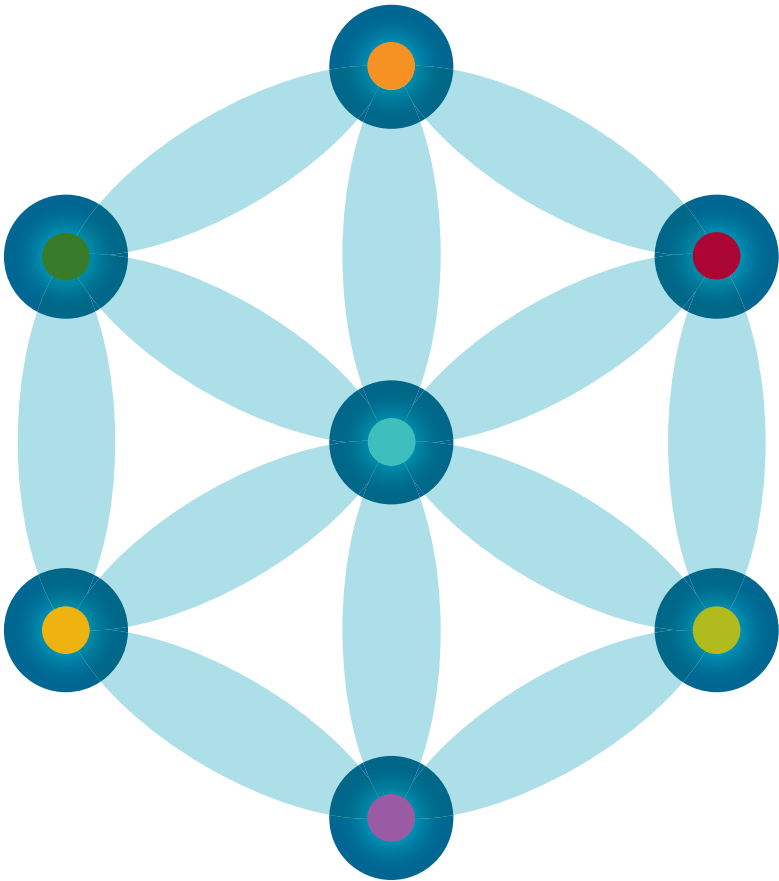


SCIENCE EUROPE

SEVEN REASONS TO CARE ABOUT INTEGRITY IN RESEARCH



SCIENCE
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Shaping the future of research

SEVEN REASONS **TO CARE ABOUT INTEGRITY IN RESEARCH**

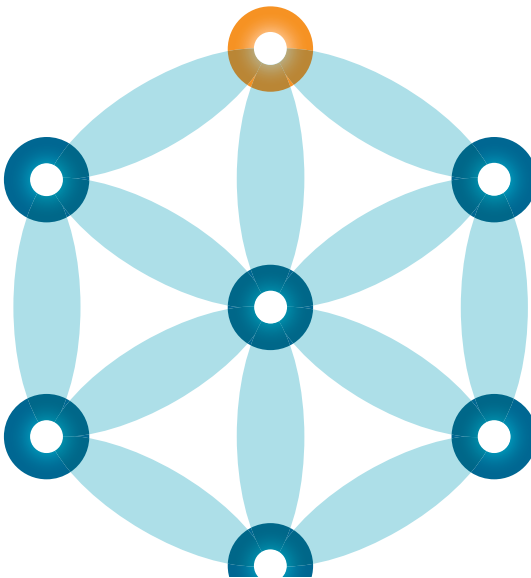
Research integrity is intrinsic to research activity and excellence. It is at the core of research itself. It is a basis for researchers to trust each other as well as the research record, and, equally importantly, it is the basis of society's trust in research evidence and expertise. Research misconduct is not a victimless crime and can damage reputations, careers, patients and the public. It is also a waste of public investment in research and is costly to remediate.

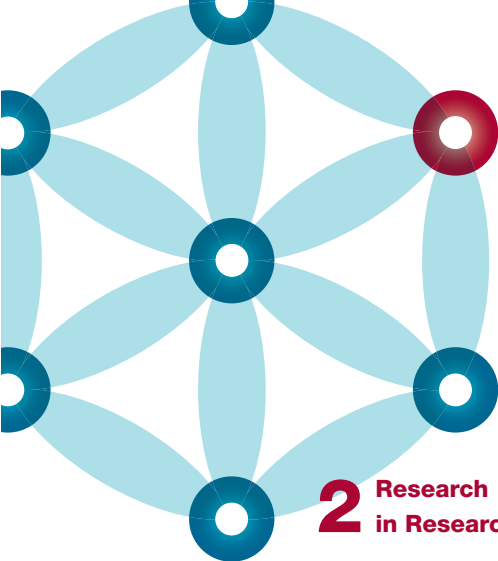
This paper sets out seven key reasons why Science Europe Member Organisations, and research organisations in general, should be concerned about promoting research integrity amongst their research community.

