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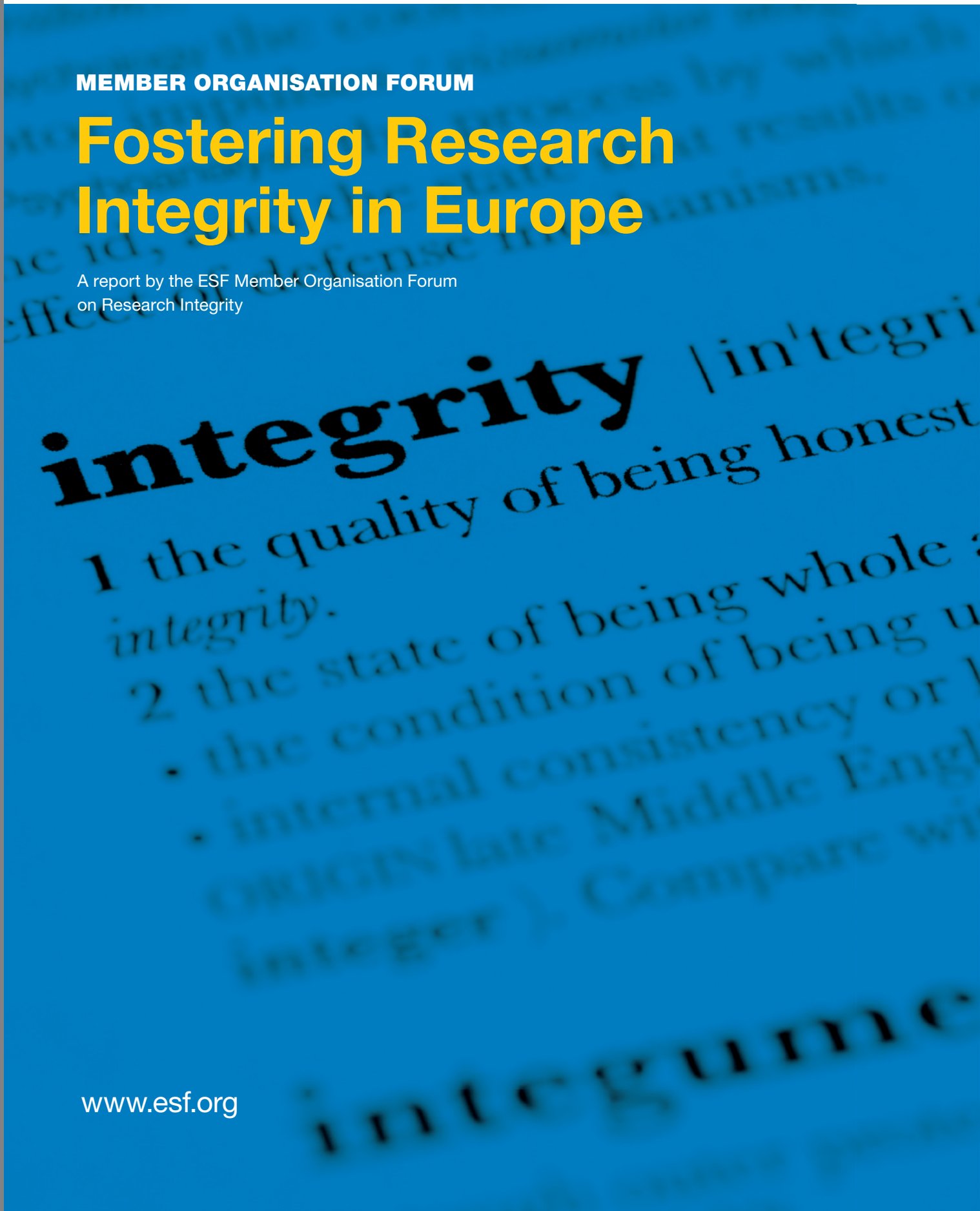
MEMBER ORGANISATION FORUM

Fostering Research Integrity in Europe

A report by the ESF Member Organisation Forum on Research Integrity



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- Development of best practices and exchange of practices on science management, to benefit all European organisations and especially newly established research organisations.
- Harmonisation of coordination by MOs of national programmes and policies in a European context.

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This report has been written by the Chairs with the support of the Forum and the working groups.
ESF is grateful to the Chairs of the working groups, the coordinator of the MO Forum, Laura Marin, and to ALLEA, for authoring the report on behalf of the Forum.

More information:
More information on and full details of all the documentation and work developed by this Forum can be found at:
www.esf.org/activities/mo-fora/research-integrity.html

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Foreword

At a time when the need to build trust between science, society and policy makers is becoming more and more important, it is essential that the culture of best practice is established as the foundation for research integrity. Research activities should be undertaken within the highest ethical considerations, and misconduct should be identified and dealt with in an open and transparent manner. The quality of research is entirely based on the highest level of integrity.

Though the national research organisations, funding systems and traditions in Europe are diverse, the organisations and researchers themselves are collaborating and building partnerships on a continent-wide scale. Therefore, in addition to mutual respect for national diversity, there must be a common understanding of the demands of research integrity.

ESF has been committed to the promotion of research integrity since 2000, when it published the Science Policy Briefing *Good Scientific Practice in Research and Scholarship*. In September 2007, the ESF, together with the US Office of Research Integrity (ORI), organised the first World Conference on Research Integrity in Lisbon. This was followed by an ESF survey on research integrity structures in European countries, *Stewards of Integrity. Institutional Approaches to Promote and Safeguard Good Research Practice in Europe*. In 2008 an ESF Member Organisation Forum on Research Integrity was set up, the objectives of which were to serve as a platform for the exchange of information on good practice, to support and encourage those organisations which did not yet have the appropriate support to develop such structures, to learn from others and initiate debates in their respective communities. The outcomes of this Forum were to be channelled as the European input to the second World Conference on Research Integrity in Singapore in July 2010.

It was envisaged that the ESF Member Organisation Forum would integrate its conclusions into a comprehensive strategy for safeguarding integrity in scientific research and practice at the national and European levels. The results of the work of the ESF Member Organisation Forum are the basis of this report, *Fostering Research Integrity in Europe.* It takes the format of a *European Code of Conduct for Research Integrity*, which can be used as a reference point for all aspects of research activities, complementing existing codes of ethics and complying with national and European legislative frameworks.

The European Code of Conduct, together with further recommendations on the promotion of research integrity and the implementation of structures, developed by the ESF Member Organisation Forum and in workshops together with the All European Academies (ALLEA), addresses conduct and good practice in all scientific disciplines as a canon for self-regulation. It is not intended to replace existing national or academic guidelines, but to represent a Europe-wide agreement on a set of principles and priorities for the research community. ESF's aspiration is that the European Code can contribute to the development of a global code of conduct for research integrity.

ESF wishes to acknowledge the key contributions of its Member Organisations and of ALLEA to the development of the European Code of Conduct for Research Integrity and to this overarching Report.

Professor Marja Makarow
ESF Chief Executive

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1. Introductory Note

Increasingly European researchers are collaborating across borders on joint research initiatives. Any doubt or distrust about the ethical standards employed calls into question the basis of our scientific understanding. With a diverse mix of research structures, funding systems and traditions across the continent, a common understanding of the demands of research integrity is essential. The European Code of Conduct for Research Integrity was developed to answer this need, involving members of the European Science Foundation and the All European Academies. It was welcomed at the second World Conference on Research Integrity in Singapore last July as an example of international coordination that builds a basis for a world-wide consensus about research integrity.

The ESF Member Organisation Forum on Research Integrity (MO Forum) was established following the first World Conference on Research Integrity held in Lisbon in September 2007 for which the ESF acted as co-organiser with the US Office of Research Integrity. It was clear that there had to be substantial follow-up at the European level to the whole issue of research integrity.

The aims and objectives of the MO Forum were:

Aims:

To create an output-orientated network that brought together ESF Member Organisations and others which play a key role in promoting and safeguarding research integrity (not including at this stage related issues of independence of researchers in contract research and ethical aspects). It addressed both the individual aspects of research integrity and the structural science policy aspects (at least to the extent to which ESF Member Organisations are concerned).

Objectives:

- To serve as a platform for various organisations to present each other's approaches, to discuss their strengths and shortcomings (if any), and thus to act as a vehicle for exchange of good practice;
- To support and encourage organisations which do not yet have appropriate structures (but are interested in developing them) to learn from the experiences of others and to initiate debates in their respective communities on adequate models;
- To channel European input to the second World Conference on Research Integrity in Singapore in July 2010.

Scope and Structure

Following the first World Conference on Research Integrity held in Lisbon in September 2007 (co-organised by the ESF and ORI), the ESF published its survey of research integrity structures in European countries – 'Stewards of Integrity' [European Science Foundation (2008): *Stewards of Integrity: Institutional Approaches to Promote and Safeguard Good Research Practice in Europe*]. Following on from this, the ESF established an ESF Member Organisation Forum on Research Integrity that held its first workshop, 'From principles to practice', in Madrid on 17-18 November 2008. The objective of the meeting was to serve as a platform for MOs to exchange information on good practice, to support and encourage those organisations which did not have appropriate structures to develop such structures, to learn from others and initiate debates in their respective communities, and to channel European input to the second World Conference on Research Integrity. The outcome of that meeting was to establish four working groups to cover the following areas:

WG 1 'Raising awareness and sharing information' (chair: Sonia Ftacnikova, SK): raising awareness and sharing good practices involving all stakeholders and developing platforms for continuous exchange of information on the various approaches to promote and safeguard research integrity (including efforts to promote research integrity in education and training);

WG 2 'Code of Conduct' (chair: Pieter Drenth, NL): WG 2 was requested to devise and formulate a European Code of Conduct to be used as a template for national codes which define core values to be pursued and norms to be complied with in responsible research and which could be used as a template for national or institutional codes of conducts (at least in Europe);

WG 3 'Setting up national structures' (chair: Maura Hiney, IE): establishing a checklist for setting up national and institutional structures to promote good research practice and to deal with research misconduct. Countries (and institutions) that have not yet established mechanisms to promote and safeguard good research integrity can profit from the experiences of others that do have tested structures; and

WG 4 'Research on scientific integrity' (chair: Livia Puljak, HR): to make recommendations on the kind of research that is needed regarding research integrity in order to know the prevalence of research misconduct and its causes, to explore the best ways to address this problem and to better understand research misconduct to help formulate evidence-based policy.

The MO Forum held four workshops (in Madrid, November 2008; in Strasbourg, October 2009, in conjunction with an ESF-ORI meeting on Good Research Practices and Research Integrity Training; in Split, March 2010; and in Rome, November 2010). Many members of the MO Forum also attended the second World Conference on Research Integrity in Singapore in July 2010, of which ESF was again a sponsor.

It was envisaged that the four working groups would integrate their conclusions in a comprehensive strategy for safeguarding integrity in scientific research and practice nationally, as well as in the wider European context. The results of the work developed by those four Working Groups form the basis of this report.

The Executive Report of the MO Forum was published in June 2010 and was presented at the World Conference in Singapore where it was a significant input as a rare attempt to develop a coordinated approach to research integrity across many countries and involving many institutions and disciplines. It also includes the European Code of Conduct for Research Integrity.

The final results, including some of the recommendations formulated at the Rome Conference (November 2010), were presented at the ESF Annual Assembly in Strasbourg on 17 November 2010.

2. Executive Summary

2.1 Background and Rationale

Scientific and scholarly research is a shared enterprise, aimed at the discovery and dissemination of new knowledge. Any doubt or distrust about the ethical standards employed in this pursuit can materially put into question the basis of our scientific understanding. The present document draws attention to the necessary self-regulatory mechanisms of scientists and their institutions (employers, funders, etc.) to prevent such detrimental developments.

Research is highly competitive, because of peer pressure and the high stakes involved in the outcomes of the successful quest for new knowledge. Acknowledging possible shortcomings in the behaviour of researchers is necessary, but foregoing the principles of research integrity risks undermining the entire chain linking the creation of new knowledge in science to the creation of wealth and welfare in society.

Scientists and scholars may be in error, research may be incomplete, data may mislead, but the shared enterprise rests on a presumption of honest effort, of fair reporting, of collegiate integrity. There have been flagrant cases of deliberate dishonesty, but most researchers have tended to think of these as rare events. That is because it is believed that peer review and collegiate ethos, the process of challenge and the practice of questioning, sooner or later reveal the truth. As Arthur C. Clarke once said, "In the long run, there are no secrets in science. The universe will not cooperate in a cover-up." This report aims at strengthening this ethos.

But there are uncomfortable facts to be faced. The world's researchers now number in the millions. According to Nicholas H. Steneck[1], consultant at the US Office of Research Integrity, the numbers of cases of research misconduct could number in the tens of thousands. "Studies suggest that as many as one in every 100 researchers engages in serious misconduct over the course of a three to five year period."

In addition to fabrication, falsification and plagiarism, many other objectionable practices deserve attention. Some may have serious legal or moral consequences; others may create nuisance, discontent or procedural discord. Many of them may risk undermining public trust in research and science.

The term 'research misconduct' is meant to embrace many things, including insufficient care for the people, animals or objects that are the subject of or participants in research; breaches of confidentiality, violation of protocols, carelessness of the kind that leads to gross error and improprieties of publication involving conflict of interest or appropriation of ideas. Many of these unacceptable research practices are addressed in the European Code of Conduct for Research Integrity (section 2). Sadly, many of these can be found in all aspects of research. Some represent failures of training for research that has become professionally more challenging and complex. "New researchers are not today routinely trained to deal with the challenges and complexities they face as professionals", says Steneck. "This situation needs to be addressed."

