Foreword

Forging an international consensus on responsible conduct in the global research enterprise.

A global research enterprise is emerging, with enormous benefit to economic and social well-being. Today throughout the world, millions more scientists and engineers are working than there were just two decades ago. Many countries are now investing substantial sums in scientific, engineering, medical, social science and other scholarly research. Multinational research teams are on the increase. In this new global context, shared scientific core values and norms are important for both the research community and the broader public. Yet significant differences among countries have been revealed in the definitions of and approaches to the conduct of responsible research.

These urgent issues are being addressed by the world's national scientific academies through their representative international organizations, the InterAcademy Council (IAC) and the IAP – the global network of science academies. This report, sponsored by IAC and IAP, represents the first joint effort by the scientific academies to provide clarity and advice in forging an international consensus on responsible conduct in the global research enterprise. It acknowledges and draws on information and recommendations from the many national and international organizations that have issued guidelines and statements on the basic responsibilities and obligations of researchers.

The report serves as a guide to basic values that govern the conduct of research and the communication of research results and recommends specific actions that should be used to ensure and maintain the integrity of research. We call attention to key recommendations in the report:

- Researchers have the primary responsibility for upholding standards of responsible conduct in research. They should employ the expected standards of their fields, observe applicable laws and regulations, be willing to share data with others, and agree on the standards to be observed in multidisciplinary collaborations.
- Research institutions need to establish clear, well-communicated rules that define irresponsible conduct and ensure that all researchers, research staff, and students are trained in the application of these rules to research. They should establish effective mechanisms for addressing allegations of research misconduct. Research institutions also need to create an environment that fosters research integrity through education, training, and mentoring and by embracing incentives that deter irresponsible actions.
- Public and private funding agencies should avoid policies that might lead to overemphasis of quantity over quality in the reward systems for researchers. They should provide support to researchers and research institutions at a level sufficient to ensure that research can be undertaken properly and responsibly, without compromising quality or integrity.
- Journals should use technological means to protect the integrity of the research literature. They should make retractions visible so that retracted papers are not used or cited. Both authors and journals should take steps to avoid duplicated publications that readers expect to be original and should refrain from citations designed only to boost the journal's impact factor.

As the report recommends, national scientific academies should provide forceful leadership on issues involving responsible conduct in research, including the establishment and dissemination of standards. They should work within their own scientific communities to ensure that effective mechanisms exist to address allegations of research misconduct. Interacademy organizations can play analogous roles at the regional and global levels.

We are grateful for the insightful work of the international authoring committee, ably co-chaired by Indira Nath and Ernst-Ludwig Winnacker. They and their committee colleagues have devoted much time and effort to the development of this report. We also appreciate the work of an independent set of experts who peer-reviewed the final draft of the report under IAC procedures. Financial support for this project is provided by IAP, IAC, and the U.S. National Research Council.

We recommend wide dissemination of this report to the scientific community; worldwide research-funding agencies; universities; governments, including ministries of education, research, science and technology; the private sector; scientific and professional societies and associations; relevant international scientific disciplinary unions; and other relevant international bodies. We trust that this report will contribute to international dialogue and action to promote and maintain the integrity of the global research enterprise.

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Preface

The contributions that scientific and scholarly research makes to economic growth, to improved health, and to addressing many other societal needs are widely appreciated around the world. As the Chinese Academy of Sciences has stated, "Science is a shared asset of humankind and serves its benefit" (CAS, 2007). Similarly, the Budapest World Science Forum (2011) notes that "more than ever before, the world will be shaped by science."

A truly global research enterprise is emerging. More researchers are working than ever before in human history, and more research is being performed. In addition, more researchers are crossing national borders to pursue education and careers, and a growing proportion of research involves international collaboration. This global research enterprise requires that the universal values of science be embodied in global standards of behavior that are understood and followed by all. Humanity needs new knowledge more than ever to solve its problems, and it has placed its trust in the research enterprise to generate this knowledge. To maintain this trust, everyone involved with the research enterprise must do what is necessary to ensure the integrity of research.

Responsible Conduct in the Global Research Enterprise is a straightforward, practical, and integrated guide to the responsible conduct of research. It reflects several major trends that have been reshaping the research enterprise.