1 Research Integrity Safeguards the Foundations of Science and Scholarship

Rigour is the basis of the research method. Theories are validated through experiments that must be reproducible from one researcher to another and from one period to another, and/or that are based on trustworthy and verifiable sources. Once the knowledge is developed and validated, its integrity is based on the fact that the existing methods were used without falsification or fabrication and without bias caused by ideology and economic or political imperatives, or unintentional bias that could have been mitigated against. Researchers must be able to trust in the integrity of their colleagues. Questionable practices may be motivated by a desire to 'prove a point' or by pressure to publish, compete for funding and advance careers. Yet researchers have a responsibility to leave to posterity a solid foundation for the continuity of the work they have started.

The achievements of current research have been built over the centuries on a stock of accumulated knowledge worldwide. In the context of European innovation and economic advancement, including the importance of self-reflection within European society, the reliability of the stock of knowledge and its preservation are becoming more and more crucial. For an activity that is increasingly collaborative, anything less has serious implications for researchers' ability to work with, and build on, the outputs of their peers.





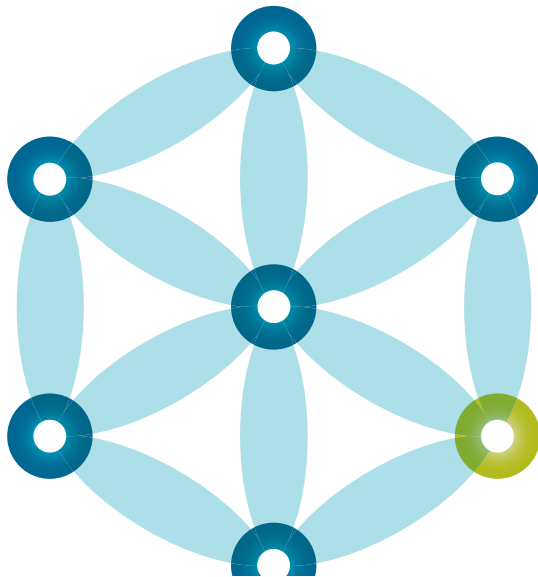
2 Research Integrity Maintains Public Confidence in Researchers and Research Evidence

Polls repeatedly show that public trust in research remains high, whereas the level of trust towards researchers is more variable and depends on the field of study. Frequent media reporting on high-profile misconduct cases generates distortions in the social perception of research, affecting the image of researchers and their credibility. In particular, scandals in the fields of medicine and health cause anxiety, fear among the public and, potentially, harm to health. A disbelieving public will be more susceptible to the scare tactics and misinformation of pressure groups, whose arguments are intended to discredit the research process to bolster their own cause. If suspicion settles on researchers, it is confidence in research evidence that is called into question, leaving the public vulnerable to misinformation, suspicion and poorly formulated choices.

Secondly, the legitimacy of the expertise of researchers must be without doubt. Researchers are regularly consulted by their governments to provide expert opinion on a variety of issues that involve political choices. Societal debates and crisis situations, such as food, health, security or geophysical, sometimes make it necessary to take quick political decisions. Politicians then consult experts, expecting them to provide solutions. Where poor political choices are subsequently made, it is easy for the public to blame the experts, especially if their confidence in their expertise is weak. In addition, alternatives to research expertise are often proposed, without much underlying evidence, by advocacy groups for or against certain technologies, and possibly inspired by political or religious ideologies. In such a crowded and often contradictory environment, it is particularly important that the opinion of scientific experts is recognised as trustworthy and based on integrity.

