International Science Council

A CONTEMPORARY PERSPECTIVE ON THE FREE AND RESPONSIBLE PRACTICE OF SCIENCE IN THE 21ST CENTURY

Executive summary of the Discussion Paper of the International Science Council's Committee for Freedom and Responsibility in Science

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IMAGE CREDITS:

The report cover artwork is from 'Spectators' by Toyin Loye. Toyin Loye studied Fine Art at Obafemi Awolowo University in Ile Ife. His work has been exhibited in solo and group exhibitions in Nigeria, Senegal, Argentina, Indonesia, Japan, South Korea, United Kingdom, Australia, United States, Germany, Spain, Norway, Belgium and the Netherlands. He lives and works in The Hague, The Netherlands.
https://chiefsandspirits.nl/artists/35-toyin-loye/works/

CONTEXT

The International Science Council (ISC) is committed to a vision of science as a global public good. This vision has profound implications for the ways in which science is conducted, how it is used, and the roles it plays in society. The ISC's work to make its vision a reality is underpinned by its core Principle of Freedom and Responsibility in Science[1]. This principle sets out the freedoms that practising researchers should enjoy, and the responsibilities they carry as scientists.

Our understanding of scientific freedom and responsibility is informed by the history of scientific research and by the contemporary context in which scientists work. Developments in the 21st century offer new opportunities to advance science as a global public good, but also pose complex challenges to scientific research. The aim of this paper is to review the concepts of scientific freedom and responsibility in the context of these developments and to guide the free and responsible practice of science in contemporary society. This should enable international scientific organizations such as the ISC to mobilize the international scientific community toward action aimed at realizing its responsibilities to society.

In emphasizing the interdependency of freedom and responsibility in science, this paper reflects an important shift in thinking between the 20th and the 21st centuries. In the period after the Second World War, scientists and policy-makers thought of freedom (particularly autonomy in setting research agendas) and responsibility (specifically moral responsibility for the social impacts of scientific research) as being in direct conflict. During the early 21st century, this perspective has shifted towards a different understanding – that scientific freedom must come with social responsibility, for scientists in all areas of research.

This paper recognizes the value of science as an integral part of human culture, both contributing and responding to the evolution of society. As such, the free and responsible practice of science is capable of producing immense public benefits. Interdisciplinary and globalized research, together with socially engaged and transdisciplinary science, are essential parts of the scientific response to the complex challenges facing humanity and our environment. Emerging concepts and technologies used in diverse settings, amplified by new media and communication channels, have resulted in tremendous innovation in scientific enquiry, as exemplified by the collaborations undertaken to develop vaccines for SARS-Cov-2 and to combat climate change.

At the same time, new political tensions, as well as ongoing conflicts and inequities, continue to threaten scientific freedom, both on an individual level and for the wider scientific community. In many countries around the world, governments, scientific institutions and other stakeholders in the global science system are restricting or frustrating the freedoms necessary for responsible scientific enquiry and exchange. Advances in communications technology, and an increased focus on diversity and inclusion, help to expose and confront such threats by making science more accessible, but also raise new challenges of their own.

Social and technological developments of recent decades continue to change the way science is practised around the world. Artificial intelligence, big data, the internet of things, and social media all promise benefits to science, but these innovations are accompanied by new responsibilities for the dissemination and use of scientific and technical knowledge. Public trust has been compromised by fraud, plagiarism, fabrication and falsification, and by lack of

reproducibility of research findings. Meanwhile, there are threats to freedom and responsibility in science from aspects of modern science systems including inadequate recognition and reward systems, bureaucratic governance, relations with media and tensions at the interface between public and private science.

A contemporary understanding of scientific freedom and responsibility requires the realization that science is practised in a range of settings: universities, government entities at central and local levels, independent research organizations, not-for-profit research organizations, the private sector, and through sole practice and volunteering. Each has its own culture, obligations, revenue sources, operational environment, and contractual and employment arrangements. These affect the freedoms that scientists are afforded and the responsibilities that scientists need to consider when undertaking their research.

The paper begins with an overview of historical understandings of freedom and responsibility in scientific research. It then considers new challenges to scientific freedom and responsibility arising from developments during the first two decades of the 21st century. Some basic principles to underpin contemporary scientific endeavours are then introduced, with particular reference to ideas articulated by sociologist Robert K. Merton in the 1940s. On the basis of these principles, the paper suggests key freedoms and responsibilities that should be upheld in order to advance science as a global public good. Finally, the paper offers guidance to readers in a range of institutional and policy settings on the actions needed to uphold these freedoms and responsibilities.

RECOMMENDATIONS

This paper asserts that scientific freedom goes hand-in-hand with responsibilities for all scientific researchers. These include both individual and collective freedoms and responsibilities when undertaking scientific investigation, professional collaboration, scientific critique and science communication.

The ISC seeks to uphold four fundamental freedoms for scientific researchers: freedom of movement, freedom of association, freedom of expression and communication, and freedom of access to data and information. In addition to these freedoms, the ISC recognizes the responsibility of scientists to carry out and communicate scientific work with integrity, respect, fairness, trustworthiness, and transparency, recognizing its benefits and possible harms.

All stakeholders in global science systems are responsible for protecting scientific freedoms, and different stakeholders have different roles to play in this endeavour. Similarly, different stakeholders have different obligations for ensuring that the individual and collective responsibilities of scientific researchers are upheld. Some of these responsibilities and obligations are summarized overleaf, for researchers, research organizations, the private sector, governments, and international science organizations.