The situation needs to be addressed in Europe, where national research structures, funding systems and traditions may be diverse but where, increasingly, researchers have begun to collaborate, to coordinate initiatives and to build partnerships on a continent-wide scale. Therefore, beyond mutual respect for national diversity, there must be a common understanding of the demands of research integrity. The European Code of Conduct for Research Integrity, presented here, should serve as a reference point for all parts of the research spectrum. It could be the basis for developing national regulations where none exist, could complement existing codes of ethics and may be fit, in some cases, to enhance or supersede those already in operation. It is sufficiently inclusive to allow easy compliance with national and European legislative frameworks. A concern for research integrity begins first of all with the responsibilities of the individual, but places obligations on research institutions, research funders, learned societies, academies, editors and research efforts supported by the private sector.

In Europe, comparatively early efforts in awareness-raising and in offering guidelines to the research community and their institutions can be traced to the European Science Foundation's (ESF) Science Policy Briefing on *Good Scientific Practice in Research and Scholarship* (2000), and to the All European Academies's (ALLEA) *Memorandum on Scientific Integrity* (2003). Global efforts include the work of OECD's Global Science Forum on *Best Practices for Ensuring Scientific Integrity and Preventing Misconduct* which focuses on issues related to international collaboration. The First World Conference on Research Integrity was held in Lisbon in 2007. It was initiated by the ESF and the US Office of Research Integrity, with backing from the EU Presidency and the European Commission. An ESF Member Organisation Forum was then established to take the issues forward and this report is the outcome of the investigations and debates in this context. It builds on an ESF survey issued in 2008 (*Stewards of Integrity – Institutional Approaches to Promote and Safeguard Good Research Practice in Europe*) which highlighted key problems and the need for education and training to better equip the research community to deal with the issue raised.

The document was presented at the Second World Conference on Research Integrity, held in Singapore from 21 to 24 July 2010. It aims, fundamentally, at achieving an agreement on principles, and an understanding that compatibility of procedures is necessary for the European Research Area to develop and to play its part in global research collaboration.

1. Address at the first World Conference on Research Integrity, *Fostering Responsible Research,* Lisbon, 16-19 Sept. 2007.

2.2 European Code of Conduct for Research Integrity

This code – developed through a series of workshops involving the ESF (European Science Foundation) and ALLEA (All European Academies) – addresses the proper conduct and principled practice of systematic research in the natural and social sciences and the humanities. It is a canon for self-regulation, not a body of law. It is not intended to replace existing national or academic guidelines, but to represent Europe-wide agreement on a set of principles and priorities for the research community.

2.2.1 The Code

Researchers, public and private research organisations, universities and funding organisations must observe and promote the principles of integrity in scientific and scholarly research.
These principles include:

- honesty in communication;
- reliability in performing research;
- objectivity;
- impartiality and independence;
- openness and accessibility;
- duty of care;
- fairness in providing references and giving credit; and
- responsibility for the scientists and researchers of the future.

Universities, institutes and all others who employ researchers, as well as agencies and organisations funding their scientific work, have a duty to ensure a prevailing culture of research integrity. This involves clear policies and procedures, training and mentoring of researchers, and robust management methods that ensure awareness and application of high standards as well as early identification and, wherever possible, prevention of any transgression.

Fabrication, falsification and the deliberate omission of unwelcome data are all serious violations of the ethos of research. Plagiarism is a violation of the rules of responsible conduct vis-à-vis other researchers and, indirectly, harmful for science as well. Institutions that fail to deal properly with such wrongdoing are also guilty. Credible allegations should always be investigated. Minor misdemeanours should always be reprimanded and corrected.

Investigation of allegations should be consistent with national law and natural justice. It should be fair, and speedy, and lead to proper outcomes and sanctions. Confidentiality should be observed where possible, and proportionate action taken where necessary. Investigations should be carried through to a conclusion, even when the alleged defaulter has left the institution.

Partners (both individual and institutional) in international collaborations should agree beforehand to cooperate to investigate suspected deviation from research integrity, while respecting the laws and sovereignty of the states of participants. In a world of increasing transnational, cross-sectional and interdisciplinary science, the work of OECD's Global Science Forum on *Best Practices for Ensuring Scientific Integrity and Preventing Misconduct* can provide useful guidance in this respect.

2.2.2 The principles of research integrity

These require *honesty* in presenting goals and intentions, in reporting methods and procedures and in conveying interpretations. Research must be *reliable* and its communication fair and full. *Objectivity* requires facts capable of proof, and transparency in the handling of data. Researchers should be *independent* and *impartial* and communication with other researchers and with the public should be *open* and honest. All researchers have a *duty of care* for the humans, animals, the environment or the objects that they study. They must show *fairness* in providing references and giving credit for the work of others and must show *responsibility for future generations* in their supervision of young scientists and scholars.

2.2.3 Misconduct

Research *misconduct* is harmful for knowledge. It could mislead other researchers, it may threaten individuals or society – for instance if it becomes the basis for unsafe drugs or unwise legislation – and, by subverting the public's *trust,* it could lead to a disregard for or undesirable restrictions being imposed on research.
Research misconduct can appear in many guises:

- *Fabrication* involves making up results and recording them as if they were real;
- *Falsification* involves manipulating research processes or changing or omitting data;
- *Plagiarism* is the appropriation of other people's material without giving proper credit;
- Other forms of misconduct include *failure to meet clear ethical and legal requirements* such as misrepresentation of interests, breach of confidentiality, lack of informed consent and abuse of research subjects or materials. Misconduct also includes *improper dealing* with infringements, such as attempts to cover up misconduct and reprisals on whistleblowers;
- *Minor misdemeanours* may not lead to formal investigations, but are just as damaging given their probable frequency, and should be corrected by teachers and mentors.

The response must be proportionate to the seriousness of the misconduct: as a rule it must be demonstrated that the misconduct was committed intentionally, knowingly or recklessly. Proof must be based on the preponderance of evidence. Research misconduct should not include honest errors or differences of opinion. Misbehaviour such as

intimidation of students, misuse of funds and other behaviour that is already subject to universal legal and social penalties is unacceptable as well, but is not 'research misconduct' since it does not affect the integrity of the research record itself.

2.2.4 Good research practices

There are other failures to adhere to good practices – incorrect procedures, faulty data management, etc. – that may affect the public's trust in science. These should be taken seriously by the research community as well. Accordingly, *data practices* should preserve original data and make it accessible to colleagues. Deviations from *research procedures* include insufficient care for human subjects, animals or cultural objects; violation of protocols; failure to obtain informed consent; breach of confidentiality, etc. It is unacceptable to claim or grant undeserved authorship or deny deserved authorship. Other *publication-related* lapses could include repeated publication, salami-slicing or insufficient acknowledgement of contributors or sponsors. Reviewers and editors too should maintain their independence, declare any conflicts of interest, and be wary of personal bias and rivalry. Unjustified claims of authorship and ghost authorship are forms of falsification. An editor or reviewer who purloins ideas commits plagiarism. It is ethically unacceptable to cause pain or stress to those who take part in research, or to expose them to hazards without informed consent.

While principles of integrity, and the violation thereof, have a universal character, some rules for good practice may be subject to cultural differences, and should be part of a set of national or institutional guidelines. These cannot easily be incorporated into a universal code of conduct. National guidelines for good research practice should, however, consider the following:

1. **Data**: All primary and secondary data should be stored in secure and accessible form, documented and archived for a substantial period. It should be placed at the disposal of colleagues. The freedom of researchers to work with and talk to others should be guaranteed.
2. **Procedures**: All research should be designed and conducted in ways that avoid negligence, haste, carelessness and inattention. Researchers should try to fulfil the promises made when they applied for funding. They should minimise impact on the environment and use resources efficiently. Clients or sponsors should be made aware of the legal and ethical obligations of the researcher, and of the importance of publication. Where legitimately required, researchers should respect the confidentiality of data. Researchers should properly account for grants or funding received.
3. **Responsibility:** All research subjects – human, animal or non-living – should be handled with respect and care. The health, safety or welfare of a community or collaborators should not be compromised. Researchers should be sensitive to their research subjects. Protocols that govern research into human subjects must not be violated. Animals should be used in research only after alternative approaches have proved inadequate. The expected benefits of such research must outweigh the harm or distress inflicted on an animal.
4. **Publication**: Results should be published in an open, transparent and accurate manner, at the earliest possible time, unless intellectual property considerations justify delay. All authors, unless otherwise specified, should be fully responsible for the content of publication. Guest authorship and ghost authorship are not acceptable. The criteria for establishing the sequence of authors should be agreed by all, ideally at the start of the project. Contributions by collaborators and assistants should be acknowledged, with their permission. All authors should declare any conflict of interest. Intellectual contributions of others should be acknowledged and correctly cited. Honesty and accuracy should be maintained in communication with the public and the popular media. Financial and other support for research should be acknowledged.
5. **Editorial responsibility**: An editor or reviewer with a potential conflict of interest should withdraw from involvement with a given publication or disclose the conflict to the readership. Reviewers should provide accurate, objective, substantiated and justifiable assessments, and maintain confidentiality. Reviewers should not, without permission, make use of material in submitted manuscripts. Reviewers who consider applications for funding, or applications by individuals for appointment or promotion or other recognition, should observe the same guidelines.

The primary responsibility for handling research misconduct is in the hands of those who employ the researchers. Such institutions should have a standing or *ad hoc* committee(s) to deal with allegations of misconduct. Academies of Sciences and other such bodies should adopt a code of conduct, with rules for handling alleged cases of misconduct, and expect members to abide by it. Researchers involved in international collaboration should agree to standards of research integrity as developed in this document and, where appropriate, adopt a formal collaboration protocol either *ab initio* or by using one drafted by the OECD Global Science Forum.

2.3 Defining and Implementing Awareness and Structures for Research Integrity

2.3.1 Promoting Research Integrity

All institutions defined above have an obligation to raise awareness and share information on Good Research Practice (GRP) to promote research integrity, and it is in everybody's interests to do so. Research conducted rigorously, respectfully and responsibly is integral to excellence. So research integrity and research excellence are complementary objectives.

ACADEMIES promote quality and interest in science and scholarship. As an institution, a National Academy is independent and authoritative, and is among those able to promote and develop, possibly also to implement, measures aimed at ensuring scientific integrity in a given national science system.

UNIVERSITIES and RESEARCH PERFORMING ORGANISATIONS have a role in encouraging good research practices and preventing unacceptable behaviour, and in dealing with allegations of research misconduct against their staff. They have a special responsibility for training young researchers and students in good research citizenship.

FUNDING ORGANISATIONS have the obligation to promote good research practices and to ensure research integrity. They have the power to insist on these principles with researchers and research employers, and the policies to deal with malpractice. The fundamental principles of scientific practice and peer review safeguard the mutual trust indispensable for research.

SCIENCE JOURNALS and magazine editors have an interest in detecting plagiarism, fabrication, falsification and other fraudulent behaviour before publication. So they too must promote best practices and help detect misconduct.

The situation in countries around Europe with respect to research integrity varies widely as demonstrated in the ESF survey 'Stewards of Integrity'. For this document, a variety of institutions (funding agencies, academies, universities and faculties, journals, professional organisations, etc.) reported on their experiences and concerns.

Successful approaches

The ESF MO Forum undertook in 2010 a survey of attempts to promote GRP that found a number of successful approaches:

- Producing and disseminating articles, books, brochures on research integrity;
- Producing and promoting guidelines on good research practice and on investigations of allegations of research misconduct;
- Establishing websites and portals as resources for further study and teaching;
- Holding workshops, conferences, seminars, etc. on research integrity at the national or institutional level in order to launch debates;
- Establishing an adequate institutional framework, including ethical committees, research integrity bureaus (at the institutional and national level);
- Introducing training programmes for advanced PhD students and other staff;
- Gathering of evidence on best practice elsewhere (surveys, etc.);
- Surveys to monitor the implementation of GRP and training programmes.

Monitoring procedures

Institutions participating in the exercise also reported on a number of useful measures that can be taken to monitor compliance with the basic rules of research integrity and good research practice. These include:

- Checks on infrastructure and policies in universities and institutes (ombudsman, committee on research integrity, procedures for handling allegations, protection of whistleblowers, mentoring, ethos of research groups, etc.);
- Requiring universities and institutes to include research integrity, including numbers of allegations received and resolved, in their annual reports;
- Asking scientific journals to report yearly on misconduct or alleged misconduct;
- Analysing cases reported in general media, asking employers of accused researchers for further information;
- Occasional surveys of awareness in samples of students, scientists and scientific administrators;
- Measures of the number of hits on research integrity web pages and online resources;
- Checks of the numbers of participants who complete online training and numbers of training courses run in research integrity areas;
- Checks on the availability of mentoring programmes.

Difficulties

Even where the subject matter has been identified as being relevant, individuals and institutions report consistently on a number of difficulties in approaching the topic of research integrity. They include:

- Absence of clear definitions, especially in terms of unacceptable research practices;
- Misunderstanding of the difference and relationship between research integrity and general science ethics;
- Preconceived idea that cases of misconduct are rare and exceptional;
- Belief that the peer review process itself can identify misconduct;

- Uncertainty about the priorities between the need to deal with allegations of research misconduct and the danger of reducing academic freedom;
- Claims that a proactive attitude towards good research practice and research integrity would add up to a higher administrative burden for researchers.

At a more general level, it was reported that there is concern with a lack of resources for establishing effective national frameworks for dealing with research misconduct, and that the wide variety of different stakeholders (national and regional government, universities and research organisations, etc.), with approaches which are not always congruent and yet overlapping responsibilities, makes it difficult to achieve overall, nation-wide approaches.

