Research Integrity in the UK

Annual statement 2023

UKCORI
UK Committee on Research Integrity

Contents

Executive summary

This is the first annual statement produced by the UK Committee on Research Integrity. It gives a snapshot of research integrity in the UK, highlighting the work already being done by others and identifying areas for further work.

UK research has an international reputation for its strength, creativity, and innovation, and continuing this tradition of high calibre research requires a clear focus on research integrity.

Integrity underpins the confidence that research users, or those impacted by it, can have in the research. It can also help address and counter misinformation.

All of those involved in research such as organisational leaders, researchers, technical and professional staff, policy makers, funders and publishers, have a role in ensuring that research is carried out with high levels of integrity. The Committee aims to support them in this role by highlighting what constitutes good research integrity, how to support and improve it, and how to embed it into organisational culture and practice.

We have structured our annual statement around the **five key principles** set out in the Concordat to Support Research Integrity[1]. These are: **rigour, transparency and open communication, honesty, care and respect**, and **accountability**.

As well as addressing the five principles, our statement includes a section on research misconduct. By this we mean practices that breach the norms of integrity and that are not honest errors. Examples include fabrication, falsification, plagiarism, failure to meet legal, ethical and professional obligations, misrepresentation, and improper dealing with allegations of research misconduct. We address misconduct directly because of its clear potential to cause personal and social harm.

We have identified several areas where there is need for more information to assess research integrity practice in different disciplines and settings. The development of indicators can underpin action and help to monitor progress. In keeping with thinking about reduction of bureaucracy and responsible metrics, we urge a careful and proportionate approach to the design and use of any integrity indicators.

We note that:

- The 2019 Concordat to Support Research Integrity provides a strong foundation for research integrity. Its impact would be enhanced by wider adoption, as well as increased consistency in the annual statements produced by organisations as one of the concordat commitments.
- There is a need to build the evidence base relating to research integrity from all parts of the research sector, including higher education institutions, industry and government to inform action.
- There needs to be more consideration to the training provided to all involved in research, including the development of evidence as to its effectiveness.
- Rigour, which underpins reproducibility, requires a discipline specific approach, but one that is open to learning across sectors and fields including sciences, social sciences, arts and humanities.
- There needs to be a concerted focus on new technologies, including artificial intelligence, to understand the risks and opportunities that they afford to research integrity.
- Honesty and other aspects of research integrity must be supported by research cultures in which issues can be safely raised and discussed.
- There is no evidence that research misconduct or questionable research practices are a greater problem in the UK than in other countries. However, there is a need for closer attention to the alignment of misconduct processes between organisations.
- Accountability for research integrity is not always as clear as it should be. There is a need to develop common processes and to embed, recognise and reward high integrity research.

The UK Committee on Research Integrity is working on many of these issues, as outlined in our work plan[2] including convening discussions on indicators for research integrity, artificial intelligence (AI), and poor research practice and misconduct. In our work we take into account evidence from researchers suggesting that they face pressures that may present risks to integrity.

We also seek to highlight good practice, and to encourage people and organisations to share their examples publicly.

Understanding of research integrity is evolving as methods, technology and society itself changes; there is never room for complacency. Maintaining and enhancing research integrity requires a concerted and coordinated effort. We hope that this statement will help all working in research, especially leaders and senior researchers, to think about how to improve research integrity and to strive for excellence in research.

Box 1 Who we are

As the UK Committee on Research Integrity, it is our responsibility to promote and drive research integrity in the UK.

Our vision is that the UK's research system continues to achieve and build high levels of research integrity, so that research integrity:

- is central to all work and actions of all individuals, groups and organisations in the research system
- enhances and protects the quality of research
- safeguards confidence in research

We work across the research system, including:

- higher education institutions
- independent research organisations
- research institutes
- research funders
- public, private and third sector organisations

The UK Committee on Research Integrity consists of two co-chairs and ten members. We bring expertise and experience from a breadth of disciplines including government, publishing, industry, research at various career stages, and research policy and governance.

Introduction

UK research

UK research encompasses many diverse disciplines, fields and approaches. The UK system embraces the spectrum of research, from ideas and discovery through to translation and innovation, and is increasingly interdisciplinary involving a wide array of international partnerships. In 2020, 60% of UK research publications had one or more international co-authors[3]. The 2023 Independent Review of the UK's Research, Development and Innovation Organisational Landscape, led by Sir Paul Nurse, provides a comprehensive overview of the UK context[4].

The benefits of research include impacts to society, the economy, and our personal health and wellbeing. While research findings have historically received a lot of attention, it has only been in the last few decades that significant consideration has also been given to the people working within the research system[5]. In 2019, over one million people were members of the UK's research workforce, which comprises a wide variety of professions and fields[6]. They carry out research in thousands of organisations across higher education, government, private and third sector organisations. Funders, investors and publishers are also key actors in UK research; the system is complex and large. The UK government's 2021 R&D People and Culture Strategy provided attention and commitment to people, culture and talent, creating new opportunities and a call to action to attract, develop and retain talent.

Why research integrity matters

Research integrity matters because it allows all those involved in the research process, including funders, other researchers and those that are impacted by the findings, to be able to assess the trustworthiness of the research. If the research is trustworthy then we can have confidence in it because it has been carried out in an open, honest and rigorous manner. While sometimes assumed to relate largely to cases of misconduct, research integrity encompasses the behaviours, actions, norms and culture that support good research practice, as well as the trustworthiness of the research record. Integrity also lies at the heart of reproducibility and replicability of research. Rigour in research methodology, as well as honesty and transparency in how the research is carried out, is what allows people to either reproduce research, or to understand how the researchers came to their findings.

The UK research integrity landscape

The UK Concordat to Support Research Integrity provides a framework that applies to all fields of research, outlines responsibilities, complements existing frameworks and recognises the autonomy of employers[1]. Our statement draws on the Concordat's principles of research integrity (box 2).

A strengthened version of the Concordat was published in 2019 following its original launch in 2012. There are plans for a further update to the Concordat in 2024/2025 which will take into consideration findings from the Concordats and Agreements Review[7]. Signatories include research funders and representative organisations. Recipients of research funding from the signatories and members of the representative bodies who are signatories, commit to following the Concordat and producing an annual statement on research integrity.

In 2022, the Concordat and its corresponding principles were introduced across government for both conducted and commissioned research[8]. As part of this commitment, Government departments and bodies will produce annual statements, the first two of which were published in May 2023.

The Concordat provides a UK-specific approach to internationally recognised principles and guidelines, such as the Singapore Statement on Research Integrity[9] and the European Code of Conduct for Research Integrity[10].

Several organisations and groups support research integrity in the UK. These include the UK Research Integrity Office, an independent charity that offers support to the public, researchers and organisations; the UK Reproducibility Network, a peer-led consortium focused on reproducibility and replicability; and the Scottish Research Integrity Network, one of a number of member-led forums for sharing good practice. There are also sector specific organisations such as COPE (Committee on Publication Ethics), which is international in remit.

There is growing global attention to research integrity, demonstrated through the work of organisations such as the World Conferences on Research Integrity, the European Network of Research Integrity Offices and the US-based Center for Open Science.

The UK Committee on Research Integrity was set up in 2022. The House of Commons Science and Technology Committee recommended a new body in their 2018 report into research integrity[11]. The Committee has responsibility to promote and drive research integrity in the UK (box 1). In its 2023 report, the Science Innovation and Technology Committee highlighted the importance of research integrity, welcoming the establishment of the UK Committee on Research Integrity, and providing recommendations focused on improving reproducibility of research[12].

Box 2 What is research integrity?

This statement draws on the definition of research integrity in the 2019 Concordat to Support Research Integrity[1] and its five principles (figure 1). These principles are interlinked, for example transparency and open communication support rigour and are also a component of care and respect.

Figure 1

Evidence used in this statement

In developing this statement, we have used the most recent available evidence and carried out new analyses. We also identified continuing gaps where more comprehensive and robust information would support discussion about UK research integrity. Much more work will be required so that future interventions and improvements can be based on sound evidence.

Our 2023 statement uses these sources of evidence:

- Commissioned analysis of 283 statements on research integrity provided by higher education institutions (2019-2022) [13].
- Commissioned analysis of 3,782 UK responses to a 2021 International Survey on Research Integrity (IRIS)[14].
- Analysis of data relating to 39,000 retracted publications, provided by The Center for Scientific Integrity[15].
- Published material including the report 'Research Integrity: a landscape study' conducted by Vitae in partnership with the UK Research Integrity Office and the UK Reproducibility Network[16], and other publications including reports and research studies.
- Analysis of the PLOS Open Science Indicators dataset published in December 2022.
- Commissioned analysis of Vitae's 2021 Culture, Employment and Development in Academic Research Survey (CEDARS) by career stage[15].
- The exploration of research integrity indicators conducted by Research Consulting for UK Research and Innovation (UKRI), GuildHE and Cancer Research UK in 2022 [17].
- Information provided to us during consultation processes when we developed our strategic plan[2].
- Stakeholder workshops focused on accountability, held in 2022[18].

UK practice in research integrity

Annual research integrity statements provide rich evidence about practice in UK higher education institutions. Working with the signatories of the Concordat to Support Research Integrity, we commissioned content analysis of annual research integrity statements, shown in box 3. Within higher education institutions there is a diverse range of integrity-related activities. There is evidence that institutions are sharing learning from misconduct cases, that the research culture agenda is encompassing discourse on research integrity and that importance is given to research integrity training, especially for those in the early stages of their careers.