RESEARCHERS

In the context of new and evolving challenges, this paper makes the following recommendations for free and responsible research in the 21st century:

When conducting research, scientists must:

- Act with integrity;
- Expose the evidence for knowledge claims that they make, and make it available to be tested through the scrutiny of peers;
- Meet the international standards of ethical practice within their discipline;
- Consider the dual-use potential of their findings; and
- Act to mitigate their hazardous use.

When collaborating in research, scientists must:

- Uphold the rights and interests of those involved in collaborative research, including research participants and the environment in which research is undertaken;
- Assist equitable access to research; and
- Promote and embrace diversity in the scientific community.

When communicating research, scientists must:

- Consider the needs of diverse audiences;
- Explain uncertainties in scientific evidence;
- Signal the risks of emerging technologies;
- Challenge misinformation; and
- Advocate for equitable access to research outcomes while contributing to infrastructure which facilitates sharing.

RESEARCH ORGANIZATIONS

Institutions which fund or perform scientific research face a range of pressures in the 21st century, including financial constraints, the complexities of transnational collaboration, political interference and, in some instances, the impact of armed conflict and humanitarian disasters.

In managing science, research organizations must:

- Uphold rigorous standards of research integrity;
- Deal with scientific misconduct fairly and consistently;
- Adopt appropriate performance evaluations for research and researchers; and
- Promote the communication of scientific evidence, including to the public and policy-makers.

In protecting researchers, research organizations must:

- Promote scientific freedom and the responsible practice of science through legislation and culture;
- Support efforts made by scientists to address structural and systemic challenges to scientific freedom, and to advance responsible research within their institution;
- Support the professional development of researchers;
- Defend institutional autonomy from external influence; and
- Protect staff from coercion, threats and pressures, including from political, religious and commercial interests.

To protect these rights, research organizations must be afforded institutional freedom to meet their responsibilities in managing science and protecting scientific researchers, and must balance their autonomy with accountability. The 2020 Magna Charta Universitatum is a valuable tool for universities, containing principles of academic freedom and institutional autonomy as a guideline for good governance. The 2017 UNESCO Recommendation on Science and Scientific Researchers provides a comprehensive list of the rights and responsibilities of research institutions.

THE PRIVATE SECTOR

Increasing private investment in scientific research offers new opportunities to researchers around the world. These opportunities are often associated with a shift in emphasis from curiosity-driven, discipline-based research towards problem-focused, interdisciplinary projects, with increased links to private industry.

A major challenge when conducting research within the private sector, or with private funding, is the lack of internationally agreed standards and governance in this domain. A key recommendation emerging from this paper is for the development of frameworks through which research governance and standards can be secured, and which protect scientific freedom while upholding responsibility. To aid this process, scientists working in or with the private sector, as well as those working in government agencies, should seek closer involvement in the unions and academies within the ISC's membership.

GOVERNMENTS AND ELECTED OFFICIALS

The State at all levels has a critical role to play in creating an enabling environment for the free and responsible practice of science. Governments can also threaten scientific freedom and responsibility. Many existing declarations, instruments and treaties list the responsibilities of governments for safeguarding science and scientific researchers. In addition to these, this paper proposes that governments must:

- Adopt and enforce standards for ethical practice in scientific research;
- Adopt legal frameworks which respect the autonomy of research institutes;
- Ensure scientific freedom, while protecting national security and individual privacy;
- Nurture diversity, equity and inclusion in science, through agenda-setting and funding strategies;
- Encourage science communication and engagement with diverse communities;

- Foster interfaces for the use of scientific advice in policy-making; and
- Monitor the state of science and scientific researchers according to international standards.

Multiple stakeholders, including governments, research organizations and the private sector, share a responsibility to respect the freedom of scientists, and the institutional autonomy of scientific institutions in determining funding allocations. Many of the actions listed above are necessary for the responsible allocation of research funding, particularly for maintaining ethical standards, evaluating merit, and promoting equity and diversity in the research community.

INTERNATIONAL SCIENCE ORGANIZATIONS

Science organizations that span national and regional borders have a unique role to play in promoting science as a global public good. Five recommendations that emerge from these responsibilities are:

- Foster international scientific collaboration, for example by advocating for funding and tools for transnational collaboration between nations in diverse cultural, scientific and legal environments;
- Promote diversity, equity and inclusion in the global science community;
- Protect the principle and practice of open science;
- Provide platforms for science communication and engagement with multiple stakeholders; and
- Advocate for the role of scientists in national and international policy-making.

OTHER GROUPS

Many of these suggestions apply equally to scientific publishers, and to the media, whose responsibilities are not explicitly listed in this Paper. The ISC has a dedicated project which explores the role of publishing in the scientific enterprise and asks how the scholarly publishing system can advance science as a global public good. The responsibilities of science journalists and other actors in the media are covered by their professional codes, governing bodies, and organizations.

A POSITIVE PERSPECTIVE

Science is a unique human activity that has given us deep knowledge of ourselves and our place in the universe. The sciences broadly defined have played vitally important roles in human history and will attain an even more important position in the 21st century. As such, researchers are key members of contemporary society. Their contribution to human wellbeing and to planetary health is maximized when they are free to meet their individual and collective responsibilities. The international scientific community, governments, the public, and private research institutions should each have a clear sense of these freedoms and responsibilities, and clear strategies to achieve the free and responsible practice of scientific research in the development of a more sustainable world.

1 Statutes and Rules of Procedure of the International Science Council. Available at https://council.science/wp-content/uploads/2020/06/ISC-Statutes-and-Rules-of-Procedure_02.2021.pdf

International Science Council

The global voice for science

Work with the ISC to advance science as a global public good.

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