2.3.2 Developing a framework for research integrity governance

Core elements of a framework for research integrity governance

Globally-recognised guidelines, such as those developed by the ESF, ALLEA and OECD's Global Science Forum, can set out strong fundamental principles. The challenge in developing a nationally relevant framework for research integrity governance is to ensure that global principles can be translated into national policy and practice. The starting point in each country will be different but there is scope to enhance all existing systems. All systems need:

- A mandate: a clear and authoritative national statement, charter or legislative support to underpin research integrity governance structures. In devising such a mandate countries can draw on the experiences of others;
- Fair and transparent processes at both local and national level and a balance between prevention and sanction, with the emphasis on prevention, in whatever processes are adopted;
- Clearly-assigned roles and responsibilities for prevention, investigation and imposition of sanctions at local and national level.

In addition, there are a number of core requirements that should apply at an operational or functional level including:

a) Core requirements for embedding principles of good research practice and research integrity into research culture include:

- Mechanisms for prevention, education and awareness at all levels. These include, but are not confined to, training in GRP from the start of a career in science or scholarship and making research integrity an integral component of supervision and mentoring;
- Robust procedures for data management, training in good practices in relation to data collection and centralised storage;
- Guidance for researchers and other stakeholders and tools for information sharing on training materials, guidelines and misconduct scenarios;
- Agreed procedures for sharing case information to establish a body of data on research misconduct locally, nationally and across Europe and to improve current procedures.

b) Core requirements for individuals and institutions where allegations of malpractice or poor research conduct have been made include:

- Procedures for investigation that are legally robust and enshrine minimum legal standards for the protection of the individual;
- Clear procedures for allegations, including agreement about who can raise a concern and how they can do this (anonymous, named), the form in which it should be raised (verbal, written) and the authority to whom concerns should be addressed;
- Agreement at the outset on the transparency and/or confidentiality of misconduct investigations and clarity about when to reveal outcomes to third parties (press, national oversight bodies, funders) and under what circumstances;
- Decisions on procedures for appeal, and the types of appeal, for example, concerning either the scientific or the procedural elements of an investigation;
- Decisions on sanctions that can be imposed, appropriate to the level of departure from codes of GRP;
- Protection for whistleblowers, in law if necessary, since the success of research integrity governance structures depends on their willingness to step forward.

Models of research integrity governance

Broad approaches to research integrity governance in Europe and elsewhere include self-regulation and reliance on peer review; governance at an institutional level; provision of oversight by research funding agencies, professional associations and learned societies; and national oversight or more formal governance structures. The situation in most European countries is complex, with more than one approach being adopted across institutions and national bodies at the same time.

The challenge for each institution, agency, society or country is to balance individual and local responsibility and structures on the one hand and national research integrity coordination or governance on the other. Such challenges are acute where there is no research integrity governance or oversight in place, or where governance happens at a strictly institutional or local level with no national coordination. Conversely, it can be observed that as a coordinated and nationwide agreed system emerges, the robustness of the governance structure increases.

Research integrity governance driven by national bodies

Oversight by research funding agencies, professional associations and learned societies is likely to be accepted by the research community as providing harmonised guidelines and independence and credibility in procedures. Such oversight can also facilitate an appeals mechanism and make it harder to hide cases. However, there are a number of difficulties. Many of these national bodies will not have the resources to monitor compliance. Institutions may resist external oversight. Such oversight may not cover both public and commercial activity. Regardless of who provides regional or national oversight, responsibility for implementation will still reside locally, with the attendant challenges and risks described above.

National research integrity governance structures

Properly constituted national research integrity governance structures can resolve many of the issues with self-regulation or oversight/regulation by research funding agencies, professional associations or learned societies. National offices can provide consistent advice, support and guidelines across both the public and private research sectors. They can also provide true independence for investigative processes and equality in access and treatment of cases, making conflicts of interest less likely. Importantly, national standing committees can develop professional competence. Moreover, their authority for dealing with GRP and investigations is clear to everyone. Such research integrity governance can also facilitate international cooperation and mutual learning. The emerging framework should make the best use of opportunities to establish links with other national offices: currently, ENRIO (European Network of Research Intergity Offices) offers such a platform.

Steps in adopting a research integrity governance structure

The good name of science and scholarship needs to be a priority for all nations and institutions, although in some instances this does not occur. The research community has to be prepared to deal with suspicions of misconduct. At an international level, organisations such as the ESF, ALLEA, the OECD and others play an important role in promoting research integrity and identifying universally acceptable guidelines on which national institutions and governments can build robust research integrity governance structures. These guidelines should also be linked to COPE and other professional editorial body guidelines to bring external pressure to bear on the academic system to initiate change. The aim is to ensure that the entire academic system, from knowledge production to publication, adheres to the same high standards, and has a clear point of reference for initiating change wherever necessary. In addition, the role of national champions who are willing and able to drive change in their own country cannot be underestimated.

The deliberations of the ESF Member Organisation Forum suggest that no “one size fits all” framework of research integrity governance can be applied across all European countries. There is national and institutional diversity in the definition of misconduct and in the preventive measures applied to ensure the integrity of a country’s national research system.

The US, Denmark, Norway, Finland, Australia, Canada and Germany are among the small number of countries with established national research integrity procedures or guidelines and national offices to oversee their application. These offices vary in size and authority, with the most developed structures found in the US and the Nordic Countries.

Each country must develop its own research integrity governance structures, suited to its size, resources and research infrastructure. Nonetheless, there are core requirements that must be incorporated in order to create a workable research integrity governance structure. Such commonality may help integrate national and local systems and spread the doctrine of ‘good science’. Shared experience is extremely important locally, nationally and internationally. Pooled national and international experience will build up a body of data on research misconduct across Europe. Networks such as the European Network of Research Integrity Offices (ENRIO) provide an important forum for sharing experience and identifying issues around research integrity governance.

In summary, there is a balance to be struck between promoting GRP on the one hand, and investigating and punishing misconduct on the other. There is no single framework that will have pan-European application but this section has attempted to identify the elements that should be present in a workable research integrity governance structure.

2.4 Need for Further Evidence on Research Integrity

Little is known about the causes and significance of practices that lead to research misconduct or about successful methods to ensure high standards of integrity in research. There is a lack of data about the incidence of research misconduct worldwide and in Europe. A variety of approaches should be encouraged.

Promotion of research on research integrity

Prevention of research misconduct is the ultimate goal. Scholarly research is the tool for understanding misconduct and improper research practices and the reasons behind them. Coupled with this is the need to encourage the publication of such studies of both policy issues and scientific behaviour. Both research and its literature will

facilitate greater attention from relevant stakeholders. To prevent research misconduct, we need to know more about research integrity. Funding bodies, politicians, academies, universities, ESF, ENRIO, journal editors and researchers themselves should all be involved in promoting studies of research integrity. Many European countries share common values, but local culture and values should also be respected when providing recommendations.

At a European level, the European Commission could include such research in the area of 'Science and Society' and ESF could also promote studies on research systems, including integrity, within its networking programmes. Continuing support of the World Conference on Research Integrity is especially important.

2.5 Next Steps: recommendations for the future

- Promoting **European standards – ESF international guidelines**. These should cover not just fabrication, falsification and plagiarism but also GRP and the more difficult areas of conflict of interest, misrepresentation, duty of care and informed consent. The Code and Guidelines are a fundamental part of such an approach and should be endorsed by both ESF and its Member Organisations.
- Leaders of **ESF projects** should agree to comply with **ESF guidelines.** This would be a constituent part of the funding agreement. This will help to introduce the European standard especially to countries that do not yet have their own national guidelines. **ESF recommendations** should also be adopted by its **Member Organisations,** and discussions with the European Commission should aim at seeing them adopted equally for its research activities including the FP, the ERC and the EIT.
- Consideration should be given to **ESF** to act as a **European clearing house** to provide information about available resources. It should provide a **European database** (web pages, online training, case-study material, etc.) relating to components of research integrity such as publication and authorship practices, mentoring, data management, etc. A common approach could be adapted to national circumstances.
- Repeat a **quinquennial survey** and analysis for revised editions of 'Stewards of Integrity'. Many aspects of research integrity improvement need to be compared (see section above). ESF, which represents academies, funding and performing institutions of research in a large number of countries, is a natural place for future discussion.
- The possibility of **limited funding** for collaborative work on research integrity and the encouragement of Member Organisations to introduce grants on the subject of research integrity might also be considered.
- The **coordination** of **national procedures** in Europe for preventing misconduct and coping with fraudulent publications is an issue which will require further consideration.

Continuing support for the World Conference on Research Integrity

The first World Conference on Research Integrity was very successful in raising awareness about this issue. ESF should support the continuation of the World Conferences on Research Integrity. They are important fora for exchange of good practice and experiences and help carry the message beyond the circle of the institutions and individuals already involved with such work. An important part of future conferences should be presentations on new research on integrity and misconduct.

3. The European Code of Conduct for Research Integrity

3.1 Preface

The present proposal for a Code of Conduct has resulted from a series of discussions within the European Science Foundation (ESF) member forum Working Group 2; the standing committee on science and ethics of All European Academies (ALLEA); and a meeting of representatives of ALLEA's member Academies (Berne, 29-30 June 2009). The discussions were based on various drafts of a discussion paper[2], distributed both within the WG2 and ALLEA.

ALLEA has taken up the gauntlet formulated in the ESF briefing on *Good scientific practice in research and scholarship*[3], in which the following was suggested (art. 60): "National academies are well placed to provide leadership in the pursuit of scientific integrity and good practice. They are often the most appropriate independent body to establish and support a national committee for scientific ethics and to nominate independent experts on panels to investigating cases of alleged misconduct. Those academies that employ scientists have an added responsibility of formulating and managing their own guidelines and codes of practice".

Analysis has been made of a large number of existing national and international codes, ethical guidelines and regulations with respect to scientific integrity, as produced by academies, research foundations and other organisations around the world concerned with the scientific and ethical quality of research. In particular the US ORI publication *Introduction to the responsible conduct of research*[4], the OECD-report on *Best practices for ensuring scientific integrity and preventing misconduct*[5], and the text of an advice of the Coordinating committee for facilitating international misconduct investigations to the Global Science Forum of the OECD (submitted to the 20th meeting of the GSF, Feb. 2009) have lent support to the propositions developed in this paper. Moreover, the thoughts expressed in this paper are consistent with both ALLEA's *Memorandum on Scientific Integrity*[6], and the European Commission's *Ethics for Researchers*[7].

In many academies, universities and funding organisations some Code or Guidelines for research integrity and good research practices are already in effect. It is not the intention to replace these with the Code presented here. We expect these Codes or Guidelines to be rather in line with the latter. In some cases some additions or improvements on the basis of the present proposal may be considered. However, in countries where such a Code does not yet exist or is still being developed, this new Code may have a stimulating effect. This document represents an agreement on a set of principles and priorities at a given point in time: changing national or institutional frameworks or scientific and technological developments may make some regular adjustments necessary.

Naturally the confinement to a European agreement on a Code of Conduct does not imply that these principles and guidelines are to remain restricted to the European scientific community. Hopefully they will be a step towards a globally accepted code to be conceived by world science organisations such as IAP (the International Academy Panel), or the International Council for Science (ICSU)[8]. The objective is to stimulate the emergence of institutional settings that strengthen scientific integrity, and to set standards across Europe that can, eventually, be held valid and implemented world wide.

In the following we will propose a Code of Conduct, preceded by a short preamble, and followed by an extensive elucidation; a suggested list of guidelines for good research practice; and suggestions for handling allegations of misconduct and for dealing with the issue of research integrity in international collaborative research.

3.2 The Code of Conduct

3.2.1 Preamble

This Code of Conduct is not a body of law, but rather a canon for self regulation. It is a basic responsibility of the scientific community to formulate the principles and virtues of scientific and scholarly research, to define its criteria for proper research behaviour, and to set its own house in order in case scientific integrity is threatened.

Science as the process of knowledge augmentation is embedded in a wider socio-ethical context, and scientists must be aware of their specific responsibility towards society and the welfare of mankind. They bear responsibility for the choice of subjects to be investigated and its consequences, for proper care and treatment concerning the objects of research, and attention and concern with respect to practical applications and use of their research results. In this Code, however, we confine ourselves to standards of integrity while *conducting* research, and do not consider this wider socio-ethical responsibility.

2. P.J.D. Drenth (2009), *Science and Integrity,* discussion paper, Amsterdam: ALLEA, and P.J.D. Drenth (2009), *Scientific Integrity: Code of Conduct,* discussion paper Amsterdam: ALLEA.
3. European Science Foundation (2000), *Good scientific practice in research and scholarship. ESF Science Policy Briefing*, Dec. 2000.
4. N.H. Steneck (2004, rev. ed.), *Introduction to the responsible conduct of research.* Washington: US Office of Research Integrity.
5. OECD (2008), *Best practices for ensuring scientific integrity and preventing misconduct*, www.oecd.org/sti/gsf.
6. ALLEA (2003), *Memorandum on Scientific Integrity.* Amsterdam: ALLEA.
7. European Commission (2007), *Ethics for Researchers.* Brussels: EC.
8. A first step towards such globalisation may be the planned discussion of this proposal at the second World Conference on Research Integrity in Singapore, July 21-23, 2010.

3.2.2 Code of Conduct

Science, including natural and social sciences as well as humanities, is the systematised knowledge obtained through observation and experimentation, study and thinking. Scientific research is carried out to determine the nature and principles of what is being studied. In spite of their differences in content and methods all sciences have a common characteristic: they depend on arguments and evidence, i.e. observations of nature or of humans and their actions and products.

Researchers, research institutes, universities, academies and funding organisations commit themselves to observe and to promote the *principles* of scientific integrity. These include: honesty in reporting and communicating, reliability in performing research, objectivity, impartiality and independence, openness and accessibility, duty of care, fairness in providing references and giving credits, and responsibility for future science generations. Research institutes, funding organisations, academies and other actors in the field of scientific research have to adhere to appropriate standards for data management and preservation of records and data and to high ethical standards in dealing with research participants.