While the analysis of statements highlights institutions' progress to embed and support high integrity practice, it also highlights areas of further opportunity. For example by demonstrating the effectiveness of their endeavours, institutions can share best practice and support high integrity across the sector.

Our commissioned analysis of UK data from the 2021 International Research Integrity Survey (IRIS) provides information about the views of 3,782 UK-based researchers (box 4). Respondents valued the fundamentals of research integrity, including overall research quality and trustworthiness, far more than extrinsic benefits like promotion[14].

Box 3 Analysis of Higher Education Institution annual statements on research integrity

Working with the signatories of the Concordat to Support Research Integrity, we commissioned the first comprehensive analysis of higher education institution annual statements on research integrity. The analysis included 283 such statements produced from 2019-2022.

The proportion of higher education institutions that publish an annual statement on research integrity has increased since the strengthened version of the Concordat was released in late 2019. An analysis conducted in 2017 found that only 58% of 140 Universities UK members were able to provide a link to a recently published annual statement[13]. In our analysis, 78% of all 134 higher education institutions in receipt of UK Research and Innovation funding since 2019 were able to do so for their 2020/21 statement. There is evidence that higher education institutions consider research integrity to be a strategic priority and have been ramping up efforts in this area. For many individual institutions, content of annual statements demonstrates progress over time. Progress includes changes and updates driven by internal factors such as gap analysis, misconduct investigations, or development in external policies and environments.

This suggests that institutions are seeing annual statements as a way to take stock, learn, adapt and focus on next steps that will be reported in subsequent years.

We found that:

- Annual statements describe diverse activities in different institutional contexts
- Annual statements show evidence of institutions learning from previous instances of misconduct
- Research integrity is considered within broader discussions around research culture
- Support and training on research integrity are focused on early career stages
- The effectiveness of research integrity activities is not formally monitored

The full report is on our Committee's resources webpage: https://ukcori.org/resources/

Evidence about general training in research integrity

In our analysis of higher education institutions' annual statements on research integrity (box 3), training on research integrity appears to be focused on early career stages. This includes training and support for postgraduate or early career researchers, but also for first-time PhD supervisors and new staff, for example as part of an induction. In IRIS, 68% of UK respondents said that their working environment was not closely aligned with an ideal in which "training in research integrity is provided to all researchers, at all career stages, by qualified trainers"; this figure was even higher for EU researchers (81%) (box 4). Most UK respondents to IRIS agreed that there should be mandatory (57%) or voluntary (61%) research integrity training[14].

We know of no evaluation of the effectiveness of general training in research integrity in the UK and its impact on integrity related practice. International evidence suggests that other factors, such as research culture, may be more important than training. However we recognise that this evidence gap may, in part, relate to an absence of indicators for research integrity or broader considerations of the relationship between research integrity and the wider research environment.

Research culture and research integrity

The Research Integrity Landscape Study[17] provides information about UK researchers' views about their own practice and their research environments. Commissioned by UK Research and Innovation (UKRI) in response to a recommendation from the House of Commons Science and Technology Committee in 2018[12], the Landscape Study collected information from 1,539 members of the UK academic research community, with 1,084 complete responses.

The study reported that 99% of active researchers agreed that personal integrity drives research integrity, and 94% said that they understood the levels of research integrity expected. However, 59% of researchers believed that other researchers feel "tempted" or "under pressure" to compromise on research integrity some of the time, with a further 19% believing that this is felt by others most, or all, of the time.

A survey of 1,766 UK-based technical staff, followed by nine focus groups, indicated 'room for improvement' to establish positive research cultures, and the need for technical staff to feel that research culture is relevant to them and that they have a place in any improvements[19].

The Landscape Study and IRIS indicate that people working in the research system are highly motivated to conduct their research with integrity. Both studies indicate that local culture, at the institutional or departmental level, can strongly influence individual practices. However, local research cultures and individuals working in them are impacted by the wider system. We have heard that systemic issues include onerous research bureaucracy, high levels of competition, difficulties in career progression and fixed-term research contracts, equality of opportunity and concern about equitable outcomes. Research environments and ways of working, often described as 'research culture', are key to everyday practice of integrity.

Box 4

Evidence from the International Research Integrity Survey

The International Survey on Research Integrity (IRIS) was carried out in the context of Horizon 2020 research programme, as part of the project 'Standard Operating Procedures for Research Integrity' (SOPs4RI). In 2021, Allum et al. received over 70,000 researcher responses from 34 countries to the survey covering all main areas of research.

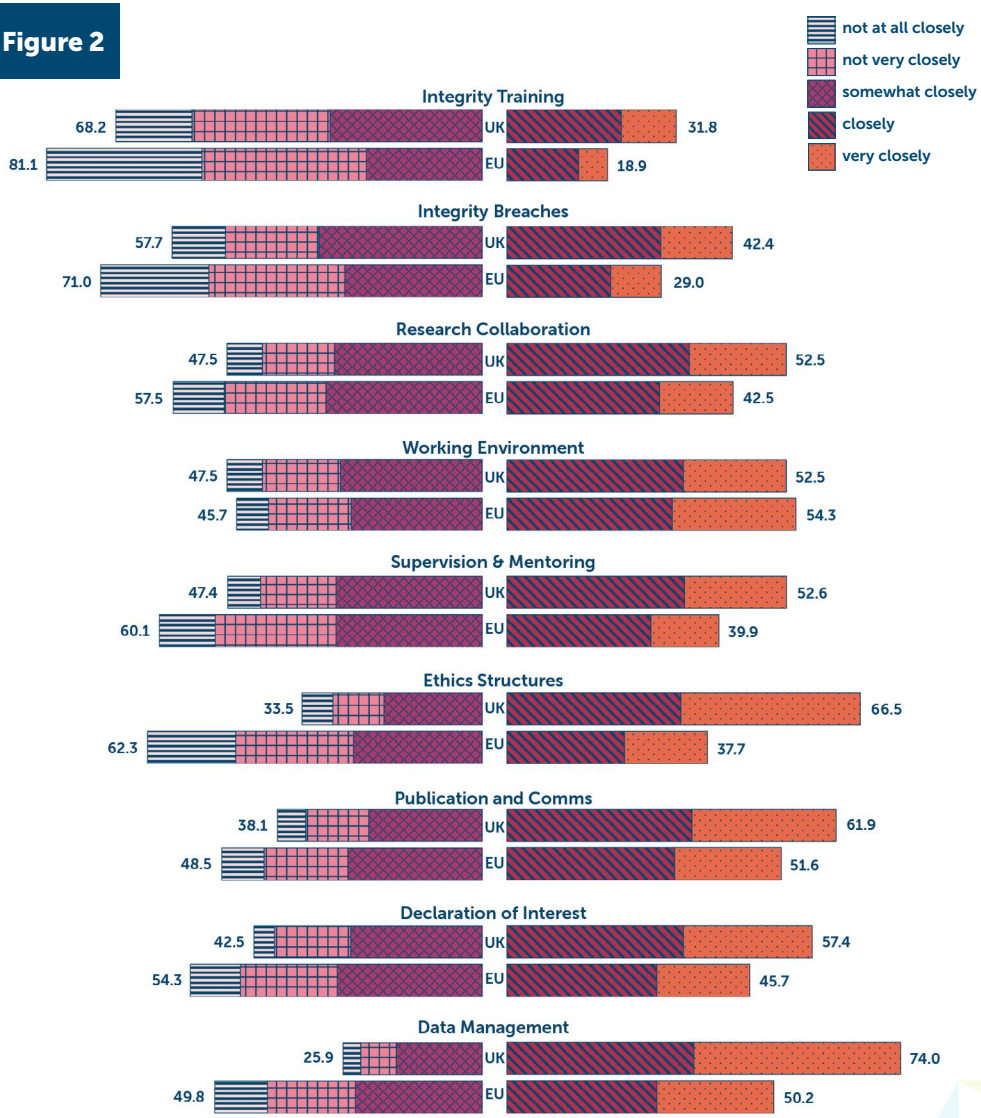
The full dataset is available at https://osf.io/xb9rk/.

There were 3,782 responses from the UK. The majority were from academia/ universities (2,840) with small numbers from other workplaces, including industry (87), not-for-profit research institutes (89) and healthcare settings (184).

Allum and Brooker analysed the UK data on our behalf. We use the findings from the analysis of the UK data throughout this statement and the full analysis is available online[14].

Analysis provides information about the views of UK researchers about the degree to which their working environment aligns with research integrity standards in key areas such as integrity training, integrity breaches, research collaboration, working environment and supervision and mentoring (figure 2).

Figure 2



Future evidence needs

UK Research and Innovation, Cancer Research UK and GuildHE commissioned a report on the landscape, opportunities and challenges of indicators for research integrity in 2022[20]. This highlighted that there is currently limited or no use of research integrity indicators, at least not beyond individual organisations. The work identified a range of potential areas where indicators could be co-created by the sector, with a focus on promoting positive change and avoiding the creation of benchmarks or league tables.

Although surveys and annual statements from research organisations provide vital information, they do not provide comprehensive coverage of UK research. Most available evidence relates to work conducted in or by higher education institutions and publishers. Evidence is not always collected or available in a consistent way that would enable comparison or identification of trends.