- Research is changing as disciplines have forged connections and merged. New technologies are enabling researchers to pursue more data-intensive approaches. These developments have accelerated the generation of new knowledge while also raising issues in such areas as the allocation of credit, data sharing, and the interpretation and communication of results.
- As the amount of research funding and the number of researchers have risen around the world, research integrity has become a more visible issue. In response, a growing number of national and international organizations have issued policy statements on responsible research.
- The increased globalization of the research enterprise has raised a variety of research integrity issues, such as how to ensure that all the students and researchers in a collaborative project have shared values and have received common training.
- Research results increasingly underlie and influence public policy debates in many fields, including public health and medicine, climate and the environment, agriculture, and energy. The heightened role of research in public policy has led to greater scrutiny of research results and of the researchers and institutions that generate those results.

In response to these trends, a project to addresss issues of research integrity was launched in 2011 by the InterAcademy Council (IAC) and IAP – the global network of science academies. This report is the first product of that activity. It describes the basic values that govern the conduct of research and the communication of research results. It also contains principles and guidelines that individual researchers, students, research groups, universities and other research organizations, public and private research sponsors, journals, societies, policy makers,

academies, and other stakeholders should use to maintain the integrity of research. This report has been prepared by an expert committee on research integrity established by IAP and IAC, and it has been peer reviewed by an independent set of experts under IAC procedures. An expanded committee will extend this work by developing international educational materials on research integrity and scientific responsibility.

This report uses the words *science* and *research* very broadly. The guide posits that research encompasses many forms of disciplined human thought, including the natural sciences, the social sciences, and the humanities, along with the archives of that knowledge. These forms of knowledge and the methods used to arrive at this knowledge can be very different. Yet all researchers, whether in the sciences or in other forms of scholarship, are expected to adhere to the fundamental values that underlie good research.

Chapter 1 provides an introduction to the project and to the trends and issues that are part of the global context. Chapter 2 provides an overview of the core values of research and describes some of the other prerequisites needed for successful research. Chapter 3 examines the research process, from the origin of research ideas to the communication of research results, and identifies principles that need to be followed to protect research integrity. Chapter 4 compiles the recommendations made earlier in the report.

This report covers a wide range of issues that require a variety of responses from participants in the research enterprise. These issues include the need to ensure that mechanisms are in place to deal with egregious cases of irresponsible research behavior such as fabrication, falsification or plagiarism; the need to promote responsible practices and high standards throughout the research process; and the need for awareness of the broader social context for research. It acknowledges that some aspects of the conduct of research can differ among disciplines, countries, and cultures. The guide identifies principles where substantial international consensus exists or is within reach. It also suggests priority areas where efforts should be made to develop internationally applicable principles.

The ultimate goal of this project is to help the research enterprise develop an ethical framework that applies to every individual and institution involved in research. The committee responsible for this guide understands that this process is in its early stages. The IAC, IAP, other interacademy groups, individual academies, and academy members can and should play important roles in the development of this framework.

Because of the increasing importance of research in the broader society, scientists and other scholars bear a responsibility for how research is conducted and how the results of research are used. They cannot assume that they work in a domain isolated from the needs and concerns of the broader world. Similarly, they cannot assume that the proper conduct of research has relevance only for researchers. All researchers have an obligation to themselves, to their colleagues, and to the broader society to act in accord with the values and principles described in this guide.

Report review

This report was externally reviewed in draft form by six experts chosen for their diverse perspectives and technical knowledge, in accordance with procedures approved by the IAC Board. The purpose of this independent review was to provide candid and critical comments that would help the produce a sound report that meets the IAC standards for objectivity, evidence, and responsiveness to the study charge.

The review procedure and draft manuscript remain confidential to protect the integrity of the deliberative process. Although the reviewers provided constructive comments and suggestions, they were not asked to endorse the conclusions and recommendations, nor did they see the final draft of the report before its release.

Reviewers of the report

The IAC and IAP thank the following individuals for their review of this report:

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Monitor of the review process

A review monitor was responsible for ascertaining that the independent examination of this report was carried out in accordance with IAC procedures and that review comments were carefully considered.

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