Research employers (universities, institutes and other research performing organisations) also have a responsibility to ensure that a *culture of research integrity* prevails. This includes clear policies and procedures, training and mentoring of researchers at all stages of their careers, and robust management procedures to ensure that high standards are observed and any transgression is identified at an early stage.

Fabrication and falsification, including misrepresentation and deliberately omitting unwelcome facts or data, are among the most serious *violations* of the ethos of science. Also plagiarism is an unacceptable form of misbehaviour, and a violation against other researchers.

Institutes or organisations that fail *to deal* properly with such wrongdoing are also guilty of dereliction of duty. All allegations should be properly assessed, and credible allegations should be investigated fully, with corrective actions taken if allegations are confirmed.

Minor misdemeanours, reflecting only poor performance by researchers as opposed to serious misconduct – some adjustment or selecting of data or 'adaptation' of a figure – may not give cause to a formal charge. Minor misdemeanours by students or junior researchers should however always be reprimanded and corrected by teachers or mentors. Minor misdemeanours by more experienced researchers that leads to misrepresentation may be treated more seriously, and if repeated should be considered as misconduct.

In addition to the violation of the fundamental principles of responsible science many other forms of poor and inappropriate *practices* in science research deserve attention. These include poor data practices and inadequate data management, inappropriate research procedures, including questionable procedures for obtaining informed consent, insufficient respect and care for participants in the research, improper research design and carelessness in observation and analysis, unsuitable authorship or publishing practices, and reviewing and editorial derelictions. Some of these are very serious and discreditable, e.g. abuse of ethical requirements and of trust in relation to the public, research subjects or other participants in the research. However, unlike the fundamental principles of scientific integrity and the violation thereof, which have a *universal* character, such practices may be subject to different national traditions, legislative regulations or institutional provisions. A required system of regulations of good practice in research should, therefore, (except for gross violations of ethical principles or the law) not be part of a universal *Code of Conduct*, but should be developed in the form of national *Good Practice Rules*, that would recognise the legitimate differences between national or institutional systems. The enclosed list of recommendations should be used as a guideline for the formulation of such national Good Practice Rules.

Investigations of research misconduct allegations should be consistent with national laws of the country in which the investigations are conducted. What is required is a due and fair process, that is uniform and sufficiently rapid, and leads to proper outcomes and sanctions. The investigations must be carried out in accordance with the highest standards of process integrity, uniformity within one domain of jurisdiction, and fairness to all parties. Confidentiality should be observed as much as possible, unnecessary detriment to reputations should be avoided, and a proportionate action should be taken against persons found to have committed research misconduct. Wherever possible precaution should be taken to ensure that investigations are carried through to a conclusion. They should not cease, leaving questions unresolved, merely because the defaulter has left the institution.

In *international collaboration* partners should agree to conduct their research according to the same standards of research integrity, and to bring any suspected deviation from these standards, in particular alleged research misconduct, to the immediate attention of the project leader(s) (and of the senior responsible officer in the university or institute (employer), in order for it to be investigated according to the policies and procedures of the partner with the primary responsibility, while respecting the laws and sovereignty of the

States of all participating parties. In large scale, funded international projects the promotion of good practice and the handling of possible cases of misconduct, as recommended by the coordinating committee of the OECD Global Science Forum, should be followed. The boiler plate text, recommended by this committee, should be embodied in the formal documents that establish the collaborative project.

3.3 Background and Elucidation

In this section a more extensive elucidation of the somewhat condensed Code of Conduct, presented above, is given. The nature of science and scholarship, the values to be fostered in scientific and scholarly research, the various discreditable forms of misconduct will be discussed, and procedures for dealing with allegations of misconduct and rules for good research practice will be recommended.

3.3.1 Nature of science and scholarship

In a broad sense *science* (in Latin scientia is knowledge) is the systematised knowledge obtained through observation and experimentation, study and thinking. It is rooted in human curiosity, the wish to understand the physical, biological and social worlds as well as the human mind and its products. Science aims at deepening our understanding and extending our knowledge beyond what is already known. The term 'science' is normally applied only to the natural and social sciences; in this document it will be applied in a broader sense, like the German word 'Wissenschaft', which applies also to the humanities. Of course, there are differences between the various disciplines, sometimes even indicated as 'cultural' [9], but in this discussion emphasis will be laid on the communalities rather than the disparities between the disciplines.

Scientific *research* is carried out in order to determine the nature and principles of what is being studied. Such research is diverse and multifaceted and cannot be captured in a single factual and normative description. However, although they may differ in methods and traditions, all sciences have a fundamental characteristic in common: they depend on argument and evidence, i.e. observations of nature, or of humans and their actions and products.

Science is not an enterprise carried out in isolation. Research cannot be done without drawing upon the work of other scientists and scholars; and in most cases it requires collaborating with others (cf. Merton's[10] communalism). And this collaboration assumes ever more an international character. It is also the scientific community that determines appropriate methods of research and the validation of findings. The contribution of scientific research to the extension of human knowledge can, therefore, only take place if its results are presented to others in such a way that they can judge their validity (Merton's organised scepticism).

There is another connection with the outside world. Not only do social and political forces affect the directions of research, science itself also affects greatly societal developments. The impact of science, now extending to nearly all fields of knowledge and its applications, has contributed immensely to society, even though its results can be and have been misused at times. It is the responsibility of scientists and researchers to do what they can to ensure that research is for the universal well being of mankind and the good of society.

Coercion of powerful persons or institutions, religious or political pressure, economic or financial interests can corrupt science. Science should, therefore, be as 'disinterested' and independent as possible and always impartial, and should have the freedom to adhere to its own laws and criteria. At the same time we have to acknowledge that scientists operate in a value-bound context. Their paradigmatic presumptions, their choice of subjects to be studied, the way they collect their data, the impact of their discoveries on the society all refer to the ethical and social context in which science proceeds.

3.3.2 Science and ethics

The ethical/social values and conditions referred to in the previous section accentuate again the ethical and social responsibility of the scientist. A distinction should be made between two categories of issues: problems related to science and society, emphasising the socio-ethical *context* of research, and problems related to scientific integrity, emphasising standards when *conducting* research. There is, of course, no perfect watershed between the two categories. Some forms of misconduct may have serious consequences for the health or wellbeing of citizens, and can, therefore, be seen as unethical in the broader sense of the word, but in the light of a discussion on a Code of Conduct the distinction may be clarifying.

Any ethical questions arise when science is regarded in a wider ethical/social context. Is the subject worthy of investigation? What are the consequences of such research? Could the research result in harm for people, nature or society, or be in conflict with basic human values? Is the

9. C.P. Snow (1959), *The Rede lecture.* Cambridge: Cambridge University Press.
W. Leppenies (1985), *Die drei Kulturen; Sociologie zwischen Literatur und Wissenschaft.* München: Hanser.

10. R.K. Merton (1973), *The sociology of science: theoretical and empirical investigations.* Chicago: Cambridge University Press. The other three Mertonian norms of science are universalism, desinterestedness and organised scepticism.

research sufficiently independent of interested parties? Could a university or laboratory become too dependent on sponsored contract research? Could the researcher guard against the improper or selective use and misinterpretation of their findings, or against objectionable applications of their discoveries?

This document will not deal with this wider ethical *context* of science, but focus on the second category, the responsible *conduct* of research[11].

3.3.3 Integrity in science and scholarship: principles

Both the definition of scientific misconduct and the specification for proper scientific practice are based upon principles of scientific integrity. These are principles that all scientific and scholarly researchers and practitioners should observe individually, among each other and toward the outside world. These principles include the following:

- *Honesty* in presenting research goals and intentions, in precise and nuanced reporting on research methods and procedures, and in conveying valid interpretations and justifiable claims with respect to possible applications of research results.
- *Reliability* in performing research (meticulous, careful and attentive to detail), and in communication of the results (fair and full and unbiased reporting).
- *Objectivity:* interpretations and conclusions must be founded on facts and data capable of proof and secondary review; there should be transparency in the collection, analysis and interpretation of data, and verifiability of the scientific reasoning.
- *Impartiality* and *independence* from commissioning or interested parties, from ideological or political pressure groups, and from economic or financial interests.
- *Open communication,* in discussing the work with other scientists, in contributing to public knowledge through publication of the findings, in honest communication to the general public. This openness presupposes a proper storage and availability of data, and accessibility for interested colleagues.
- *Duty of care* for participants in and the subjects of research, be they human beings, animals, the environment or cultural objects. Research on human subjects and animals should always rest on the principles of respect and duty of care.
- *Fairness,* in providing proper references and giving due credits to the work of others, in treating colleagues with integrity and honesty,
- *Responsibility for future science generations.* The education of young scientists and scholars requires binding standards for mentorship and supervision.

3.3.4 Integrity in science and scholarship: misconduct

Violating these basic norms leads to research misconduct, which is the crux of inappropriate behaviour in science. Research misconduct is damaging to *science*, because it may create false leads for other scientists or the results may not be replicable, resulting in a continuation of the deception. It is also harmful to *individuals* and *society*: fraudulent research may result in the release and use of unsafe drugs, in the production of deficient products, inadequate instruments or erroneous procedures. Furthermore, if policy or legislation is based on the results of fraudulent research, harmful consequences are not inconceivable. But damage is also done through the subversion of the public's *trust in science*. The credibility of science would decline and trust in science as a dependable source of information and advice in respect of numerous decisions, so important for the welfare of mankind and society (environment, health, security, energy), would be subverted. This could lead to undesirable restrictions on permissible research, which could further damage the pursuit of knowledge.

There is some empirical evidence[12] that there is an increasing incidence of research misconduct. Pressure to publish, commercialisation, greater competition for funds, more opportunities for instance through the internet, evaluation practices, and the current career system for scientists, may all contriute to this unfortunate development.

The two most serious violations of the ethos of science are fabrication and falsification. *Fabrication* is making up results and recording or reporting them. *Falsification* is manipulating research processes or changing or omitting data. Fabrication and falsification can also arise in the reporting of other researcher's results, in the reporting of expert opinion and in the public dissemination of science. A third category of misdemeanour is plagiarism in proposing, performing, or reviewing research, or in reporting research results. *Plagiarism* is the appropriation of another person's ideas, research results or words without giving appropriate credit. The precise wording of an idea or explanation or illustrative material (such as original figures and photographs, as well as lengthy tables) in textbooks or popular material are protected by copyright laws, but nevertheless can be subject to plagiarism. Plagiarism is of a different

11. As was requested at the establishment of the ESF Member Organisation Forum on Research Integrity (Madrid, 2008), and reiterated at the first meeting of the Chairs of the four working groups (Amsterdam, 2009).

12. Reported by N. Steneck at the ESF-ORI first World Conference on Research Integrity, *Fostering Responsible Research.* Lisbon, Portugal, 16-19 Sept., 2007. The same increase of misconduct was generally observed by European Academy Presidents in a survey conducted in 2007, and reported by P.J.D. Drenth (*Strengths and weaknesses of current policies and practices)* at the same Lisbon conference.

order since it is supposed to be more injurious to fellow scientists than to science as such. However, we have seen that openness is one of the basic integrity principles, and that progress in science depends on communication and discussion among fellow scientists and on a well functioning peer-review system. And if scientists would hesitate or even refuse to practice this openness and communication for fear of not being recognised as devisor or author the quality of science would suffer as well.

Also *improper dealing* with such infringement of principles of integrity (attempts to cover up, reprisals to whistle-blowers and violations of due process) can be classified as misconduct. In general it should be underlined that research institutes, funders, academies, universities and other actors conducting and administering research have the duty to promote good research management so that research integrity is instilled into the culture.

It is generally accepted that the primary responsibility for handling cases of misconduct is in the hands of the employers of scientists doing research. Frequently this concerns the institute or university where the accused researcher works. These institutions should have a standing committee that deals with misconduct, or establish an *ad hoc* committee in case a serious allegation is brought forward.

Furthermore, there is a general consensus on the need for a due and fair process, that is uniform and sufficiently rapid, and leads to proper outcomes and sanctions. A coordinating committee for facilitating international research misconduct investigations of the OECD[13] has formulated a number of overarching principles for investigating research misconduct in international collaborative projects, that can be adopted for general application. Annex I contains recommended principles that follow the main lines of the OECD recommendations.

Responses will depend on the seriousness of the research misconduct. In this respect the level of intent of the misconduct, the consequences of the behaviour, and other aggravating and mitigating factors should be considered. It has to be shown that the misconduct was committed intentionally, knowingly, or recklessly. As standard proof for the culpability of a suspected researcher 'preponderance of evidence' should be applied. It should be stipulated that research misconduct does not include honest errors or differences in opinion.

It should be recognised that the demarcation line between unacceptable and still acceptable behaviour is not always clear and beyond academic debate. Where does one draw the line between verification on a too small sample and the illustration of an argument with 'case' data? Where is the boundary between plagiarism and careless citation? Was an incorrect, but 'favourable' statistical technique truly chosen deliberately? Was a biased selection of data meant to start a scientific discussion or intended to present a full review of the evidence?

In the literature another class of misconduct is discussed, the 'questionable research practices' (QRP). Three groups of misbehaviour fall within QRP: Firstly: personal misconduct: intimidation of students, harassment, discrimination, insensitivity to social or cultural norms in doing research, misuse of funds, etc. Although we deal with undesirable and, at times, unacceptable conduct here it is not 'scientific misconduct', since it does not affect the integrity of the research record. Much of this misbehaviour is subject to generally applicable legal and social penalties that apply to everyone.