Narrative statements relating to the Concordat to Support Research Integrity have enabled us to start to assess reporting and practice. However, the historic lack of consistency in statements has made comparison and analysis of trends over time difficult. A voluntary, uniform reporting template developed by the UK Research Integrity Office with the Research Integrity Concordat Signatories Group has been in a pilot phase since November 2022.

Rapid advances in research and in research processes demonstrate the need to consider the impact of both on research integrity. Artificial intelligence (AI) is an example of an area with potential implications for research integrity (box 5). AI has been in development for some years but has recently received greater public attention because of wider availability of generative AI tools.

There are other advances in research and society that may be transformative and/or disruptive, ranging from advances in quantum computing, to growing awareness of issues relating to cyber-security, trusted research, and research that could produce dual use concerns (when both harm and good can come from the application of research). As these areas develop it will be necessary to ensure that research integrity requirements keep pace, understanding how principles such as transparency need to be applied.

There is a need to consider how to collect further information about UK research integrity and to make existing sources of information more consistent. Any new ways to collect information would need to be designed and deployed responsibly, and in line with principles of research integrity. This would include caution about unintended, negative consequences, and avoidance of undue bureaucratic burden in keeping with recommendations of the 2022 Review of Research Bureaucracy[21].

Disciplines have well-established approaches to provide support for research integrity. There is an opportunity to share practice between disciplines and to explore how practices and approaches support research integrity, including in interdisciplinary research.

Box 5 Artificial intelligence and research integrity

Artificial intelligence (AI) has been used widely in research for years, but its influence on research has picked up significantly since the introduction of generative AI models. Generative AI is capable of processing large amounts of data and images, and drawing conclusions based on that information. However, it is not the only type of AI used in research. Other programmes are used to generate findings and in processes that support a number of parts of the research lifecycle, including in publication. Additionally, the field of research that develops AI is large and growing, accounting for 3.8% of all peer reviewed publications in 2019[22].

In October 2022, the House of Commons Science, Innovation and Technology Committee opened an inquiry into Governance of Artificial Intelligence to examine evidence relating to the effectiveness of different governance models[23]. The Alan Turing Institute provides a guide to AI ethics, which includes values and principles for the responsible design and implementation of AI. These include the FAST Track principles, comprising fairness, accountability, sustainability and transparency. The guide provides helpful information, including the recommendation that AI should be auditable, reproducible, and available for monitoring[24]. The Ada Lovelace Institute has also highlighted ethical review processes for discussion, and suggested a need for research ethics committees and traditional research governance mechanisms to acquire a comprehensive understanding of the ethical challenges uniquely posed by AI[25].

Although AI can accelerate and augment research in many disciplines, it poses challenges in relation to integrity across all research. These especially relate to rigour and transparency but are also linked to other principles of research integrity including care and respect[26]. For instance, generative AI can synthesise credible text and image content, but may auto-plagiarise or could be used intentionally to fabricate results.

In early 2023, COPE, scholarly publishers, and other organisations stated that AI tools, such as Large Language Models, cannot be attributed as authors on research publications. Similarly, processes and outputs that have used machine learning pose a challenge to existing ways of assessing and supporting reproducibility, including when results of AI reasoning may not be precisely repeatable and when it is hard to make AI reasoning fully transparent. Equally, it is known that the quality and completeness of training data is vital to the credibility and appropriateness of the outputs of AI, and therefore to the results of research using it and in subsequent uptake and application of research results.

Tools that use AI can enhance research processes. For instance, some scholarly publishers use AI-driven tools to help with publication processes, and in 2021 COPE produced a discussion document about the use of AI in decision making for publishing[27]. AI can also help to identify matters relating to integrity in research. For instance the material about open data, code and preprints in PLOS journals that we have analysed and describe in box 9 was developed by PLOS and DataSeer using AI-driven approaches. There may be scope for greater use of AI in assessment of research integrity.

We appreciate the important and complex nature of AI as a research tool and research area in its own right. The rapid pace of development in AI requires an effort to maintain on-going awareness, plus monitoring and development of appropriate research culture for the field. We have started to convene experts across AI research, ethics, integrity, social sciences and industry to identify knowledge gaps and identify next steps in relation to AI and UK research integrity, this includes how experts in AI assess rigour in their own field.

Evidence about research integrity: the way forward

What we will do

To continue the development of responsible indicators of research integrity in 2023-2024, we will hold workshops in 2023 to take forward the work published in 2022 by UKRI, Cancer Research UK and GuildHE[20].

To support organisations in publishing an annual statement on research integrity, and to work towards a consistent approach to reporting, the Research Integrity Concordat Signatories Group is piloting use of its first non-compulsory template. In 2024, we will work with the signatories to learn from the pilot and identify next steps for reporting.

To provide information about how best to intervene, we are commissioning a review of the positive and negative influences on research integrity. This will be completed in 2024.

To understand trends in research integrity reporting and practice, we will conduct a further analysis of annual narrative statements from 2023-2025. This will include annual statements published by government departments and bodies.

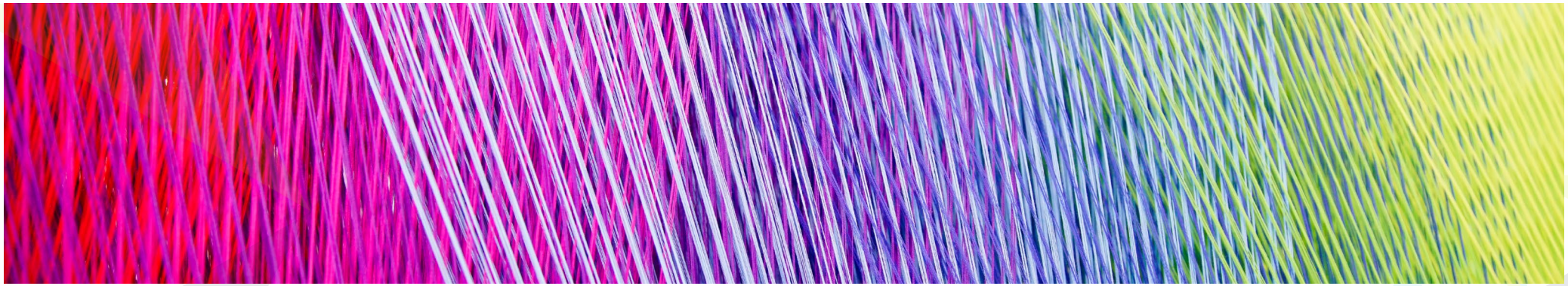
To address the growing use and impact of AI, we will continue our work to convene expert stakeholders. In 2023, this group will grow and will identify knowledge gaps and next steps.

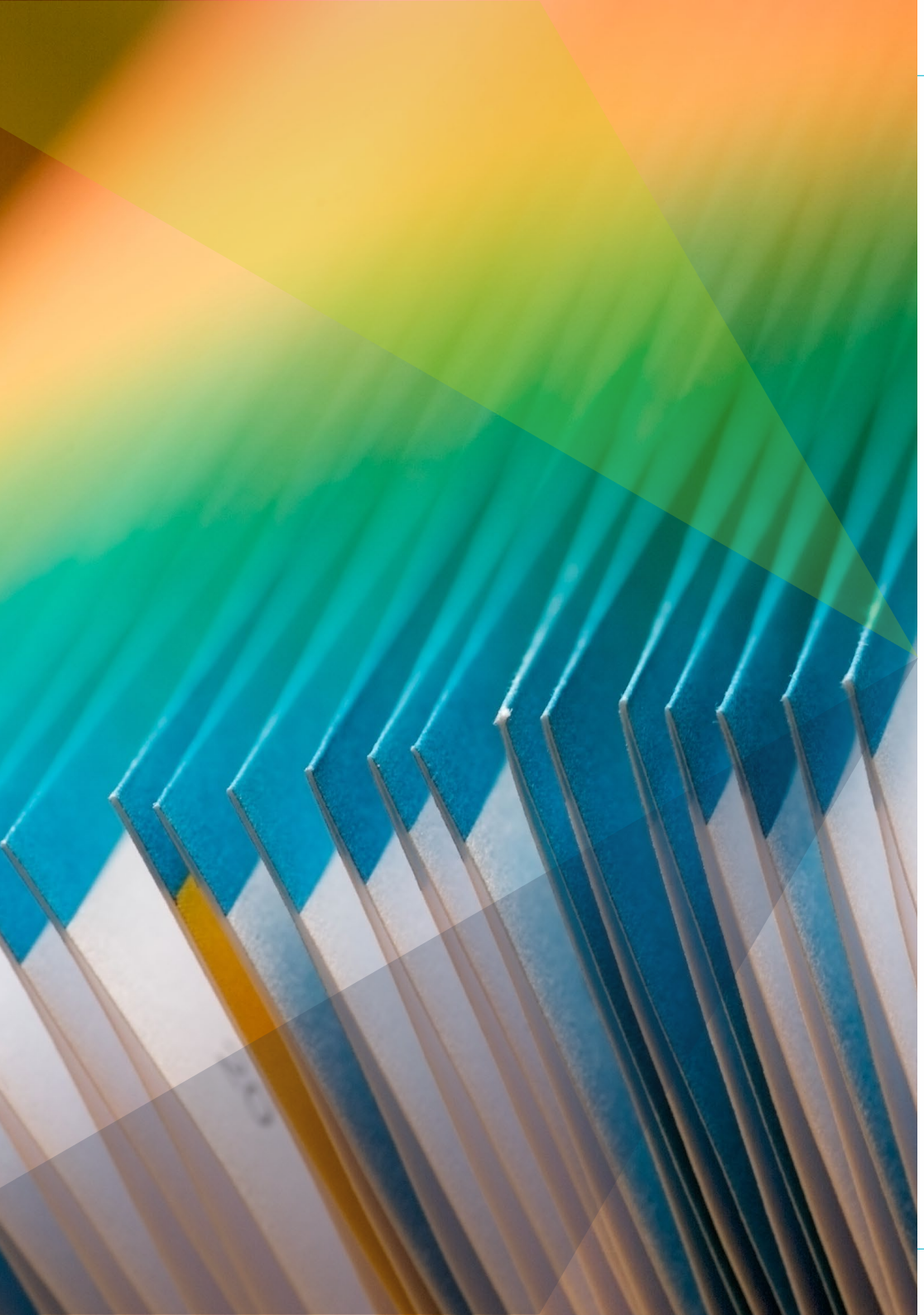
Areas for further development across the research sector

Engagement with the Concordat to Support Research Integrity provides organisations with clear principles, encourages self-reflection and helps to make integrity practices visible. We encourage all research performing organisations to consider how to engage with the Concordat to Support Research Integrity.