3 Research Integrity Underpins Continued Public Investment in Research

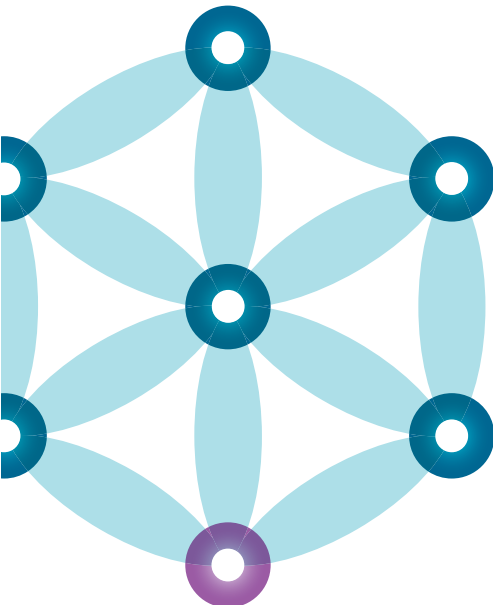
Over the last two decades there has been very significant and increasing public investment in European research across all spheres, including humanities and social sciences and the STEM (science, technology, engineering and mathematics) disciplines. Public research is financed by taxes, and researchers are dependent on taxpayers to provide the opportunity for them to practice their profession, although they rarely think about the public in this way. The financial support provided by Member States or the European Commission to their funding agencies and programmes, while usually considered insufficient by the research community, is perceived as generous by the taxpayer. For their investment, the public can reasonably expect researchers to encompass intellectual freedom and excellence, in the hope that they will uncover rational solutions or new approaches to major societal challenges. Governments, who represent that public, approve investment in research in the hope that this will benefit their citizens through societal and economic impacts. Any disclosures of misconduct that come to light can have serious implications for the scale of (dis)continuing public investment and risks the intellectual capacity of a country.

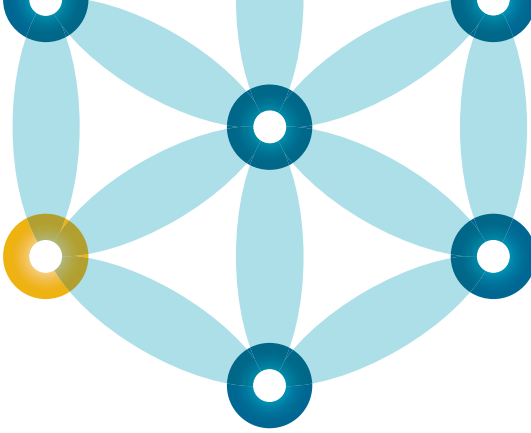


4 Research Integrity Protects the Reputation and Careers of Researchers

Proven research misconduct not only damages the career and reputation of a guilty researcher but can cause significant collateral damage to students, colleagues, and the field of study associated with the guilty party. Graduate students supervised by a discredited researcher may experience career retardation. The reputation and career of other authors connected to the guilty party through publication and collaboration, and the research group, laboratory and institution associated with a serious case, may suffer reputational damage. Somewhat unfairly, many whistle-blowers also experience negative consequences in their personal and professional lives.

Additionally, the image and visibility of the field of study associated with misconduct may suffer, and there is some evidence that there can also be a decrease in new articles and research funding flow into the field^[1]. Since funding agencies and national governments make significant investment in the training and career development of researchers, misconduct that damages this investment represents a waste of important national assets and talent.





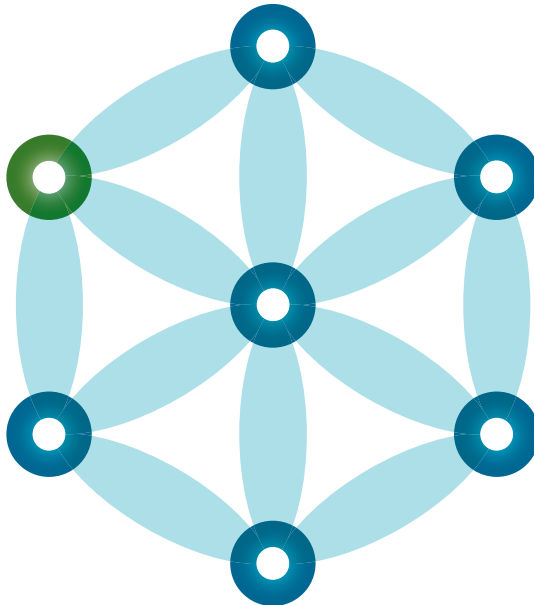
5 Research Integrity Prevents Adverse Impact on Patients and the Public