Secondly: a varied group of bad research practices, such as bad data management, incorrect research procedures, or some publication related misconduct. Bad practices are not acceptable and often harmful to the public's trust in science. They need correction indeed, but are not necessarily basic infringements of scientific integrity. The next section will deal with this category.

In the third place minor misdemeanours that may not lead to formal allegations and investigations, but are just as damaging given their probable frequency: some 'adjustment' of data, cutting a corner, omitting an unwelcome observation… It should be clear that here we deal with unacceptable violations of the principles of scientific integrity: it is falsification *in statu nascendi*. If it occurs with students or junior scientists, it should be corrected through proper supervision and mentorship. With more experienced researchers, especially if seen to be repeated, it should be treated more seriously.

It should be emphasised that the principles discussed in the previous section and the infringements defined in this section refer to *fundamental* and *universal* norms for responsible conduct in research. There is no need for cultural or regional adaptations or compromises in a Code of Conduct that encompasses these principles and infringements.

3.3.5 Good practices

In addition to fabrication, falsification and plagiarism many other forms of objectionable practices in scientific research deserve attention. Some of them have serious moral or legal consequences, others may create nuisance, discontent or procedural dissension. Many of them may undermine public trust in science same as basic infringements of scientific integrity, and should therefore be taken seriously by the scientific community. The following categories may be distinguished:

1. *Data practices*, including data management and storage, placing data at the disposal of colleagues who want to replicate the findings, adequate preservation of original data.
2. R*esearch procedures*. Deviations from desired prac-

13. Referred to in the preface of this document.

tices include insufficient care for research subjects[14], insufficient respect to human subjects, animals, the environment, or cultural heritage; violation of protocols; failure to obtain informed consent; insufficient privacy protection; improper use of laboratory animals; or breach of trust (e.g. confidentiality). Improper research design, carelessness in experimentation and calculations that lead to gross errors, may also be classified under this heading, although the partition-wall between incompetence and dishonesty may be rather thin here.

3. *Publication-related* conduct, including authorship practices. It is unacceptable to claim or grant undeserved authorship and to deny deserved authorship, or to inadequately allocate credit. Breaching of publishing rules, such as repeated publication, salami-slicing of publication, no or a too long delay in publication, or insufficient acknowledgement of contributors or sponsors, fall within this category as well.
4. *Reviewing* and *editorial* issues, including independence and conflict of interests, personal bias and rivalry, appropriation of ideas.[15]

Again, the dividing line between acceptable and not acceptable practices is somewhat vague, and may vary over nations, regions or disciplines. But there is also a thin borderline between some violations of these practices and the serious types of misconduct, as discussed in section 3.3.4. Unjustified claimed authorship and ghost authorship are forms of falsification, purloining ideas as an editor or reviewer is plagiarism, causing pain or stress to research participants or to expose them to hazards without informed consent is certainly ethically unacceptable behaviour. But in general these 'good practices' refer to practical rules and arrangements in conducting, administering and reporting research.

Unlike the fundamental principles of scientific integrity and the violating of these principles through fabrication, falsification or plagiarism, which have a universal character, good practices as outlined above may be subject to cultural differences: definitions, traditions, legislative regulations and institutional provisions may vary over nations or regions, sometimes also over disciplines. A required system of regulations of good practices in research should, therefore, not be part of a universal Code of Conduct. It should rather be developed in the form of national or institutional *Good Practice Rules*, recognising the legitimate differences between national, disciplinary or institutional systems. Nevertheless a list of issues to be addressed in such Rules (see sub 3.4 below) should be provided, including recommendations on how to deal with them. In general such recommendations are based on general assent, but, as said, rules of procedure must allow for national differences and cannot claim catholicity.

14. The treatment of human subjects in research is in many countries regulated by law.
15. A number of suggestions with respect to headings 3 and 4 in the Rules of Procedure are extracted from the excellent publication of the Committee on Publication Ethics (COPE) *Guidelines on good publication practice.* We are also grateful for the Committee's comments on an earlier version of this proposal.

3.4 Guidelines for Good Practice Rules

In these guidelines the following categories of good practices in scientific and scholarly research are distinguished: proper data practices, proper (technical as well as responsible) research procedures, well-considered publication-related conduct and responsible reviewing and editorial procedures.

Each country should adopt, amend or supplement these recommendations in accordance with its legislative requirements or traditions and compose an own set of Good Practice Rules. Then the scientific society will require all its members to adhere to these Rules, and will also ask its institutes and scientific organisations to require their own members to comply.

1. Good data practices: availability and access

- All primary and secondary data should be stored in a secure and accessible form.
- Original scientific or scholarly research data should be documented and archived for a substantial period (at least 5 years, and preferably 10 years).
- Research data should be placed at the disposal of colleagues who want to replicate the study or elaborate on its findings.
- Freedom of movement of scientists, the right to peaceably and voluntarily associate with other scientists, and the freedom of expression and communication should be guaranteed.

2. Proper research procedures

- All research should be designed and carried out in a careful and well considered manner; negligence, haste, carelessness, and inattention should be avoided, so as to prevent human errors.
- Researchers should try to deliver what has been promised in the application for support or funding.
- Researchers must seek to minify any harmful impact on the environment, and should be aware of the need for sustainable management of resources; this implies an efficient deployment of the (financial and other) resources, and minimisation of waste.
- Clients and/or sponsors should be alerted to the ethical and legal obligations of the researcher, and to the possible restrictions this may imply.
- Clients and/or sponsors should be made aware of the vital importance of publication of the research findings.
- Confidentiality of data or findings should be respected by the researcher when it is legitimately required by the client or employer.

- Proper account will be given to the sponsor in case a grant or co-funding was received for the research.

3. Responsible research procedures

- All research subjects, be they human, animal, cultural, biological, environmental or physical, should be handled with respect and care.
- The health, safety or welfare of the community, or of collaborators and others connected with the research, should not be compromised.
- Sensitivity to age, gender, culture, religion, ethnic origin and social class of research subjects should be evinced.
- Human subject protocols should not be violated: this implies complying with the requirement of informed consent on the basis of adequate and appropriate information, and to voluntary agreement to participate, treating personal information with highest possible confidentiality, avoiding unnecessary deception, and using the obtained information only for the purpose of the investigation.
- The use of animals in research is acceptable only if alternative ways to achieve the results have been investigated and have been found inadequate; any harm or distress to be inflicted on an animal must be outweighed by the realistic expected benefits and must be minimised as much as possible.

4. Publication-related conduct

- Researchers should publish the results and interpretations of their research in an open, honest, transparent and accurate manner.
- Researchers should strive to ensure the earliest possible publication of the results of their research, unless commercial or intellectual property considerations (e.g. patent application) justify delay.
- Authorship should only be based on a creative and significant contribution to the research (i.e. contribution to the design, data collection, data analysis, or reporting, not for general supervision of a research group or editing of text). Guest authorship (i.e. listing authors who do not qualify) or ghost authorship (i.e. omitting individuals who meet authorship criteria) are not acceptable. All authors are fully responsible for the content of the publication, unless it is specified they are responsible only for a specific part of the study and publication.
- Sequence of authors should be agreed by all authors, ideally at the start of the project or the initiation of the article/monograph, and may follow national and/or disciplinary codes. The criteria for deciding the order of authors should be agreed at the start of the project or writing.
- The work and contribution of collaborators and assistants should be acknowledged if appropriate, with their permission.
- All authors should declare any relevant conflict of interest, which may be financial, commercial, personal, academic, or political.
- Important work and intellectual contributions of others that have influenced the reported research should be appropriately acknowledged. Related work should be correctly cited. References should be restricted to (paper or electronically) printed publications and publications 'in print'.
- In communication with the general public and in popular media the same standards of honesty and accuracy should be maintained; any attempt to exaggerate the importance and practical applicability of the findings should be resisted.
- Publication of the same (or substantial parts of the same) work in different journals is acceptable only with the consent of the editors of the journals and where proper reference is made to the first publication. In the author's CV such related articles must be mentioned as one item.
- Financial or other types of support for the research and its publication should be properly mentioned and acknowledged.

5. Reviewing and editorial issues

- An editor or reviewer who has a relevant potential conflict of interest – which may be personal, academic, political, commercial or financial – should, ideally, withdraw from involvement in any publication decision. If the conflict is considered minor or unavoidable it should be disclosed to the readership.
- Reviewers should provide thorough, accurate, objective, and justifiable assessments in a timely manner.
- In the review of a manuscript, confidentiality must be maintained.
- Reviewers and editors shall not make any use of the data or interpretations presented in submitted manuscripts without the author's permission.
- The same standards and rules apply in the review process with regard to projects or programmes submitted for funding, rewards or reconnaissance purposes.
- The same standards and rules apply in the review process of individuals or institutions for appointments, promotion, awards or other forms of recognition.

3.5 International Collaborative Research

International scientific collaboration is increasing sharply, not only because of the growth of international funding and the stimulation of modern communication technology, but also because science itself has developed into a truly collaborative and international activity. Common agreement on standards of scientific integrity, and on rules and procedures to deal with cases of misconduct, is of crucial

importance in international research as well. This is the main argument for an internationally accepted Code of Conduct.

In international collaboration partners should agree to conduct their research according to the standards of research integrity as developed in this document, and to bring any suspected deviation from these standards, in particular alleged research misconduct, to the immediate attention of the project leader(s) and senior responsible officer in the university or research institute (employer). Such a case should be investigated according to the policies and procedures of the partner with the primary responsibility for the project, while respecting the laws and sovereignty of the States of all participating parties.

In formal, large scale, and often externally funded international research projects there may be questions as to which country should conduct the investigation if allegations of misconduct are raised, and how; and, even more importantly, what is to happen when the relevant national policies are at odds with each other. The Coordinating Committee of the OECD Global Science Forum, referred to sub 3.3.5, recommends the establishment of an agreement for collaborative research that addresses the promotion of responsible conduct in research and describes the procedures for the investigation of allegations of research misconduct within the project. The Committee has produced a boilerplate text for International Agreements, which should be embodied in the formal documents that establish the collaborative project. This boilerplate text is included under Annex II.

Annex I:

Recommended Principles for Investigating Research Misconduct

Integrity of the process

- Investigations into research misconduct allegations must be fair, comprehensive and conducted expediently but without compromising accuracy, objectivity, and thoroughness.
- Those parties involved in the procedure must ensure that any interests they have which might constitute a conflict of interest are disclosed and managed.
- Detailed and confidential records will be maintained on all aspects of the procedure.

Uniformity

- Procedures for dealing with misconduct should be spelled out in sufficient detail so that the transparency of the process and uniformity within one domain of jurisdiction from one case to another is ensured.

Fairness

- Investigation of research misconduct allegations should be conducted in a manner that is fair to all parties and in accordance with relevant laws.
- Persons accused of research misconduct must be given full details of the allegation(s) in writing and allowed a fair process for responding to allegations, asking questions, presenting evidence, calling witnesses, and providing responses to information presented.
- Allow witnesses to be accompanied by or seek advice and assistance from anyone of their choosing.
- Proportionate action should be taken against persons found to have committed research misconduct.
- Any action(s) taken should be subject to appeal. Of course, there should be an authority issuing the final decision.

Confidentiality

- The procedure should be conducted as confidentially as possible, in order to protect those involved in the investigation. Such confidentiality should be maintained provided this does not compromise the investigation of the allegation, health and safety, or the safety of participants in research.
- Where possible any disclosure to third parties should be made on a confidential basis.
- If the organisation and/or its staff have legal obligations to inform third parties of research misconduct allegations, those obligations must be fulfilled at the appropriate time through the correct mechanisms.

No detriment

- Anyone accused of research misconduct is presumed innocent.
- No person should suffer any unnecessary penalty when accused of research misconduct before the allegation is proven.
- No person should suffer any penalty for making an allegation of research misconduct *in good faith*, but action should be taken against persons found to have made allegations in bad faith.

Annex II:

Boilerplate text for International Agreements, as suggested by the OECD Global Science Forum Coordinating Committee for facilitating international misconduct investigations

We, the parties, agree:

- to conduct our research according to the standards of research integrity, as defined in the "Guidance Notes for Developing Procedures to Investigate Research Misconduct Allegations in International Collaborative Research Project" (*www.oecd.org/sti/gsf*) and other

appropriate documents, including: (*specify the national codes of conduct and disciplinary or national ethical guidelines that apply*);

- that any suspected deviation from these standards, in particular alleged research misconduct, will be brought to the immediate attention of (*all designated contact point(s)*) and investigated according to the policies and procedures of (*to be filled in with the body with primary responsibility*), while respecting the laws and sovereignty of the States of all participating parties;
- to cooperate in and support any such investigations; and
- to accept (subject to any appeal process) the conclusions of any such investigation and to take appropriate actions.

4. Implementing Research Integrity: Elements of a framework for research integrity governance

4.1 Scope of a Research Integrity Governance Framework

Many European countries currently either have no, or poorly developed, national guidelines or structures to promote research integrity and respond to misconduct. In addition, a number of countries are currently modifying or reviewing existing structures. As part of the ESF Member Organisation Forum on Research Integrity (MO Forum), Working Group 3 (WG3) undertook to:

Identify a framework and develop guidelines for establishing national and/or institutional structures to implement good research practice guidelines and to deal with allegations of research misconduct.

The Forum members agreed on the tenet that both scientific and scholarly research should be governed by the principles of research integrity, and that early preventive and inductive measures to ensure an awareness among scientists and scholars of good research practice (and hence of research integrity) should be advocated as part of curricula.

The extent of misconduct that is within the scope of any governance framework seeking to enforce research integrity should encompass the core issues of research misconduct as identified under the European Code of Conduct on Research Integrity, namely the so-called FFP (Fabrication, Falsification, Plagiarism), but also other forms of serious scientific misconduct. Chapter 3 discusses such improper dealings in more detail.