To support research integrity across all research areas, there is a need to share and to access more information and evidence about good practice in research integrity. We therefore encourage higher education, government, private and third sector research organisations to increase their sharing of good practice between different areas of UK research and across the UK research sector.

Organisations that provide training in research integrity should consider how best to evaluate the impact and benefit of such training to integrity practice. However, we acknowledge that this might first require the development or identification of appropriate indicators.





Rigour

"Rigour, in line with prevailing disciplinary norms and standards, and in performing research and using appropriate methods; in adhering to an agreed protocol where appropriate; in drawing interpretations and conclusions from the research; and in communicating the results."

UK Concordat to Support Research Integrity

The importance of rigour in research

Rigour is the technical quality of research and is central to its integrity, to the trust that others have in its findings and to the ability to reproduce or replicate the findings of research. The requirement for high levels of rigour applies to all disciplines, fields and parts of the research system.

What does rigour look like?

What constitutes rigour is often discipline-specific. In addition, the norms and best practices rightly develop over time, for example because of methodological developments.

In some disciplines for which rigour is understood in relation to reproducibility, the availability of primary data and clear descriptions of methodology may help demonstrate rigour. In fields such as the arts, the concept of reproducibility may be understood in different terms, particularly through reference to transparency. This is because the nature of an enquiry may only become clear through practice; methodology may be shaped by the researchers experience, and findings informed by the researchers' philosophical stance and/or critical framework.

In such fields, it is still necessary for the researchers to provide enough information and signposting for others to be able to understand how they reached their conclusions.

It is not always clear how newcomers to a field can access a clear articulation of norms and best practices in rigorous research It is also not always easy to tell whether research has been conducted with rigour[17]. This can be a particular challenge for interdisciplinary research in which it is important that people from different disciplines can understand, be assured of, and respect the rigour of their collaborators.

In IRIS, UK respondents reported that their research integrity was motivated by the benefits of obtaining more reliable scientific knowledge, and that their colleagues would have more trust in their research. Such motivation is consistent with results from other UK-focused surveys, including those conducted by Wellcome (2020) and Vitae (2020).

Rigour requires researchers to be competent in the techniques that they use and have access to training and support, but this can be in tension with a culture that requires rapid progress and publication. Provision and use of adequate skills for rigorous research training and support is vital. This supports new researchers entering a field and provides sound foundation for them to clearly articulate methods in any interdisciplinary or cross-sector research. Researchers need to understand any methodology they use, including its limitations. Equally, employing organisations need to support and train researchers in research methodology.

In the UK, doctoral students receive support and training in technical and research skills. Within organisations that have signed up to it, the Concordat to Support the Career Development of Researchers contains commitments for institutions, research funders, research managers and researchers[28].

There are several other activities and initiatives that enhance rigour. These include the San Francisco Declaration on Research Assessment (DORA) which, among other impacts relating to responsible use of research metrics, has led to greater acceptance of non-traditional research outputs. Networks such as the UK Reproducibility Network have developed resources and fostered conversations which are designed to improve rigour. To foster discussion about reproducibility and open science, ReproducibiliTea is a journal club that runs in many research organisations across the UK and internationally (box 6).

Box 6 Case study; a grassroots journal club focused on reproducibility and open science

"ReproducibiliTea has made me think more deeply on the most pressing issues surrounding research practices, academic culture and the need for improving how we currently approach science. These experiences greatly influenced how I conduct my own research."

Helena Gellersen, Postdoctoral researcher

ReproducibiliTea is a grassroots initiative launched in 2018 at the University of Oxford, and now supported by the UK Reproducibility Network. The initiative helps early career researchers to build supportive local communities within their institutions and to develop their understanding of open, reproducible and transparent research.

During ReproducibiliTea journal clubs, students and staff come together to discuss diverse issues, papers and ideas around improving science, reproducibility and the Open Science movement.

Club members usually select papers to discuss that are broadly relevant to reproducibility and methodological improvements across a wide range of disciplines.

ReproducibiliTea journal clubs prioritise creating safe and relaxed environments to encourage members to feel comfortable asking questions, sharing opinions and being open about challenges in their research. For example, they often provide hot drinks, lunch or snacks to encourage informality. There are currently ReproducibiliTea endorsed clubs in 140 institutions across 27 different countries

Why start an 'Open Science' journal club?

Concepts of integrity can have different connotations across different fields, and what constitutes good and bad practice is often not definitive. By setting up a journal club on open and reproducible research, early career researchers have access to a forum through which they can gain and share experience, while contributing to the improvement of their own research, their peers' research and wider research practice.

For more information on how to set up an Open Science journal club, go to https://reproducibilitea.org/getting-started/.

Rigour: the way forward

What we will do

To support a full understanding of rigour, and the diverse disciplinary approaches to it, we will use our convening role to work with learned societies and professional bodies to develop discussions of, and public articulation about, what constitutes rigour in their disciplines. Such discussions would benefit from the inclusion of researchers from across industry, government, higher education institutions and other research sectors.

Areas for further development across the research sector

More work is needed to explore whether novel approaches, such as registered reports (box 7), help to bolster rigour and related reproducibility. We encourage organisations who are piloting or introducing such initiatives to evaluate and describe their impact.

Box 7 Case study; enhancing rigour: registered reports

Across certain areas of research, including in how research is designed and carried out[29], registered reports are increasingly encouraged to emphasise the importance of the research question, enhance rigour in research design and reduce the risk of reporting and publication bias.

A registered report comprises a research methodology sent for peer review in advance of data collection. It is the first in a two-part process. The research team commits to publishing the findings and conclusions, regardless of nature or direction, once the research is completed and they receive an acceptance in principle for publication by publishers, regardless of the results. Over 300 journals use registered reports as part of their regular submission process, or have done special issues on them[30].

The opportunity for peer reviewers to inform methodology before data collection can increase rigour in study design. This works particularly well for null hypothesis testing study designs, although less well for other research like observational studies.

In addition to enhancing rigour, registered reports may be associated with decreasing reporting or publication bias, when decisions about what to publish are based on the findings of the research. This bias can lead to a distortion of results, influencing the overall trustworthiness of the research record.

Cancer Research UK is piloting a Registered Reports Funding Partnership Model to encourage grant applicants to opt-in. This model gives researchers a wide range of choice in where to submit their registered report. It also provides reassurance to funders that the research they fund is robust, it will be carried out as planned and is virtually guaranteed to be published. Applicants to a range of funding schedules operated by Cancer Research UK are able to opt into the registered reports pilot.

Transparency and open communication

"Transparency and open communication in declaring potential competing interests; in the reporting of research data collection methods; in the analysis and interpretation of data; in making research findings widely available, which includes publishing or otherwise sharing negative or null results to recognise their value as part of the research process; and in presenting the work to other researchers and to the public."

UK Concordat to Support Research Integrity

The importance of transparency and open communication

Transparency helps to protect trust in research, whether that is public trust in its findings or that of publishers, funders and researchers in the system. Transparency and open communication intersect with rigour and honesty and one way to demonstrate these is through transparency about how research is conducted. Like rigour, transparency and open communication underpin reproducibility and replicability.

Openness about perceived, or actual, conflicts of interest can increase confidence in the research because it enables people to gauge any influence or bias in the research process and in the evaluation of research.

Upholding the principle of openness in relation to methods and findings, whether through reports, "preprint" or "self-archived", or peer-reviewed publications, reduces the likelihood that confirmative and negative results are not published. Non-publication of results produces an incomplete research record.

Making underlying research outputs, data, or information available reduces wasteful duplication of effort, allows for data re-use and enables others to replicate, verify or better understand results and interpretations, and provides the chance to draw broader conclusions from individual pieces of work.

Author contribution statements are another way to provide transparency about individual contributions to research outputs. The Contribution Roles Taxonomy (CRediT), currently used by over 40 journals and publisher repositories, provides a useful framework for explaining individual roles in the development of published outputs[31].

Transparency and openness should be driven by the principle of being 'as open as possible, as closed as necessary'. This does not mean that researchers should lose intellectual property or competitive advantage, or that all research can be shared at the same stage of the research lifecycle.

Transparency is a complex area, there can be legitimate reasons not to share research results. For instance, the Government Office for Science provides a set of exemptions from transparency of research results that include legal obligations and commercial confidentiality[8], and the National Protective Security Authority provide further advice on security considerations[32]. Reasons for not being transparent should be articulated clearly and up front.