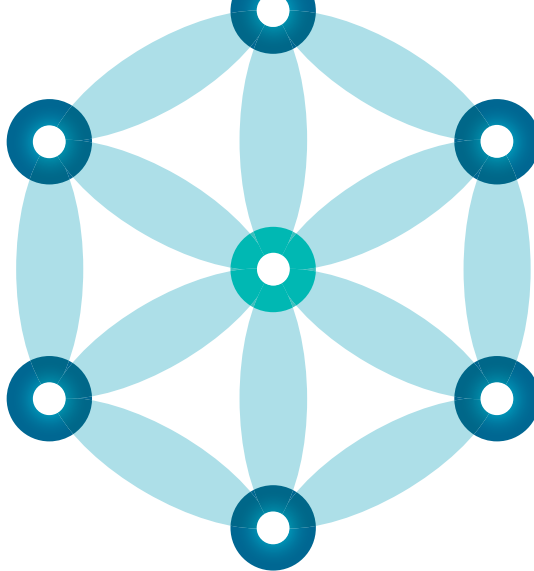
Undertaking research that involves human or animal participants that will yield unreliable results – for example by poor design or research misconduct – is unethical. It is also unethical (and hence misconduct) to undertake research on human participants without their informed consent. The application of research results flawed by unethical practices or misconduct may have strong impacts on people, particularly in the fields of medicine and health, but also in the social sciences and the humanities with significant bearing on, for example, the environment, education and public policy.

In terms of clinical impacts, patients can suffer because treatments they receive are based on faulty or incomplete data generated by poor research practice or questionable publication ethics. Unfortunately, not all evidence from human trials is reported, and some of what is reported is done so inadequately^[2], although serious attempts are now being made to address these issues through registration of clinical trial protocols and data. The impact of these practices is that missing data about adverse events in trials can harm patients, and incomplete data about risks and benefits can lead to futile costs to health systems. The time-lag to retraction of flawed clinical data means that it can be available for use by other researchers in their own clinical studies and treatment protocols for many years^[3]. Even when a flawed clinical paper is retracted, on-going access on non-publisher websites is a problem^[4]. Finally, retracted clinical studies may continue to have an impact in people's minds and consequent behaviours well beyond their retraction. This is typified by the link established – and subsequently discredited – between childhood vaccination and the development of autism, which continues to have an impact on the rate of MMR vaccination of children in many countries^[5].

6 Research Integrity Promotes Economic Advancement

The link between high quality research and economic and societal advancement has been accepted across the globe. In Europe, investment in research has happened within the wider policy objective of ensuring that Europe can address its economic and societal challenges, compete effectively with its global neighbours, and create high-value, high-skilled employment, based on research-driven innovation and the successful application of research-generated knowledge. As a result, all European states support commercial exploitation of research, since economic prosperity is enhanced by knowledge transfer from public research outputs to companies and via outreach to society. The reliability of patents owned by research institutions is an extremely serious matter from a legal perspective. If it turns out that the research underlying a patent or copyright is based on the results of questionable, non-existent, or poorly controlled research, the employing organisation and the author of the patent or copyrighted material can be drawn into a dispute with the company or organisation that financed the use of this intellectual property. Misconduct may also result in the non-appropriation of research outputs by society or stakeholders and the ultimate waste of intellectual effort.





7 Research Integrity Prevents Avoidable Waste of Resources

Research misconduct and poor practices result in the waste of precious financial and human resources. There are significant direct financial costs to funding agencies and research institutions arising from the support of studies whose publication outputs are ultimately retracted due to flaws in design, conduct or analysis or more serious misrepresentation of results^[6]. The direct costs to institutions of investigation and remediation of research misconduct are also considerable^[7]. Since there is not, as yet, Europe-wide agreement on policies and procedures for dealing with misconduct, transparency of the investigation process, systems of appeals, sanctions and enforcement is often limited, creating legal challenges for institutions and governments. Even where good investigative and enforcement practices are in place, litigation of various sorts will inevitably arise, for example related to labour law cases.

These estimates do not include the opportunity costs of loss of trust/goodwill by the public and damage to the reputations of researchers, laboratories or institutions, or the indirect costs of unproductive research by other researchers who have based their work on flawed data or ideas. Neither do these estimates include the indirect costs to society of misconduct, such as preventable illness or loss of life due to misinformation in the medical literature, or poorly conceived public policies that impact the quality of citizens' lives. Therefore, research misconduct wastes a significant amount of time, work, money, and, most importantly, human capital.

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Colophon

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‘Knowledge Growth’

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