In order to promote the establishment of mutually compatible institutional structures for dealing with research integrity, we present below core elements, model structures and proposals for moving towards building such structures. The Working Group comprised members from different kinds of science organisations and aimed to propose a framework applicable to diverse institutional and legal contexts. It goes without saying that all proposals and recommendations below are to be validated against and will have to be subject to existing applicable legal and other statutory rules.

4.2 Core Elements of a Framework for Research Integrity Governance

International codes of conduct and guidelines, such as those developed by the ESF and ALLEA, the OECD's Global Science Forum and the recent Singapore statement set out strong fundamental principles of research integrity that are widely recognised and must become foundations for any framework aimed at ensuring research integrity (RI).

Consequently, an ideal research integrity governance structure should:

- Protect the core principle of 'mutual trust', necessary for knowledge sharing and research collaboration;
- Provide common standards for all actors in the scientific endeavour;
- Protect individuals and institutions;
- Strengthen public confidence in the research process and its outputs.

The position in society at which we consider RI to be most relevant will influence how the governance framework for managing expectations and failures to meet these expectations is set up. Should RI be seen as an internal part of the governance of science, or as reflecting and responding to concerns in society at large? Should it be addressed through self-binding moral commitment or through legislation?

Research, by its very nature, is founded on honesty and competition, on data that is real, yet selective, and on an open critique of conceptual and methodological frameworks among peers but increasingly also other societal actors. RI has long been considered to be a part of science governance as opposed to requiring statutory legislation, since codes of conduct and recommendations for good research practice (GRP) are dependent on understanding and upholding core research values, as laid out in greater detail in Chapter 3. On the other hand, there are situations where serious deviations from GRP constitute a statutory offence, and where the case at hand is subject to the laws of the land.

The challenge in developing a framework for research integrity governance is that it must be both compatible with diverse legal national contexts, translating globally accepted principles into national policy and practice, and correspond to the fundamental ethical guidelines that scientists and scholars set for themselves. In what follows, the focus will be on the challenges presented by the task of reconciling fundamental (and global) principles with nationally applicable legal and institutional contexts. The guiding thought is to enable flexibility and compatibility of structures in different settings without making compromises with regard to the principles to be upheld.

The starting point will be different in each European country; furthermore, promoting the integrity of science systems may face many fundamentally different challenges in developing countries, and in countries in transition or emerging economies[16]. Yet, given the increasingly close research collaboration between all these different classes of science systems, there is scope and need to enhance all existing systems: the first step implies identifying and adopting the core elements already present (and expressed in the European Code of Conduct), and which nations and institutions should set as benchmarks for aspirations to improve their current research integrity governance structures.

16. ESF/ORI Science Policy Briefing 30 (2007). *Research Integrity: global responsibility to foster common standards.*

A governance framework aimed at ensuring oversight of research integrity must include a number of core elements identified by the Working Group, regardless of the level at which it operates, to ensure that it will work. These include:

(i) Agreement of core definitions

There is a need at the outset to reach an agreement on what lies within the scope of the concept of 'research integrity' and 'scientific misconduct'. Such an agreement will be essential in the development and implementation of harmonised and compatible research integrity governance structures across Europe and beyond. However, the challenge of achieving such an agreement cannot be underestimated. The European Code of Conduct presented in Chapter 3 and the result of the work of ALLEA and WG2 proposes definitions that it is hoped can be adopted across Europe and beyond. It was presented to universal acclaim at the second World Conference on Research Integrity in Singapore in July 2010.

Definitions of good research practices need to take into account the heterogeneous nature of Europe and the many scientific disciplines that need to be reflected. This means that national and field-specific interpretations of what constitutes bad practice, and how serious that bad practice is deemed to be, may vary from country to country, organisation to organisation and even from discipline to discipline. Broadly speaking, the European Code of Conduct (Chapter 3) addresses the need to consider national and organisational cultural and philosophical norms and habits, public perceptions of and concerns about science and scholarship in a given country or regarding a given field and national stakeholder needs.

(ii) National mandate

The experience of countries in which a national oversight or governance structure has been developed suggests that there is a need for a clear and authoritative national statement to underpin research integrity governance structures. This can take the form of a charter or of legislative support. In devising such a mandate countries can draw on the experiences of others which have already addressed this element, such as Denmark and Norway. In countries in which no national debates have been held yet, the awareness raising processes referred to in the work of WG1 might aim at building alliances between the scientific communities and the main authorities governing the national science system.

(iii) Fair and transparent processes

Processes advertised to denounce and to deal with suspected cases of scientific misconduct at both local and national level must be fair and transparent. Otherwise there is a risk that stakeholders will refrain from accepting the authority of and cooperation with the relevant institutional actors. It is critical to strive for a balance between prevention and sanction. More emphasis needs to be placed on prevention, so that whatever processes are adopted will be perceived as supportive of a system to ensure good research practice and not as isolated punitive action.

(iv) Responsibility for managing processes

Roles and responsibilities for prevention, investigation and imposition of sanctions need to be clearly assigned at both local and/or national level.

In addition, there are a number of core requirements that should apply at an operational level. These can be divided into two stages:

A. Ex ante: Embedding principles of GRP and research integrity into the culture of science and scholarship:

(v) Mechanisms for embedding GRP into the culture of science and scholarship

Nobody would dispute that all researchers are entitled to work in an environment that promotes GRP. Many stakeholders have a role to play in creating such an environment, including universities, research institutes, funding agencies, journals, professional organisations, research integrity offices and so on.

Prevention, education and awareness raising should reach all stages of an academic and researcher's career – undergraduate, postgraduate and temporary or permanent employee responsible for research. At a time when research practices and scientific fields change constantly and rapidly it would be wrong to assume that the necessity to update one's knowledge on the challenges to and requirements for GRP ceases when an individual reaches the level of research team leader or tenured professor.

In order to truly imbed GRP into the culture of scholarship, training in GRP from the start of a career in science and scholarship will be necessary; at the institutions that prepare future researchers for their jobs, such training should be an integral part of their research integrity governance framework. National frameworks should refer to that responsibility, and funders should require from recipients of their funds that such measures as are required are in place.

We noticed that in many cases there is already a strong emphasis on plagiarism detection and prevention in coursework assessment at undergraduate level. However, at postgraduate level and beyond, we found as yet relatively few opportunities for formal GRP training. The recent move towards a 'structured doctorate' model in many countries provides an excellent opportunity to lay the foundations for GRP at what must be seen as the entry point into a research career. Research integrity should also be integral to research supervision and mentoring, requiring more senior researchers to become fully aware and supportive of the principles and practice of GRP. A particularly delicate moment in ensuring GRP and respect

for research integrity rules emerges at the constitution of cross-disciplinary, cross-institutional and cross-national research groups, expected to collaborate closely. The lead institution will be expected to bear the responsibility of ensuring shared standards with regard to RI.

(vi) Robust procedures for data management

The ability to repeat experiments and thereby verify (or falsify) claims made in the scientific literature are a key tenet of scientific practice. However, even where data storage practices at the laboratory level are adequate, turnover of postgraduate, post-doctoral and increasingly also senior researchers can make tracking of data difficult. Therefore, institutions should be encouraged to invest in centralised and secure storage for experimental data, making it easy to validate experimental findings if required. Training at all levels should include good practices in relation to data collection and storage.

(vii) Identify where guidance can be sourced by researchers and other stakeholders

It would be unrealistic to expect individual institutions to develop guidelines and their own training materials; assistance should be provided by national oversight bodies and/or international organisations in this regard. Tools for information sharing could include the establishment of a web site or other public fora to capture good quality documentation on GRP and related training units. This could also include presentation of misconduct scenarios as an educational tool for researchers and trainers. Elsewhere, this text refers to the emerging European network of research integrity officers as a possible point of reference for practitioners and to their planned web site as a resource for case studies.

(viii) Procedures for pooling case information

Regardless of the approach adopted in particular countries or institutions, sharing experience is extremely important. It can help to provide easy access to best practice locally, nationally and internationally. Protecting research integrity, without stifling research creativity, is a constant learning process; the pooling of knowledge and experiences will build up a body of data on the extent of research misconduct and measures to deal with and prevent the phenomenon, locally, nationally, across Europe and beyond.

Networks such as ENRIO (European Network of Research Integrity Offices) offer an invaluable international forum for practitioners to share their experiences and to identify and debate issues around research integrity governance.

While there is a need to deal with privacy issues in the appropriate fashion, there is little doubt that publishing both positive and negative outcomes of investigations will help to raise awareness among the broader research community. Therefore, there should be agreement on sharing of knowledge between the consultative bodies at local and national levels, and between the national and the international level.

B. Ex post: Dealing with allegations of research malpractice or poor research conduct:

(ix) Consistency with national laws

In terms of legislation to support research integrity governance structures nationally, care has to be taken not to create an overly legalistic framework which could threaten to stifle creativity and the pursuit of knowledge. Most countries already have provisions and statutes as part of their legal system that also cover elements of the handling of allegations of scientific misconduct. These must be upheld and respected and brought to the knowledge of all actors in science; in promoting and implementing locally and nationally such elements should be identified as predating and overriding any internal RI guidelines.

(x) Ensure that procedures for investigation are legally robust

Quite apart from the damage that research misconduct inflicts on the scientific record and, potentially, on society, it can directly harm individuals when they are subjected to practices derived from and building on tainted datasets; the reputation of host institutions of such research and of entire disciplines is at risk. Another delicate matter is threats to the careers of whistleblowers who may be subjected to undue sanctions, or damage to the reputation of individuals who have fallen victim to vexatious and untrue allegations. Therefore, any framework for the implementation of research integrity governance structures has to enshrine within it the rights of the individual to fair and equitable treatment and should make reference to the applicable legal standards concerning protection of the individual.

It is furthermore recommended that awareness raising measures deal pro-actively with the potential threats to the dignity and career prospects of individuals, including among the requests that minimum legal standards for the protection of individuals involved in such cases are guaranteed, wherever such measures should not be in place.

(xi) Clarify procedures for receiving concerns or allegations

There needs to be clearly understood procedures for making and receiving allegations. This includes agreement about who can bring forward an allegation and how they can do this (anonymous, named), in what form a concern should be raised (verbal, written) and to whom allegations/concerns should be addressed.

Different procedures may apply in different countries and institutions; it is important that in cases of cross-national and cross-institutional research collaborations these differences are made explicit to all parties concerned.

(xii) Agreement on transparency of misconduct investigations

Any research integrity governance framework should seek to achieve a proper balance between transparency and confidentiality; this means an appropriate protection of the reputation of the individual against whom allegations have been made. Guidelines should comprise clear statements about the desirability or obligation to reveal outcomes to third parties (press, national oversight bodies, funders) and about the circumstances under which a specific course of action can or must occur.

(xiii) Decide on levels of appeal

As in all legal and quasi-legal proceedings, there should be an instance of appeal. The permissibility of appeals, the types of appeals, for example concerning either the scientific or the procedural elements of an investigation, and the processes for appeal should be clearly stated in any procedures.

(xiv) Decide on sanctions and responsibility for enforcement

There needs to be a statement on the types of sanctions that can be imposed, ensuring that they are appropriate to the level of digression from codes of GRP. Ideally, an agreement should be reached among the institutions (and countries) that deliberately examine their measures for compatibility of proposed sanctions; this becomes more important in cases of cross-national and cross-institutional research collaborations. There also needs to be agreement not only on types of sanctions, but on who can recommend them and who has responsibility for enforcing them.

(xv) Protection of whistleblowers

The issue of whistleblowers is a particularly important one to address when developing research integrity governance structures. It has been observed that research students, post-doctoral researchers and junior staff are the most likely to observe misdemeanours. However, these staff are in the most vulnerable positions and a complaint, even when justified, may risk ending their research career. They may also be reluctant to complain to senior staff within their institution, out of loyalty or because they may not feel their allegations and observations will be given a neutral and impartial reception.

Therefore, it is critical that whistleblowers are afforded protection, in law if necessary, since the success of research integrity governance is utterly and crucially dependent on the willingness of individuals to step forward even though they are part of the same higher education and research structures.

4.3 Models of Research Integrity Governance

We have observed a number of broad approaches to research integrity governance and/or oversight currently being taken in Europe and elsewhere. They are summarised in a rough typology in Table 1.

Of course, the situation in most settings is more complex than Table 1 implies; typically, more than one approach is adopted across institutions and national bodies at the same time, as the same actors perform in different functions. The differing size of countries will also have implications for the approaches adopted. It may be easier or more accepted to have a 'national system' of research integrity governance in smaller countries, whereas in bigger countries with very large and powerful institutions and universities it may be more difficult to reach consensus about appropriate

Table 1: Approaches to research integrity governance in operation in Europe at present

Approach to research integrity governance	Type of structure/supporting guidelines and policies	Responsibility for implementation
Self-regulation/Peer Review	No guidelines on handling of allegations of misconduct, emphasis on general (scientific) ethics	Reliance on peer review, peer pressure and scientific ethics of the group and the individual
HE & research institutions (without higher level oversight)	Guidelines adopted locally for GRP and for the handling of allegations of misconduct	Either *ad hoc* or standing committee under the institutional leadership
Funding agencies/Academies, Learned and Professional Societies	Policy/guidelines for GRP and handling of allegations of misconduct discussed/proposed/enforced for beneficiaries and members	The agencies themselves as part of their remit for interaction with members of the scientific community (funding and membership rules)
HE & research institutions (with higher, typically national oversight)	Policy/guidelines agreed nationally for handling of allegations of misconduct; typically implemented locally; GRP measures mainly agreed upon and implemented locally	National Body oversight but local implementation
National governance	National legislation/charter approach to GRP and handling of allegations of misconduct	National (RI) Office or Standing Committees

approaches to research integrity governance. Yet, the typology does serve to illustrate the existing heterogeneity of approaches in both academic and government systems across the continent and beyond, and the need for measures to ensure compatibility.