What transparency and open communication looks like

It is difficult to assess the degree of openness in relation to conflicts of interest. However, there is evidence available about transparency and openness in peer review, research data and research outputs. There is also information about approaches already in place that support transparency and openness. Members of COPE are obliged to investigate cases where editors, authors and reviewers fail to disclose competing interests, and many universities recognise failure to declare conflicts of interest as research misconduct.

76% of UK respondents in the 2021 IRIS thought that their organisation's publication and communication policies were effective, and 62% of researchers believed that that their organisation closely resembled an ideal in which "open access and clarity in public engagement are encouraged. Researchers are supported with publication matters such as preregistration, reproducibility, handling authorship disputes, responsible peer review practices."

An analysis of Vitae's 2021 Culture, Employment and Development in Academic Research Survey which surveyed 12,594 UK-based researchers at different stages in their career, indicated that 55% of early career researchers would like to receive training in open research, followed by 48% of established researchers and 34% of senior researchers[17].

There are several approaches to increasing transparency in publishing. The transparent peer review model has been adopted by numerous scholarly journals and publishers. This brings greater transparency to the evaluation of research submitted for publication, by making public domain reviewer reports, author responses and editorial decision letters available for review. Post publication open peer review, as well as the review of preprints, offers alternative approaches which also support the unbiased evaluation of research outputs.

The STM Association, the major trade body for research publishers, has developed a taxonomy to describe and standardise definitions and terminology in open peer-review practices. For instance for life sciences, the Materials Design Analysis Reporting framework was established to enable journals to support at article level the principles set out in the Transparency and Openness Promotion guidelines, which over 1,000 journals and publishers have adopted.

In relation to open access publication, the 2021 Research Excellence Framework implemented new requirements so that journal articles and relevant conference contributions should be open access to be eligible for Research Excellence Framework[33]. Analysis of Scopus and Unpaywall data conducted in 2019 indicates that 52.3% of UK publications were open access, which was higher than for the other countries surveyed which included all of the EU and ranged from 51.8% to 23.9% open access[34]. Research organisations, funders and publishers are showing a strong commitment to open access publishing. For example UKRI and the National Institute for Health and Care Research launched their Open Access policies[35] [36] for research articles in 2022, and UKRI is expanding this to include monographs, book chapters and edited collections in 2024.

UK universities and research organisations have been striking agreements for open access with a range of publishers, and the latest data shows that 96% of UKRI funded articles, based on previous years publishing patterns, are in journals that now offer open access options compliant with the UKRI policy, a 22.6% increase from when the policy started[37].

Many organisations and funders provide data storage and methods of access. Trusted Research Environments provide ways to access data in secure digital environments[38]. For instance, ADR UK (Administrative Data Research UK), comprising four national partnerships and the Office for National Statistics[39], as well as NHS Digital, provide a dedicated and secure research environment for approved users to access de-identified data[40].

Platforms that provide data access are not necessarily new; UK Data Service is the UK's largest repository of social, economic and population data and has evolved since its original foundation in 1967.

The use of data access statements in research publications is increasing but it is difficult to determine the extent to which UK research provides open access to research outputs and information through organisational, funder or public repositories. However, there is promising developments among research publishers, and the UK Reproducibility Network is developing open research indicators which it plan to pilot at some UK universities in 2023.

Openness is often put into practice and championed by open science movements and initiatives. These include focus on the importance of open research for reproducibility, with reproducibility as a vital component of research carried out with integrity. These initiatives include strong and growing stakeholder driven and grassroots work. For instance, GO FAIR works to implement the FAIR data principles, which provide guidelines to improve findability, accessibility, interoperability and reuse of digital assets[41].

Transparency in relation to clinical trials will be strengthened with proposed changes in legislation[42]. These changes would ensure that all clinical trials are registered on a public repository, and that researchers publish a summary of results within 12 months of a trial's completion and share the findings with those that participated in the research. These changes in legislation build on the Health Research Authority's (HRA) 'Make it Public' strategy which worked to make transparency easy, make it the norm and to make information public[43]. The HRA's evaluation indicates that the proportion of studies that informed participants of study results increased from 10% in 2019 to 29% in 2022/23. The HRA approach could be applied to other research areas.

Box 8 Case study; transparency and openness in the creative sector

Commitment to openness and transparency in the creative sector is demonstrated in the practice of Creative Informatics, a Creative Industry Cluster working in Edinburgh and south-east Scotland. Creative Informatics is part of the national programme of clusters that work across the creative sector to bring together a range of researchers ranging from arts to engineering. Supported by the Arts and Humanities Research Council and the Scottish Funding Council, Creative Informatics supports challenge projects, individuals and organisations. Creative Informatics makes its guidance documents publicly available online[A].

Documentation shared by Creative Informatics includes material focused on ethics and data management. These comprise their Research Ethics overview, which is a summary of the Research Ethics audit granted by Edinburgh College of Art; an Ethics Statement that describes their approach to ethical practice, values and priorities; and a data management plan relating to research and administrative data including information about data storage and release.

All documents are available through Zenodo, an open repository for which its own code is open source[B], with links to Zenodo provided on the Creative Informatics' Website[C]. The Ethics Statement has been downloaded over 800 times and has been used by other organisations including the Science Museum Group, a group of five UK museums who have adopted the data ethics checklist to help them understand ethical issues and issue data ethics approval for any advanced digital projects.

In 2022 Creative Informatics received the University of Edinburgh's Research Office Responsible Research Award. The award recognises and celebrates leadership and role models for good research practice.

A https://creativeinformatics.org/

B https://about.zenodo.org/

C https://creativeinformatics.org/about/

Transparency and open communication: the way forward

What we will do

To support open access to research data, we have already suggested that data access statements are mandatory for outputs submitted to a future Research Excellence Framework, allowing for exceptions if required. We will continue to advocate for all research to include data access statements that, where necessary, may explain why data cannot be made available.

Areas for further development across the research sector

There should be clear frameworks and processes for managing conflicts and for dealing with instances where serious conflicts have not been disclosed. To bring transparency to these frameworks and processes, they should be made openly available on institutional websites and be clearly signposted with links attached.

To support the norm of openness, while acknowledging that there will be reasons why source information cannot be shared, we encourage all researchers to explain clearly and up front how underlying data may be accessed and to explain any restrictions on sharing.

Secure, responsible storage and access to research data requires high quality infrastructure and support. This should remain a priority in research organisations and funders.

Box 9 Open science indicators

Open science is used as an umbrella term for practices aiming to make knowledge more available, accessible and reusable for all. In December 2022 the publisher PLOS partnered with DataSeer to produce a set of three open science indicators relating to publications in PLOS journals[44]. A second version was published in April 2023, which was used for this analysis[45]. The indicators include data shared in repositories, code shared publicly, and preprint publication for PLOS articles from January 2019 to December 2022. Analysis examined data relating to publications from China, Germany, Japan, UK and US as the top five countries in terms of the number of total publications included in dataset of publications in PLOS journals.

Analysis of the open dataset of information about PLOS publications shows that the proportion of articles with data and code shared, and preprints posted, has increased from 2019 to 2022. As shown in figures 3 – 5, from 2019-2022 the UK increased the amount of data shared in repositories (currently second in terms of proportion of the UK's total PLOS publications out of the included five countries), increased the amount of code shared (currently third in terms of proportion of the UK's total PLOS publications out of the included countries) and leads on the number of preprints posted as a proportion of all UK PLOS publications.

Figures 3 – 5: Comparison of trends in data sharing in a repository, code sharing, and preprints posting, for PLOS publications over the past four years (2019-2022) for top five countries with the highest number of total articles in PLOS journals, alongside the average for all countries represented as 'All'.

Figure 3 Trends in data sharing in a repository for PLOS articles, 2019-2022

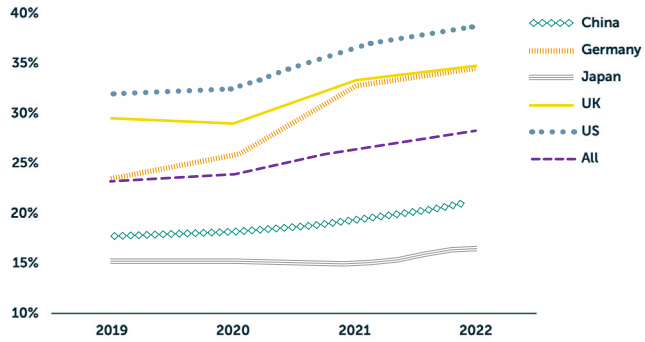


Figure 4 Trends in code sharing for PLOS articles, 2019-2022

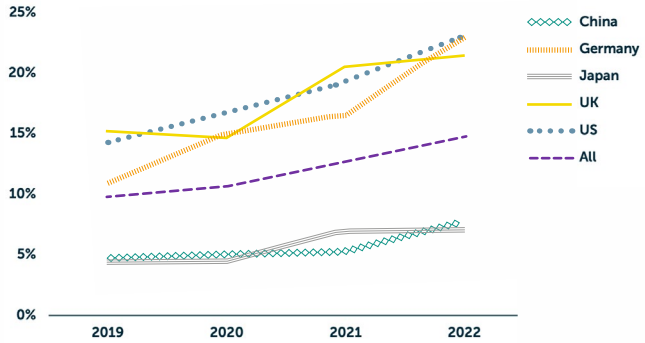
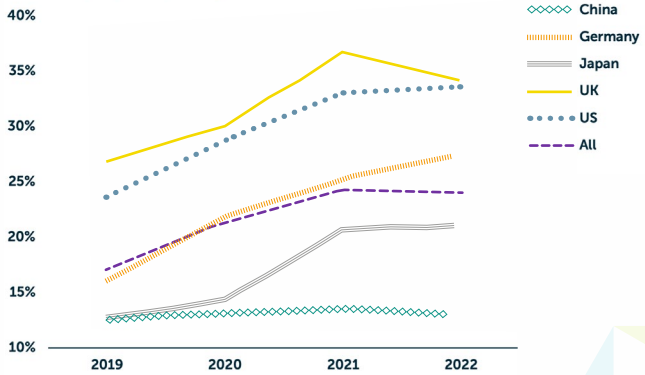


Figure 5 Trends in preprints posting for PLOS articles, 2019-2022



Honesty

"Honesty in all aspects of research, including in the presentation of research goals, intentions and findings; in reporting on research methods and procedures; in gathering data; in using and acknowledging the work of other researchers; and in conveying valid interpretations and making justifiable claims based on research findings."

