes increasingly difficult to ask for larger research budgets. Unfortunately, the many upright scientists are all too quickly lumped together with their less honest colleagues in the public's eyes. In Lisbon, many heads were nodding when Portuguese scientist João Lobo Antunes quoted Albert Einstein: "Many people say that it is the intellect which makes a great scientist. They are wrong: it is character."

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I declare that I have no conflict of interest.

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COPE flowchart

Part of one of 14 flowcharts from the Committee on Publication Ethics (COPE, <http://www.publicationethics.org.uk>), which guide journal editors before and after publication about potential breaches of publication ethics, such as publication ethics, suspected fabrication of data, duplicate or redundant publication, and plagiarism.

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The first World Conference on Research Integrity drew 300 people from 52 countries last week to Lisbon, Portugal. *Science* caught up with one of its organizers, **Nicholas Steneck** of the U.S. Office of Research Integrity, which joined with the European Science Foundation to initiate the event.

Q: Did the conference achieve what you wanted?

My expectations changed significantly over time. I had overestimated the level of engagement [on this issue] in many other countries, and therefore we had to back up and do more basic education. From that perspective, I'm enormously pleased.

Q: One speaker called plagiarism a "victimless crime." Were you disappointed by that?

Raising that question is important. I have often said that plagiarism may have a positive outcome ... because it still spreads scientific information. ... We really do need to assess which behaviors are having the biggest impact on research integrity.

Q: Norway has established a very formal scientific misconduct system with an appointed judge. Do we need a World Court of Research Integrity?

The solutions have to be country appropriate. What is important is [to] establish minimum standards: There must be a place to report, there has to be reasonable assurance an investigation will take place, [and] there has to be anonymity or at least protection of whistleblower