In persuading local and national stakeholders to establish research integrity governance structures or improve on their existing ones, both the advantages and risks of the current systems in operation need to be considered. The challenge for each institution, agency, society or country is to balance and integrate individual responsibility and local structures, national research integrity coordination or governance, and universal principles. The challenges are particularly acute where there are no research integrity governance structures in place yet, or where governance happens at a strictly institutional or local level with no national coordination. The presence of structures for certain areas (typically biomedical research) as opposed to their absence in other scientific fields is another issue to be contended with. Conversely, it can be observed that as a coordinated and nationally agreed system emerges the robustness of the governance structure increases.

Self-regulation, governance at individual institutional level and peer review

Primary responsibility for offering measures to prevent instances of scientific misconduct should lie with the institutions that are the direct employers or educators of research staff and students. In many countries, local institutions have responsibility for investigating allegations of misconduct where they arise. Such self-regulation endorses local responsibility and leadership, enhances visibility of integrity issues at an institutional level and ensures that local knowledge of the circumstances of suspected misconduct can inform appropriate action.

Despite its many advantages, this approach carries a number of inherent risks, Potential reputational damage to an institution, especially where an allegation involves a 'star' researcher or a research area in which the institution prides itself on excellence, could increase the temptation to hide cases or deal with issues behind closed doors. Thus, where no standard procedures are in place and *ad hoc* arrangements need to be resorted to, self-regulation could be perceived to militate against impartiality, thereby increasing the risk of public scepticism against research if cases are not adequately handled. The absence of agreed guidelines and procedures will also result in inconsistent outcomes in different institutions.

However, next to the argument of equitable treatment, there is also one of efficiency: for the absence of agreed processes and procedures for research integrity governance could result in loss of time when a case occurs, since investigations will essentially be starting from scratch. In addition, individual institutions are unlikely to build breadth and depth of experience in investigating misconduct and there is a lost opportunity for common learning or accumulation and sharing of experience. Furthermore, lack of agreed procedures and clearly stated support may make it difficult to whistle-blow, or discourage people from coming forward with concerns.

Similarly the process of peer review of manuscripts can serve to highlight issues about the integrity of the data or the approaches being presented, but participants in peer review colleges, acting as individuals and being pressed for time, may not always have complete access to the necessary information (even, or especially, when large data sets are supplied as part of the publication, as is increasingly occurring in a number of disciplines).

All these arguments are strong pointers towards the desirability that self-regulation is augmented by higher-level coordinating and harmonising support structures for dealing with infringements of the principles of research integrity.

Research integrity oversight driven by national bodies

The risks inherent in research integrity governance at an institutional level may be countered by oversight structures that act to harmonise and coordinate processes, procedures and guidelines across institutions and provide consistent advice, guidance and support. Such regional or national oversight structures can also facilitate a higher appeals mechanism and reduce the likelihood of cases being hidden out of misperceived institutional self-interest.

Provision of oversight and guidance by research funding agencies, Academies and learned societies, as well as professional and subject associations is likely to be accepted by many in the research community as providing independence and credibility in procedures and guidelines. The difficulty with provision of oversight by research funding agencies is that in many countries institutions may question the legitimacy of national coordination by such an agency and resist compliance. Furthermore, many such agencies will not have the resources necessary to monitor compliance while the entire system will be crucially dependent on buy-in by institutions, and their willingness and commitment to exchange information.

In addition, any such example of sectoral oversight is unlikely to provide coverage of both public and commercial activity, a fundamental requirement that should be borne in mind when considering research integrity governance arrangements. Oversight managed by professional associations and learned societies may experience similar difficulties, although in the Netherlands LOWI – with its secretariat at the Royal Netherlands Academy of Arts and Sciences – has almost universal coverage of the public sector for research integrity governance in the country, and brings together the research council, the universities,

and research institutes of the Academy and those funded by others.

Regardless of who provides regional or national oversight, it must be stressed that responsibility for implementation will still reside locally with the attendant challenges and risks described above. By the same token, and most importantly, regardless of who provides regional or national oversight, responsibility for establishing a culture of GRP and for implementing the rules of research integrity will reside with the scientific communities and institutions locally, with the attendant challenges and risks described in the previous section. These are two important basic tenets to be borne in mind for awareness raising activities.

National research integrity governance structures

Properly constituted national research integrity governance structures can resolve many of the critical issues identified for models of pure self-regulation or sectoral oversight/regulation by research funding agencies, professional associations or learned societies. National support offices can provide consistent advice, support and guidelines across both the public and private research sectors. They may also be seen as being invested with the independence necessary for investigative processes and equality in access and treatment of cases, making conflicts of interest less likely to occur. Importantly, national standing committees can reach professional competence, and the authority for GRP and investigations is clear to everyone.

Research integrity governance based in national offices can also facilitate international cooperation and mutual cross-border and cross-institutional learning processes. The emerging framework should make the best use of opportunities to establish links with other national research integrity offices. Currently ENRIO offers such a platform.

The disadvantages of the development of national research integrity governance structures pertain primarily to institution perceptions and behaviours. Institutions may become defensive about perceived loss of autonomy and interference by national offices, especially if the resourcing and location of the national office is perceived to be politically influenced. There is also a risk that institutions may not have the resources to provide training and education at the standard set nationally or that they could try to abdicate their responsibility for GRP to the national office, However, a well constituted, impartial and professional national office should allay many of these fears over time especially if the office is seen to be respectful of institutional responsibility and autonomy.

4.4 Selected National Research Integrity Governance Structures

There is still some global, national and institutional diversity in the definition of scientific misconduct and in the scope of preventive measures and practices applied to ensure the integrity of a country's national research system.

Preventive measures include comprehensive mandatory research integrity education at the undergraduate and postgraduate level (e.g., Denmark) as well as specific plagiarism education for undergraduates (e.g., UK). Investigation procedures and structures also vary widely. Typically, the primary responsibility for teaching, promoting and ensuring integrity and good research practice as well as for investigating and handling issues of research misconduct rests with the institution that hosted the research and/or is the employer of the researcher in question[17]. For example, in the USA, the research institution is usually responsible for the conduct of investigations with guidance and oversight from national bodies, while elsewhere, for example in Norway, a national office or commission is responsible for investigating allegations of misconduct.

Established national guidelines to promote research integrity and formal structures to investigate allegations of misconduct are relatively rare, with the USA, Denmark, Norway, Finland, Australia, Canada and Germany among the small number of countries with established national research integrity procedures/guidelines and national offices to oversee their application. These offices vary in size and remit with the most formal and developed structures found in the USA and Scandinavia.

In the **USA**, the National Science Foundation (NSF) Office of Inspector General (OIG)[18] and the National Institutes of Health (NIH) Office of Research Integrity (ORI)[19] facilitate research integrity of health and biomedical research funded by the NSF and the NIH. The OIG and ORI provide policy guidance and technical assistance to research institutions and perform a review and oversight function of the cases institutions refer to it. Responsibility for the preliminary investigation of allegations of misconduct rests with the host institution in which the research is conducted, but institutions must report all allegations and investigations to the national oversight office. Institutions conducting federally funded research must also meet a list of compliance requirements including maintaining written policies and procedures for addressing research misconduct allegations. Institutions are also required to foster a research environment that promotes responsible research and

17. International Council for Science Committee on Freedom and Responsibility in the Conduct of Science, 2008
18. National Science Foundation Office of Inspector General, Office of Investigations
http://www.nsf.gov/oig/officeofinvestigations.jsp
19. National Institutes of Health, Officer of Research Integrity.
http://ori.dhhs.gov/

training, and discourages misconduct[20]. In the case of NSF funding, recipient institutions must now demonstrate that they have GRP training measures in place. This policy change will have implications for collaborative ventures part-funded by the NSF outside the USA, where such procedures and training mechanisms may not be place.

A greater diversity of approaches is followed across Europe, with the Scandinavian countries among the first to develop national research integrity structures.

- The **Danish Committee on Scientific Dishonesty**[21], an eight member committee including a high court judge, was established in 1992. The Committee retains the anonymity of those on whom it has made findings and those subjected to investigation can appeal decisions to the Danish Agency for Science, Technology and Innovation.
- **Norway** established the National Commission for the Investigation of Scientific Misconduct in 2007[22] following a serious case of scientific misconduct. The commission covers all research fields and deals with research carried out by Norwegian research institutions, private or public. Primary responsibility for preventing and handling allegations of research misconduct remains with the research institutions, but they may redirect an investigation to the Commission if, for example, a case is deemed particularly complicated, has received considerable public attention or involves possible conflicts of interest. In such instances, the Commission will assess the allegations, decide whether they need further investigation and issue a statement on whether research misconduct has occurred. Responsibility for sanctions rests with the research institution. Appeals can be addressed to the Norwegian Ministry of Research, which appoints an *ad hoc* commission to handle the appeal. The Commission can also initiate investigations on its own initiative and investigate cases abroad if researchers employed by a Norwegian institution have conducted the research or if significant funding originated in Norway.

The **UK Research Integrity Office** (UKRIO)[23] is an independent advisory body, hosted by Universities UK, and supported by the major regulators and funders of health and biomedical research. While it is not a regulatory body and has no formal legal powers, it provides independent support, non-mandatory advice and guidance to employers, research organisations, researchers and the public to promote good practice in maintaining research integrity. It has published a comprehensive Code of Practice for Research and Procedures for Investigation of Misconduct, as well as providing education and training to its subscribers and a dissemination programme on research integrity issues.

For a more comprehensive description of the approaches adopted in individual European countries, the reader is referred to the 2008 ESF report *Stewards of Integrity: Institutional Approaches to Promote and Safeguard Good Research Practice in Europe*[24]. It should be emphasised, however, that the survey is in need of constant updates, as many countries are constantly improving their structures. It is envisaged that ENRIO, which will represent the RI practitioners in Europe, will be able to provide a constantly updated web site with the latest changes incorporated in close succession.

4.5 Conclusion

Good research is ultimately based on trust – trust between research colleagues and between academic institutions and industry, and the trust of the public and policy makers in the research community. Without such trust, the research system would quickly flounder. Trust in science and scholarship needs to be a priority for all nations and institutions. The research community needs to be able to apply good research practice and has to be prepared to deal with situations when there are suspicions of misconduct. Waiting for a serious case of misconduct to prompt such action is short-sighted and risks undermining the standing of science in society.

Protecting research integrity, without stifling research creativity, is a constant learning process. The deliberations of the ESF MO Forum also suggest that there is no 'one size fits all' framework of research integrity governance that can be readily applied across all European countries. Science organisations and research institutions in each country should discuss and develop their own research integrity governance structures, suited to the country's size, resources and research infrastructures.

Regardless of the approach adopted in particular countries or institutions, sharing experience is extremely important. It can help to provide easy access to best practice locally, nationally and internationally; the pooling of knowledge and experiences will build up a body of data on the extent of research misconduct and measures to

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21. Danish Committee on Scientific Dishonesty. http://en.fi.dk/councils-commissions/the-danish-committees-on-scientific-dishonesty
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deal with and prevent the phenomenon, locally, nationally, across Europe and beyond. Especially in Europe reliable data is lacking. Networks such as ENRIO offer an invaluable international forum for practitioners to share their experiences and to identify and debate issues around research integrity governance.

Other tools for information sharing include the establishment of a web site or other public forum to capture good quality documentation on GRP and guidelines, etc. This could also include presentation of misconduct scenarios as an educational tool for researchers.

In summary, there is a balance to be struck between promotion of GRP and prevention of misconduct on the one hand, and investigation and punishment of misconduct on the other. Examination of the frameworks currently in place in Europe underlines the desirability of developing national systems to support local implementation and to provide training and guidance on all elements of GRP. There is no single framework that will have pan-European application but this section has attempted to identify the core elements that should be present in a workable research integrity governance structure.

5. Conclusions and Recommendations

Following the fourth and **final meeting of the MO Forum in Rome in November 2010, it was agreed that:**

- The ESF Governing Council had already received and approved the Executive Report. The next step is to ask for the formal endorsement by the ESF Governing Council of the MO Forum recommendations and that all MOs adopt the European Code of Conduct and the Report's recommendations. EUROHORCs should also be asked to formally adopt the Code. The ESF Governing Council should also be invited to accept the implementation plan.
- MOs should be asked to incorporate the European Code and the OECD/GSF text into international agreements.
- There is a need for the adoption of the European Code and the establishment of a clear Research Integrity policy at the European level for FP8 and the ERC. ESF, with key partners (e.g., ALLEA), recommends this incorporation in key texts at different European levels (EU Presidencies, Commissioner and her Cabinet, DG Research, European Parliament (ITRE), the ERC and ERAB). Similarly, other European organisations should be urged to adopt the Code.
- All of the above bodies should be asked to endorse, and confirm that they have endorsed, the European Code and Implementation Proposals in their own activities. In particular, they should:
  a. implement the European Code of Conduct;
  b. implement the Framework for Research Integrity Governance;
  c. implement the Monitoring Proposals from the Forum; and
  d. ensure that an appropriate Research Integrity clause is inserted in all international agreements.
- The ESF Governing Council is asked to request that all MOs report back by January 2012 on what they have done to implement the Research Integrity recommendations. A further meeting of the ESF MO Forum will be convened early in 2012 to analyse the responses, and to decide what further action, if any, may then be needed. This may include taking into consideration whether there is a case for periodical updates of *Stewards of Integrity*.
- Specialist topic workshops should be developed in partnership with ALLEA, ENRIO, COPE, EUA, LERU and other appropriate organisations.