UK Concordat to Support Research Integrity

The importance of honesty in research

Honesty underpins trust in research. Honesty is a fundamental principle in research integrity and honesty is needed to address other principles. Openness and transparency, in sharing data, attributing contribution, declaration of interests and describing research methodology, help demonstrate and encourage honesty.

What honesty looks like

Assessment of honesty requires use of self reported data and reflection about the presence of organisational systems and processes that support honesty.

IRIS included questions about eight questionable research practices (QRPs), some of which may indicate lack of honesty. The full dataset[46] shows that the UK is lowest ranked of the 34 countries surveyed by the mean number of QRPs that respondents said they had engaged in when working towards producing their research publications over the last three years. Figure 6 shows the levels of self reporting for each of the eight QRPs for the UK, and for an aggregate of all respondents to IRIS[14] [46].

The IRIS authors acknowledge that this difference could be due to lower frequency, failure to recognise QRPs, or unwillingness to disclose to them. Even so, with the majority of researchers surveyed acknowledging engagement in at least one QRP over the last three years, there may be more work needed to support and reward honesty. These data suggest that work is needed to identify why these QRPs happen, and to understand their impact.

Figure 6 Percentage of respondents stating that they have undertaken each QRP often, sometimes or rarely when working to produce publications over the past three years

	Including authors who had not contributed sufficiently	Not conducting a thorough review of manuscript	Inadequately supervising junior co-worker	Choosing not to report your own findings if they contradict your theories	Failing to cite publications that contradict your beliefs	Carrying out research without ethical approval	Failing to disclose conflict of interest	Using a researcher's idea without giving credit
Overall	64	52	52	23	18	15	8	7
UK	53	48	43	19	16	15	5	7

As well as a focus on how to reduce QRPs, organisations can work to encourage honesty. Honest errors occur in research and the research system benefits from a culture in which they can be freely disclosed, addressed and respected. Whilst honesty is part of an individual's character and demonstrated in their actions, organisations can provide systems that support honesty.

Many of the processes that seek to promote honesty, such as declarations of interest, focus mainly on financial and organisational issues. There are other issues worthy of declaration that are important aspects of acting with honesty. For instance, some disciplines in the social sciences and humanities see declaration of professional, personal or philosophical standpoints as an important part of honesty in research.

Organisations can seek to provide the circumstances that support, enable or encourage honesty. These include a strong culture of open discussion and learning, ongoing training and professional development, a whistleblowing policy that makes people feel safe in raising issues and protected when they do so and procedures to support honest discussion of biases and potential conflicts of interest. Fostering a diversity of people and ideas could make it easier for individual honesty to be strengthened. There are also circumstances that are likely to discourage honesty and inhibit other aspects of research integrity. These include excessive competitiveness and environments in which people do not feel free or sufficiently safe to speak up to discuss their concerns, questions, errors and mistakes.

Healthy research culture enables issues to be raised at all points in the research lifecycle. As well as supporting this culture through leadership, organisations can put in place channels through which individuals can safely raise issues. This is often done through research integrity champions or named research integrity contacts.

Our analysis of higher education institution annual statements (box 3) found 16 institutions mentioned the presence of research integrity advisors or champions. We would encourage these, and other institutions that appoint research integrity advisors or champions, to report how they evaluate the effectiveness and impact of these roles and of any resulting research integrity related interventions.

Honesty: the way forward

What we will do

To enhance honesty in research authorship declarations, we have suggested that author contribution statements are mandatory for outputs submitted to a future Research Excellence Framework, allowing for disciplinary exceptions if required. In 2023, we will continue to advocate for the increased use of author contribution statements.

Areas for further development across the research sector

To encourage honesty, all research organisations should continue to review how they encourage discussion about research practice and provide support for those who raise concerns, or who disclose that they have carried out a questionable research practice.

Organisations implementing practices such as research integrity champions should assess whether they achieve the intended aims, and report on this information in their annual research integrity statements.

We suggest that the 2024-2025 update to the Concordat to Support Research Integrity provides greater detail on the principle of honesty and how it applies to all involved in the research process.

Box 10 What does retraction data show us?

We sought to understand retraction rates and reasons for retractions of UK-authored research papers. We also wanted to consider how useful this information is.

We used data in The Retraction Watch Database†, which is the most comprehensive searchable database of retracted papers. An extract of the database containing all retracted publications (around 39,000) was provided by The Center for Scientific Integrity, the parent non-profit organisation of Retraction Watch. The entire Retraction Watch Database includes papers dating back to 1756. Therefore, our analysis only included data on papers originally published from 2003-2022 and retracted between 2010-2022.[15]

Between 2010-2022, 940 of the papers published since 2003 and with at least one UK co-author were retracted. As a proportion of all UK co-authored publications (data from Digital Sciences' research database 'Dimensions') this represents 0.025% of all publications that were originally published between 2003-2022.

In the top five countries by volume of publications, the UK's proportion of retracted papers (0.025%) is broadly in line with Germany (0.022%), Japan (0.028%) and USA (0.028%). China has a higher proportion of papers retracted at 0.24%.

Each entry in the database is coded with at least one, but usually multiple 'reason' codes, of which there are over 100. We assigned each reason to one of four categories:

- misconduct; where this was unambiguous, e.g. misconduct – official finding
- concern; concerns/issues about results, investigation by journal, objections by author
- error; error in data, miscommunication by author
- other; withdrawn – out of date, non-payment of fees

This analysis of the reasons for retraction amongst publications with a UK co-author suggested that 51% were retracted due to misconduct or a concern. The remaining publications only had reasons related to errors or 'other'. Of the 940 retracted UK-authored papers published between 2003-2022, one paper was withdrawn because it originated from a 'paper mill' (an organisation that sells fraudulent publications).

Retraction may depend upon the parties involved, such as publishers, editors, and authors' willingness to publish a retraction. Our analysis provides no indication of the numbers of publications that should, but have yet to, be retracted. The single instance of retraction of a UK-authored article in relation to paper mill involvement suggests that this form of misconduct may not have been a major concern in UK research during the period that the analysed data relates to.

It is essential to note that retractions are not a direct measure of research misconduct. Retractions are one tool for correcting the research record, and may be necessary due to errors, misconduct, or simply progress in knowledge. An increase in retraction rates could be a sign of a healthy, self-correcting system. Beyond this, analysis of retractions does not tell us much about the incidence of misconduct in the UK.

† http://retractiondatabase.org/

Care and respect

"Care and respect for all participants in research, and for the subjects, users and beneficiaries of research, including humans, animals, the environment and cultural objects. Those engaged with research must also show care and respect for the integrity of the research record."

UK Concordat to Support Research Integrity

The importance of care and respect

Integrity requires that researchers adhere to ethical principles and procedures. The importance of showing care and respect for humans or animals who take part in research, or who are the beneficiaries of research, is a key aspect that is considered when research is reviewed for acceptability by a research ethics committee.

There is increasing understanding that research needs to respect the environment, people and communities as well as heritage, cultural and historic artefacts. There is growing realisation that some research has historically involved appropriation or looting of material or information from communities who have had little say or benefit from the research.

Although not explicit in the Concordat definition, there is also a need for care and respect for research colleagues and collaborators. This includes respect of the development and progression needs of early career researchers, and respectful attribution for the contributions of everyone involved in research projects. This principle underpins the development of a research culture that supports equality, diversity and inclusion.

What care and respect looks like

Ethical conduct of research is heavily scrutinised and there is considerable discourse on how to improve care and respect shown to research participants and subjects. Research involving humans and animals is highly regulated by law and regulation. Research ethics committees operate with clear guidelines and regulations. The Home Office produces reports on animal research, and the Health Research Authority provides oversight of research in health and social care. There are a number of UK organisations who collect information about research, make information visible and work to improve the ethical quality of studies. These include NC3Rs, AllTrials and the James Lind Alliance.

In IRIS, 75% of UK respondents thought that their own organisation's ethics policies were effective and 67% believed that their organisation closely resembled one in which there are good standards of ethical review. This compares with 51% of US respondents, and 42% in the EU.

Reports over the last ten years have highlighted concerns about research culture that include lack of care and respect for others, particularly early career researchers[16][47]. This is wrong and corrosive to research integrity. There is extensive ongoing work that addresses care and respect for others, including the Forum for Tackling Bullying and Harassment in Research and Innovation[48], which represents a commitment from funding, policy and regulatory organisations in the UK.

Initiatives in diversity, equity and inclusion in research careers also seek to foster and demonstrate care and respect for everyone involved in research. There are many notable examples of work across research that addresses diversity, equity and inclusion, including the Athena SWAN and Race Equality Charters, as well as initiatives such as the Institute of Physics' Project Juno.

Care and respect can be framed as broad social and ethical responsibility. For innovation, including private sector R&D, the British Standards Institution standard PAS 440 was released in 2020[49]. Designed to enable companies to consider wider risks and implications of innovation, PAS 440 was developed with stakeholder involvement led by Innovate UK[50]. Stakeholders included innovators working in AI, life sciences, and robotics. PAS 440 has particular relevance to responsible design of early stage or disruptive technology, which includes AI (box 5). Standards and frameworks such as the PAS 440 are crucial in areas that strive to uphold research integrity, but that may not consider themselves to be directly engaged with the Concordat to Support Research Integrity.

In research involving heritage, cultural and historic artefacts, there are a number of statements and policies now available. These often include detailed articulation of care and respect. For instance, Historic England[51] has produced a statement on research integrity that adopts the principles of the Concordat to Support Research Integrity and expands the definition of those requiring care and respect to include ancient remains, as well as living humans and animals, owners of artefacts being studied, and indigenous peoples and communities.

Box 11 Case study; transparent and open communication alongside care and respect

A key priority of the Office for National Statistics (ONS) is to provide easily accessible, useful census data in a timely manner. ONS must also ensure that census data is kept safe and secure so that individuals are not identifiable in published material. These areas are in keeping with principles of transparent and open communication, as well as care and respect.

A high level overview of the census results is available online, summarised to show changes from the previous censuses. Until recently, organisations needed to request access to tailored census datasets, making it hard to access census data in a timely way and making it difficult for members of the public to access and engage with census information.

Improving access to census data

The ONS wanted to give members of the public and researchers the power to find and use data from Census 2021. To do so it developed an easy-to-use tool, the Create a Custom Dataset tool, that allows users to create their own datasets by selecting populations, areas and variables. The tool provides flexibility so that users can explore different combinations of data. The ONS protects personal data so that individuals cannot be identified.

"In a unique innovation for official statistics, this flexible table builder provides automatic protection of individual identities in detailed statistics, making sure that no individual can be picked out in the tables. It allows the ONS to release billions of anonymised census statistics far more quickly than ever before."

Jen Woolford, Director of Population Statistics

For some smaller or more dispersed groups, the ONS will be releasing pre-defined multivariate tables to provide the greatest level of detail possible whilst still protecting confidentiality.

Recognised impacts

The Create a Custom Dataset tool makes it easier for organisations to access the data they need, which encourages wider engagement with census data. Since launching the tool, there have been 46,000 sessions interrogating the multivariate data. After an initial flurry of visits around release day on 28 March 2023, access to the tool has stabilised at approximately 1,200 visits per day.

Care and respect: the way forward

What we will do

We will continue to embed research integrity in discussions about research culture. In 2023-2024 we will promote dialogue with groups active in promotion of a research culture that prioritises care and respect for all involved in research to support alignment between work on research culture and research integrity.

Areas for further development across the research sector

Understanding what constitutes care and respect is continually evolving. We suggest that funders and research organisations consider their commitment to care and respect as a key principle for research integrity. We encourage them to consider the relationship between care and respect and other aspects of research integrity, such as rigour. We encourage all organisations to become familiar and engaged with relevant guidance relating to responsible research and innovation.

To meet a duty of care and to protect research integrity, we encourage experienced researchers and their employing organisations to consider how best to deliver on their duty to care and respect, particularly for early career colleagues.

Accountability

"Accountability of funders, employers and researchers to collectively create a research environment in which individuals and organisations are empowered and enabled to own the research process. Those engaged with research must also ensure that individuals and organisations are held to account when behaviour falls short of the standards set by this concordat."

UK Concordat to Support Research Integrity

The importance of accountability

Researchers, research organisations, funders, publishers, learned and professional societies and regulators all have responsibilities to, and within, research. When an individual, group or organisation is accountable, they have to explain, and be assessed on, how they have fulfilled their responsibilities. In research, responsibilities that relate to integrity take place throughout the research lifecycle, which includes planning, funding, supporting, delivering and communicating research.

What accountability looks like

At stakeholder workshops that we convened in 2022, participants from across research suggested that despite the helpful Concordat description of accountability, there was still more work to be done. They suggested a need to define accountability, and to describe what integrity looks like in order to assess accountability for change and progress[21].

Participants held a common understanding that all organisations and individuals in research have a responsibility to uphold research integrity. However, they highlighted a need to develop visible lines of accountability, including clarity about who is responsible for different aspects of research, and to whom they are accountable.

Accountability requires clear governance. For those taking part in research to be accountable, it is important that people know who is responsible for what and to whom, especially in work that crosses organisational boundaries. For instance, in research publishing different responsibilities sit with the editors, peer reviewers, authors, publishers and employing institutions.

It is also important for all levels within organisations to understand how they know that the research they carry out, or fund, has integrity. This goes beyond having a research integrity team or an accountability process for approving annual statements.

Policy and legislation have impact on the resources available for, and the clarity of roles in relation to, accountability. In clinical research, the UK Policy Framework for Health and Social Care Research[52] clearly outlines the role of funders, chief investigators, sponsors and research organisations in the governance of research. This clarity is also often found in industry and in large international research organisations, many of which have established governance and accountability processes, through compliance or other functions.

However, the size and shape of organisations may bring unique challenges. For instance, in higher education, small specialist institutions may not have the resource to warrant a research integrity office.

IRIS findings indicate that recognition within their scholarly community may motivate researchers to adopt research integrity related practices. However, we have heard from across research that the work that individuals, teams and organisations do to enhance research integrity is not sufficiently recognised and rewarded.

Accountability: the way forward

What we will do

To strengthen accountability frameworks, in 2023-2024 we will work to understand and share best practice to demonstrate how accountability for research integrity can be embedded into organisations' structure and governance.

While much of this statement has focused on Higher Education contexts, research takes place in many other settings: charities, government, and others commission research. All research should share the same high standards of integrity to improve confidence in the findings, and to help ensure its quality. We will work to raise awareness of accountability within procurement processes and to embed the principles of research integrity as an expectation of commissioned work.

Areas for further development across the research sector

When assessing research, whether as part of funding applications, appraisals, appointments or promotions, there needs to be more consideration of how to value the work that individuals, teams and organisations do to enhance integrity.

Research misconduct

"Research misconduct is characterised as behaviours or actions that fall short of the standards of ethics, research and scholarship required to ensure that the integrity of research is upheld.... Honest errors and differences in, for example, research methodology or interpretations do not constitute research misconduct."

UK Concordat to Support Research Integrity

The importance of research misconduct

Misconduct, as defined by the Concordat, includes fabrication, falsification, plagiarism, failure to meet legal, ethical and professional obligations, misrepresentation, as well as improper dealing with allegations of research misconduct. Honest errors are not misconduct.

Research misconduct can cause considerable individual and social harm as highlighted in the recent report from the Science, Innovation and Technology Select Committee [12]. Misconduct also corrupts the research record, damages the future contributions of innocent members of the research community and wastes valuable resources.

The potential impact of misconduct on confidence in research should not be underestimated. Misconduct and how misconduct allegations are addressed also attracts considerable attention within and outside the research community.

What research misconduct looks like

For research that is carried out in universities and publicly funded research organisations, the signatories of the Concordat to Support Research Integrity require organisations to investigate allegations of misconduct and to publish information in an annual statement. Information should include the number of cases formally investigated, and what the organisation has learned from them.

Our analysis of higher education institutions' annual statements from 2019-2022 show that around 60% of statements report at least one allegation of misconduct, and around 28% report at least one formal investigation upheld in part or in full.

Allegations of research misconduct that are upheld can result in retraction of publications. Retraction may sometimes take place many years after publication, or after a considerable period of investigation. Retraction data (box 10) provides information about the UK and four other countries, but retraction rates do not provide robust information about levels of research misconduct, with 51% of UK retractions relating to misconduct or a 'concern'.

Importantly, retractions can take place for a variety of reasons, and retraction of a research publication can indicate honesty and good practice. On the other hand, there will be publications that are flawed but have not been retracted. We therefore do not consider incidence of retractions to be a precise indicator of the incidence of misconduct.

As well as their role in management of retractions, publishers recognise the key role they play in maintaining the integrity of the research record. They have a variety of initiatives aimed at upholding integrity, such as piloting software that enables detection of image manipulation. The publisher association STM has created an integrity hub as a shared tool through which members can identify manuscripts that violate accepted integrity standards[53].

The UK Research Integrity Office and COPE publish guidelines on how to handle allegations of misconduct that institutions can adopt or adapt. Research funders, such as UKRI, British Academy, Wellcome and Cancer Research UK, have set out clear expectations about research integrity and practice as part of their conditions of funding. These include that investigations of research misconduct should be completed in an impartial, fair and timely manner.

The UK does not have a national body that oversees investigations of research misconduct or acts as a place of final appeal. Such bodies exist in some other countries, such as Canada, Australia and the United States of America, though they have different remits and statutory status.