Annexes

Annex I:
List of ESF MO Forum Members and Chairs

WG 1 "raising awareness and sharing information"

Member	Organisation	Country
Sonia Ftacnikova (Chair)	**Slovak Research and Development Agency**	**SK**
Thomas Dantes	Max Planck Society	DE
Saulius Grybkauskas	Research Council of Lithuania	LT
Rüdiger Klein	All European Academies (ALLEA)	
Milda Naujokaite	Lithuanian State Science and Studies Foundation	LT
Claire Ribrault	École Normale Supérieure	FR
Evie Vereecke	Research Foundation Flanders (FWO)	BE

WG 2: "code of conduct"

Member	Organisation	Country
Pieter Drenth (Chair)	**All European Academies (ALLEA)**	
Tommy Dahlén	Swedish Council for Working Life & Social Research	SE
Glyn Davies	Economic and Social Research Council (ESRC)	UK
Pilar Goya and Pere Puigdomènech	Consejo Superior de Investigaciones Científicas (CSIC)	ES
Michelle Hadchouel	French National Institute of Health and Medical Research (Inserm)	FR
Kirsten Hüttemann	German Research Foundation (DFG)	DE
Pavel Kratochvil	Academy of Sciences of the Czech Republic (ASČR)	CZ
Aki Salo	Academy of Finland	FI

WG 3: "check list for setting up national structures"

Member	Organisation	Country
Maura Hiney (Chair)	**Health Research Board**	**IE**
Jean-Pierre Alix	National Centre for Scientific Research (CNRS)	FR
Dirk de Hen	ENRIO	NL
Alan Donnelly	European University Association (EUA)	
Markus Roethlisberger	Swiss National Science Foundation (SNF)	CH
Jan Stålhammar	Swedish Research Council (VR)	SE
Torkild Vinther	National Commission for the Investigation of Scientific Misconduct/ The Research Council of Norway	NO

WG 4: "research on research integrity"

Member	Organisation	Country
Livia Puljak (Chair)	**National Foundation for Science, Higher Education and Technological Development of the Republic of Croatia (NZZ)**	**HR**
Emilio Bossi	Swiss Academies of Arts and Sciences	CH
Dirk de Hen	Royal Netherlands Academy of Arts and Sciences (KNAW)	NL
Sebastião J. Formosinho	University of Coimbra	PT
Michèle Salathé	Swiss Academies of Arts and Sciences	CH

Other Forum members and Observers

Member	Organisation	Country
Cinzia Caporale	National Research Council (CNR)	IT
Wim de Haas	Royal Netherlands Academy of Arts and Sciences (KNAW)	NL
Umberto Dosselli	Istituto Nazionale di Fisica Nucleare (INFN)	IT
Charlotte Elverdam and Frej Sorento Dichmann	Danish Agency for Science, Technology and Innovation (FI)	DK
Gro Elisabeth Maehle Helgesen	Research Council of Norway	NO
Cihan Kiziltan	The Scientific and Technological Research Council of Turkey (TÜBITAK)	TR
Elisabeth Kokkelkoren	Fund for Scientific Research (FRS.-FNRS)	BE
Tomas Kopriva	Czech Science Foundation (GAČR)	CZ
Tony Mayer	Nanyang Technological University Singapore	SG, UK
Asael Rouby & Frank Bingen	Fonds National de la Recherche (FNR)	LU
Krista Varantola and Eero Vuorio	Delegation of the Finnish Academies of Science and Letters	FI
Ulrike Varga	Austrian Science Fund (FWF)	AT

ESF MO Forum Coordination: **Laura Marin**

Annex II: Questionnaires

The objective for WG1 was to identify existing activities aimed at raising awareness and sharing information on good research practice in order to promote research integrity. To get the needed information we developed questionnaires and sent them not just to the ESF MOs but also to funding and research performing organisations and institutions of non-member countries.

In summary, the questionnaire asked these questions:

Organisation – Country	
1. What kind of activities has your institution organised in order to (nationally and/or internationally) promote research integrity and good scientific practice (workshops, conferences, webpages, advisory boards, articles, publications, training courses, etc.)?	
Type of activity (workshops, conferences, webpages, advisory boards, articles, publications, training courses, etc.)	
Objective of the activity (describe also the intention, if there was a specific mandate for its launch, etc.)	
Description of the activity (duration, audience: size, type, national or international level, etc.)	
Evaluation of the activity (was the activity evaluated? were follow-up activities designed? If so provide description)	
2. What awareness activities were most successful and why?	
Title and type of good practice activity	
Why was it successful?	
Target audience of the activity (+ estimated size)	
How do you think this success should be evaluated? (list potential criteria)	
Description of the training	
3. What kind of difficulties are you facing in your activities to promote research integrity?	
Describe bottlenecks	
4. Which do you think should be the role of ESF in promotion of research integrity and good scientific practice?	
Describe potential activities that ESF could undertake in this field	
5. In cases where there are no activities in your institution to promote research integrity and good scientific practice would you like to start them with the help of ESF?	

Annex III:
Examples of successful approaches to promote research integrity

I. Academies

The Royal Netherlands Academy of Arts and Sciences (KNAW) – The Netherlands

Within the KNAW an ethical committee has as its duty to advise the Board on issues in the field of science and ethics, including issues regarding research integrity. The KNAW has organised and will organise seminars and workshops on these topics. The KNAW also plays an active role in the European discussion on these issues, among others through its representative on the Standing Committee on Science and Ethics of All European Academies (ALLEA).

Some of the more specific activities and measures regarding Research Integrity promoted by the KNAW include the following:

- In October 1995 the KNAW took the initiative to write an advisory memo on Research Integrity upon a request of the Minister of Education and Sciences. It deals with a description of scientific misdemeanour, prevention, dealing with allegations, sanctions, and suggestions on how to handle these problems.
- In 2000 the KNAW published (under the auspices of the Ethical Committee) a brochure on integrity issues in science with the title: *Wetenschappelijk Onderzoek, dilemma's en verleidingen* (*Scientific Research: dilemmas and temptations*). The brochure contains statements, arguments, discussions, cases and questions, to be used in educational programmes of PhD students and junior scientists and for internal discussions in research institutes. In 2005 a second edition was published. The brochure is widely sold and used and the KNAW has received many positive reactions from the field.
- In 2001 the KNAW took the initiative to write a more elaborate memorandum on Scientific Integrity (*Notitie Wetenschappelijke Integriteit*). This was a result of a tripartite consultation of the KNAW with the Association of Netherlands' Universities (VSNU) and the National Research Council (NWO). The three organisations carry the joint responsibility for this memorandum.
- In 2001 the KNAW, VSNU and NWO jointly created an important instrument to promote and maintain scientific integrity, the *National Committee on Scientific Integrity* [in Dutch: Landelijk Orgaan Wetenschappelijke Integriteit (LOWI)]. This body operates as an independent national body, although its secretariat is housed at the premises of the KNAW, and its members are all members of the KNAW. LOWI has an appeal and advisory function vis-à-vis the boards of universities and institutes regarding cases of misconduct.
- In 2005 the KNAW brought out an advice to the Minister of Education, Science and Culture on contract research (*Wetenschap op bestelling – Science made to order).* It is suggested that both the researchers doing research for government or industry and the sponsoring party commit themselves to a testimony of independence.
- More specific advisory committees of the KNAW have suggested codes of behaviour in special areas of interest or under particular circumstances. To mention a few: The *Social Science Council* of the KNAW has pleaded for a more open access to data from public or semi-public administrations, of course with the condition to comply with a number of formulated rules of conduct. The *Committee on animal experiments, transgenesis and biotechnology* has issued a number of measures with respect to restrictive experimenting on animals, to proper dealing with genetically modified organisms, and others. The *subcommittee on legal and ethical aspects of health research* (a subcommittee of the Medical Research Council of the KNAW) has made various recommendations and suggestions for proper conduct and legislation in the area of health research.
- On 8 March 2010 the KNAW organised a well attended theme conference on the subject of Scientific Integrity with speakers from KNAW and LOWI, Universities and NWO. The audience consisted of KNAW members, scientists and scholars, ombudsmen and representatives of RI committees at universities and research institutes, science administrators and science policy makers. A book with the proceedings, with the title *Wetenschappelijke Integriteit* (*Scientifc Integrity*), will be published in the course of 2011.
- The KNAW itself provides no specific training courses on RI, neither are there national programmes on RI. Most of the training and coaching is given at the 'workfloor': within universities and research institutes. Often general courses are provided for Master of PhD students. KNAW members are encouraged to contribute to these programmes.

Annex III:
Examples of successful approaches to promote research integrity

II. Universities

Sheffield Hallam University – UK

- The university has had a policy and procedures for research ethics review in place since 2001. This is regularly updated and revised, the most recent revision being in 2009 to ensure compliance with the recent United Kingdom Research Integrity Office guidelines on research misconduct.
- Research involving human participants must be ethically reviewed before any research begins. Each faculty within the university has review procedures approved by the UREC (University's Research Ethics Committee) to ensure that this happens.
- This year (2010) all researchers (staff & postgraduate students) received a leaflet summarising their responsibilities in relation to the revised university policy and procedures and providing details of where additional information could be located.
- The UREC has a web site to support researchers with details of the procedures, university guidelines for areas such as working with children, safeguarding children, online research, etc., as well as links to national and international guidelines.
- Each of the four faculties in the university also have web sites to support research ethics as does the Graduate School and these link to the central university site.
- Undergraduate and postgraduate-taught students receive training and guidance on research ethics to a degree that is appropriate to the nature of their discipline and their level of awareness. Supporting material on research ethics is presented on course blackboard sites for undergraduate and taught postgraduate students.
- The UREC oversees a series of annual workshops for staff and postgraduate research students. These involve internal and external facilitators. Sessions on research ethics are included on the annual training courses for postgraduate research supervisors and every opportunity is taken to include updates on research ethics at faculty events across the university.
- The intention of activities in this area is to further encourage a climate of ethical reflectiveness. Workshops are open to postgraduate research students as well as to members of staff. The audience depends on the activity. Group based activities in workshops: working with case studies (some of which are real life anonymised examples) – providing time for reflection & to hear perspectives from different disciplines.
- The UREC instigated the development of a university research data archive where research material related to published studies and reports can be securely stored for the time specified by the journal or research sponsor. The material archived includes questionnaires, consent forms, ethics reviews, electronic data sets, interview transcripts, tapes, etc., which can be used to evidence the integrity of the research.

Uppsala University – Sweden

- CODEX – Rules and guidelines for research. Web site that collects links to rules and guidelines for research in Sweden. The web site is run in collaboration with the Swedish Research Council. This web site's aim is to give researchers and other interested parties access to and information on the guidelines, ethics codes and laws that regulate and place ethical demands on the research process. There are weekly news updates from the world of research ethics http://www.codex.vr.se/en/index.shtml. Have been in place since the year 2001. While it first and foremost is aiming at researchers active in Sweden, it also includes all relevant guidelines from a European or international perspective. It is read by visitors from all over the world; in 2008 there were at least 71 countries represented in the statistics.
- Annual symposia series on biomedicine, ethics and society. Hosted by the Centre for Research Ethics & Bioethics (CRB). And CRB offers training for PhD students at all faculties. CRB offers a forthnightly series of open higher seminars.
- Networking. Creating a forum for discussion and awareness-building in matters of ethical interest in relation to science.
- A series of multidisciplinary research symposia, with a primary target group of researchers and scientists at universities in Europe and the US. A number of participants each year have been representatives of government agencies and NGOs. These symposia have also attracted journalists. The series was run between 1998 and 2009. More information: http://www.crb.uu.se/symposia/index.html

III. Granting Agency

SRDA – Slovak Republic

The Slovak Research and Development Agency (SRDA) provides research grants on a competitive basis in all research fields in Slovakia. It was established in 2001 and it has the mission, among others, to support basic, applied research and technological development based on the quality.

- In 2004 SRDA with the permission of DFG adopted their recommendations on Good Scientific Practice. This guideline was amended by specific issues peculiar to the SRDA *modus operandi* and Slovak research system. The Guideline – Good Research Practice is addressed to all SRDA grant recipients and peer reviewers who are expected to follow the formulated recommendations.
- In 2007 the SRDA established the Ethics Committee which consists of 8 outstanding researchers in different scientific fields. This committee acts as an advisory board to the Agency director and deals with cases of dishonesty connected with grant proposals (including all stages – writing proposal, peer review process, reporting the results, publishing articles).
- In 2008 SRDA organised The National Conference with International Participation: Ethics in Science and Research. This conference provided an overview of the wide picture of the situation with ethics issues on a European, national and institutional level (Stewards of Integrity: Institutional Approaches to Promote and Safeguard Good Research Practice in Europe – European Science Foundation Role; Integrating Ethics into Research: FP EC Perspective; Ethics of Research and Professional Ethics of a Researcher; Legal and Ethics Issues in Nanotechnology; The Infringement of the Ethical Principles of Research, its Detection and Prevention; Scientific Publication Ethics and the Role of the Peer Review; National Registry of Theses and Plagiarism – Tracing System; The Role of Grant Agencies in Safeguarding the Good Scientific Practice; Good Scientific Practice – Recommendations of the SRDA on Research integrity).
- In 2010 SRDA organised the continuation of the series of national conferences with the National Conference – Ethics in Publications.

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Annex V: Acronyms

ALLEA: All European Academies
COPE: Committee on Publication Ethics
EIT: European Institute of Technology
ENRIO: European Network of Research Integrity Offices
ERC: European Research Council
ESF: European Science Foundation
FP: Framework Programme
GRP: Good Research Practice
GSF: Global Science Forum
OECD: The Organisation for Economic Co-operation and Development
ORI: the US Office of Research Integrity

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