IRIS data suggests that 42% of UK researchers who responded believed that their organisation closely resembled an ideal in which integrity breaches are properly addressed. This was higher than the 29% of EU researchers who responded to IRIS. When asked whether they judged their organisation's policies on integrity breaches to be effective, 55% of respondents from the UK agreed.

A known barrier to handling research misconduct relates to the legal and ethical implications of sharing personal data between organisations, for example, between universities, funders and publishers. At present, research funders have different requirements about when and how alleged or upheld breaches of research integrity should be reported to them. This makes compliance burdensome and may cause non-compliance. In addition, lack of clarity about information sharing means that investigations of misconduct can fall between gaps. For example if individuals move between different sectors such as from higher education to industry or vice versa.

Wellcome and other funders have been working with the Information Commissioner's Office in 2023 to provide clarity on the legal position relating to data sharing between organisations about individuals who have been accused of misconduct or bullying and harassment. Recommendations for how employers of researchers and editors of journals collaborate when problems with integrity have recently been developed as a way to encourage timely communications and clear processes[54].

Despite the available evidence, we think that it is not yet possible to be precise about the incidence of misconduct in UK research. Precision requires better data collection and analysis, including information relating to research in organisations that do not have a commitment to publish an annual research integrity statement.

Box 12 Data on research misconduct from higher education institutions' annual statements on research integrity

The data on misconduct allegations, investigations and outcomes provided in annual statements is not sufficiently consistent to allow in-depth analysis. However, an interpretation of the statements could not identify any apparent spikes in misconduct cases around institutions of a given size or location, or with significant focus on a given research subject.

Of the 283 annual statements analysed, 189 report at least one misconduct allegation, investigation or outcome. Using 2020-2021 as an example, there were 277 allegations across 104 reports, with 154 investigations and 93 allegations upheld in part or in full.

Of the 189 reports with allegations or investigations, 101 (53%) provide a breakdown by type of misconduct. The most common cause of misconduct appears to be plagiarism, with 203 allegations reported in our dataset, followed by failure to meet legal, ethical and professional obligations (90 allegations) and misrepresentation (63 allegations).

There are a very small number of outlier institutions in terms of the number of cases reported. In these cases, numbers of allegations appear far larger than in other institutions, at about 20-60 allegations. However, from the information provided, these cases seem to relate to plagiarism by postgraduate research students, misconduct by taught students in the context of online learning and the reporting of large numbers of historical cases.

The most common outcomes from misconduct allegations and investigations are changes in procedures and practices, to mitigate or prevent future occurrences. In some cases, updates to training and communications about authorship principles have also been implemented.

Research misconduct: the way forward

What we will do

We have already analysed higher education institutions' annual research integrity statements. We also need to carry out further analysis to include annual research integrity statements from funders, independent research organisations, and government departments and bodies. We will conduct further analysis of published annual research integrity statements for our own 2025 statement to look at trends in data.

The UK does not have a national body that focuses solely on research misconduct. Our own work on poor research practice and research misconduct will build upon the UK Research Integrity Office's 2023 review of the barriers to dealing with research misconduct[55]. We are carrying out a full analysis and consultation about what the best approach to oversight might be for the UK, which we will report in 2025.

To enhance consistency between funders in their requirements of organisations in receipt of funding, and to reduce bureaucratic burden on research organisations, we will encourage alignment of policies and assurance processes in relation to misconduct. In 2023-2024 we will support and build on the work led by Wellcome and others on ways to facilitate appropriate information sharing on research misconduct.

Although many research active organisations are multi-national, publication of an annual statement on research integrity and reporting on transparency may be valuable. In 2023 we will open conversations with industry to identify how information about research misconduct might be shared by the private sector.

Areas for further development across the research sector

There should be clear and transparent approaches to the investigation of allegations of intentional misconduct across the research system.

It is currently not a requirement of the Concordat that annual statements include information about concerns that may not have reached internal thresholds to be recorded, or formally investigated. We encourage consideration about whether such information might be of value.

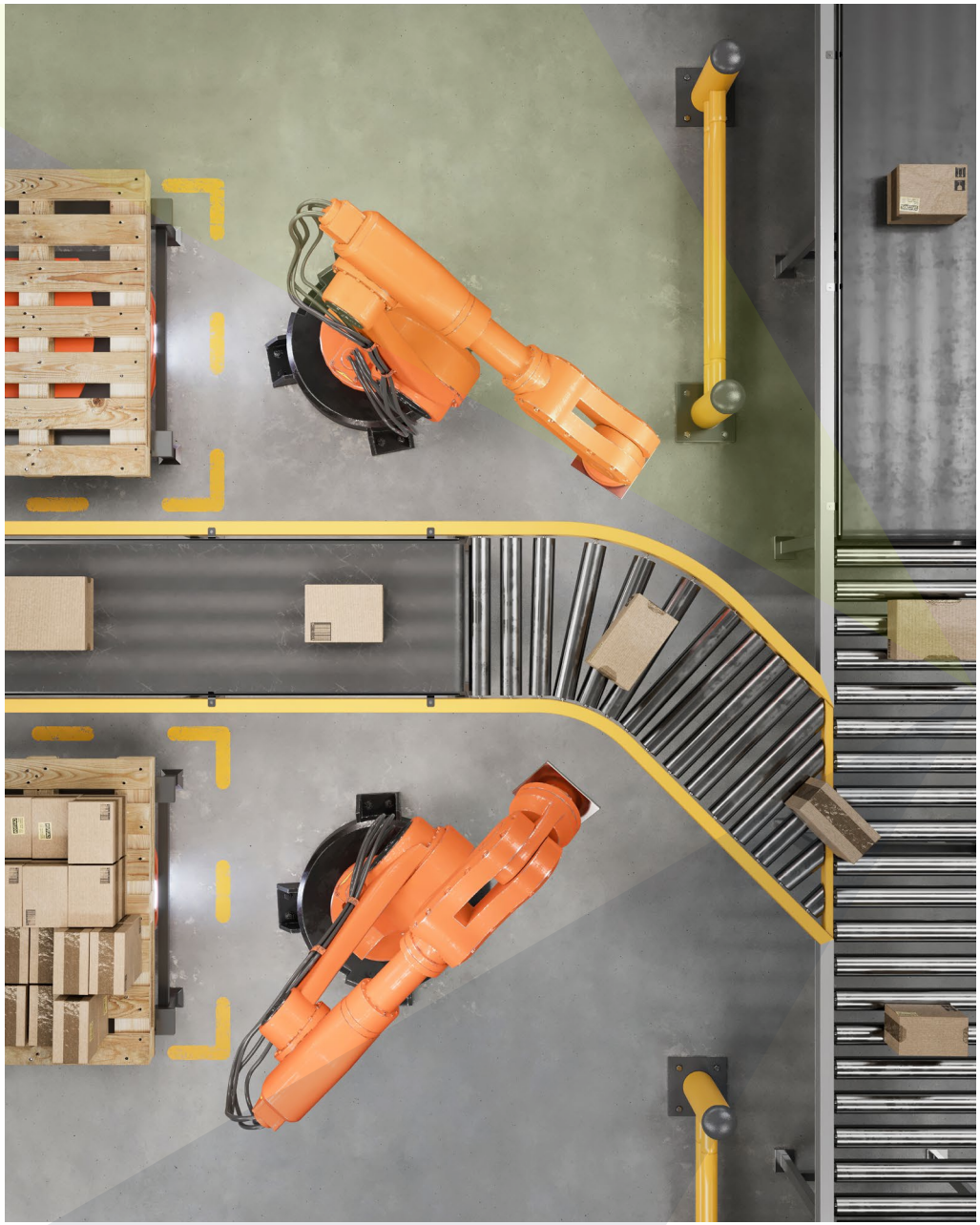
Further thought should be given to how best to increase transparency around the actions that are taken by organisations and research funders as a result of upheld allegations of research misconduct.

Conclusion

The first annual statement of the UK Committee on Research Integrity describes key features of the current landscape and knowledge in relation to research integrity in the UK. Our statement identifies future directions for our own work as well as opportunities for organisations and individuals across research. More detail about our work and plans can be found on our website[2]. In keeping with our commitment to openness, complete information about the new evidence contained in this statement has been published as supplementary material[15].

There are many existing activities relating to research integrity in the UK, although much more work is needed. The 2023 report from the House of Commons Science, Innovation and Technology Committee highlights the importance of continued focus on the integrity of research[12]. Looking to the future, such focus will need to continue to include efforts to ensure that research can be reproduced and understood.

Placing integrity at the centre of all UK research enhances and protects the quality of research and safeguards confidence in it. As the UK Committee on Research Integrity, we are optimistic that UK research integrity can, and will, remain strong, but this can only happen with continued sufficient attention and resource.



Acknowledgements

We thank the secretariat at the UK Committee on Research Integrity, Claire Henderson and Gillian Rendle, for their support to produce this statement, and colleagues at our host organisation UK Research and Innovation for analysis and being a critical friend, this includes Rachel Bruce, Joanna Jacklin, Claire Symeonides and Rebecca Veitch, as well as those involved in editing and producing the statement for publication.

Particular thanks to those who helped with the evidence used in this statement, including Nick Allum and Robin Brooker at the University of Essex, Janet Metcalfe at Vitae, and The Center for Scientific Integrity.

We also thank all those who took part in discussions with us in consultation processes, meetings, and at workshops and events: everyone's views have helped to shape the UK Committee on Research Integrity's first year's work and the content of this statement.

Thank you also to those who generously provided information for case studies. All individuals whose words have been quoted have provided their permission for inclusion.

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