

Research Integrity Annual Statement 1st January 2021 – 31st December 2021

1. Introduction

Research Integrity is a bedrock for trust in NPL, our impartiality, probity and the rigorous accuracy and reproducibility of our research. Everyone at NPL is required to act with integrity and comply with our code of conduct and our ethics policy. We are committed to the principles of the concordat to support research integrity:

1. upholding the highest standards of rigour and integrity in all aspects of research
2. ensuring that research is conducted according to appropriate ethical, legal and professional frameworks, obligations and standards
3. supporting a research environment that is underpinned by a culture of integrity and based on good governance, best practice, and support for the development of researchers
4. using transparent, timely, robust and fair processes to deal with allegations of research misconduct, should they arise
5. working together to strengthen the integrity of research and to review progress regularly and openly

As the UK's National Metrology Institute, NPL is keen to support [GO Science to implement the Concordat to Support Research Integrity within Government.](#)

This statement is publicly made to fulfil the recommendations made by the Concordat for annual reporting on research integrity and covers the period 1st January 2021 to 31st December 2021. The activities detailed are being undertaken to broaden understanding of research integrity and embed good practice across the organisation. This document is designed to be stand alone, with new developments for the year highlighted in each section, with developments made in previous years that have continued also discussed.

Web address of institutional research integrity page:

<https://www.npl.co.uk/corporate-information/research-integrity-governance>

Named contact points for:

- **Questions/ information on research integrity:**
 - Chief Scientist, [Professor JT Janssen](#)
 - Head of Science, [Professor Ian Gilmore](#)
 - Head of Metrology, [Professor Richard Brown](#)
 - Director of the Post Graduate Institute, [Professor Richard Burquete](#)
- **Concerns about research integrity/ research misconduct:**
 - Please email: integrity@npl.co.uk or ethics@npl.co.uk

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2. Key achievements supporting and strengthening research integrity

2.1. Policies, processes and systems

There have been significant efforts to ensure that our systems and processes meet the expectation of the concordat. The Knowledge Management System (KMS) for publications is now embedded within NPL processes. For each manuscript being prepared a Responsible Author must be identified and that person has responsibility for the research integrity of that paper. This includes obtaining at least one independent technical review within NPL, ensuring that any potential IP is checked out, deciding on authorship (using our new guidelines) and ensuring that the listed authors are properly ordered to reflect the author contributions. We have also made author contribution statements mandatory.

This data, along with other metadata, is recorded in the KMS. The system is automated to ensure that green copies of the manuscripts from publicly-funded research are freely available. We also encourage sharing of the data on domain relevant repositories or ensuring that they are archived openly. Over 1400 articles for publication and NPL reports have now been entered into the KMS system.

In 2020 we updated NPL's code of practice to include research misconduct and have explicitly stated what constitutes research misconduct based on the definition from the concordat. NPL's Ethics policy was revised in 2019, combining two previous policies – one for broader ethical considerations (including “business ethics”) and the other related solely to “science ethics”. The policy specifically highlights NPL's commitment to adhere to the Universities UK Concordat to Support Research Integrity and references The Government Office for Science's Universal Ethical Code for Scientists. In 2021, we posted an intranet blog on “Research Culture and Integrity” promoting the principles of the Concordat and highlighting learnings from the Wellcome Trust report on research culture. The blog encourages everyone to seek help and report any concerns about research misconduct (even if unsure) through confidential channels through the science leadership or directly to the Office of the Chief Scientist, using the confidential integrity@npl.co.uk or using NPL's whistleblowing policy.

In 2021 the ethics committee received and considered 5 project proposals that flagged one or more ethical issues in our ethics policy that needed approval to continue from the NPL ethics committee. Of these 5 proposals, 2 projects involved animals or animal tissue, 2 involve human participants as test subjects, and 1 was related with the use of human material. Approval was granted for each project.

In 2020 NPL increased its emphasis on the quality of its output and on the internal quality infrastructure by appointing ‘Quality Leads’ for each scientific group. These quality leads are the source and first point of contact for quality control and scientific best practice locally. They are responsible for ensuring the integrity and completeness of data on NPL's new Compliance Management System and more generally in ensuring compliance with NPL's Quality Management System. As this new structure has become established the Quality Leads have driven significant local improvements in data assurance, quality control, new tools and processes. The Quality Leads ensure sharing and dissemination of best practice and act as an

internal auditor for other areas of NPL whilst also driving implementation of best practice across NPL. In 2021 the community has helped to produce improved guidelines for the quality control, checking and approval of research outputs. These have now been embedded into the wider NPL Quality System.

NPL is playing a prominent role in highlighting issues of reproducibility in science through thought leadership articles defining best practice and extolling the benefits of accurate measurement, especially for [major societal challenges](#) such as climate change and COVID-19.

[We have led workshops to understand the role of NMI's](#) in addressing the challenges facing researchers with reproducibility, which has led to the International Committee for Weights and Measures (CIPM) introducing activities on open data and [increasing digitalisation](#).

NPL gave [written evidence](#) to the UK government's Reproducibility and Research Integrity Inquiry.

In the spirit of transparent research, we are publishing NPL's metrology research roadmaps. These set out some of societies greatest metrology challenges and we aim to use them to stimulate international collaboration, inspiring scientists to join us in creating collective solutions to overcome metrology barriers and improve reproducibility in research.

2.2. Training and awareness

All staff and students have conducted mandatory General Data Protection Regulation (GDPR) training in 2021.

On 6 October Ian Gilmore, Richard Brown and Louise Wright delivered three short seminars on the role of metrology in data integrity and research quality as part of an event organised jointly by NPL and the [UK Reproducibility Network](#)

These can be viewed on the UKRN YouTube channel: <https://youtu.be/41A829qfX5w> and pdf versions of the slides using the following links:

- [The measure of all things – Richard Brown](#)
- [Reproducibility in research and development – Ian Gilmore](#)
- [Digital approaches to improve reproducibility – Louise Wright](#)

The Quantum Electrical Metrology (QEM) group introduced a blind measurement protocol into the group's precision measurements in early 2021. This was in response to a growing recognition of the role of experimenter bias in the wider scientific community, and the particular problems of bias in precision metrology measurements where there is strong expectation that the result will fall within certain limits. Under the blind protocol, the lead experimenter cannot see the true result of the experiment while the measurements are underway, but only a scaled representation of the data. Thus, they cannot make deliberate or unconscious adjustments to bring the result closer to the expected value. One member of the team who is not directly involved in the experiments holds the software "key" to unlocking the true experimental result. This is only done after the measurements

have been completed. One member of the group, Stephen Giblin, wrote an internal blog article about the blind method. This generated a lot of interest and requests from other NPL scientists to share details of the method.

2.3. External memberships

- NPL is a member of the UK Research Integrity Office (UKRIO)
- We actively participate in the UK reproducibility network
- Ian Gilmore is a member of the newly established UK Committee on Research Integrity (UK CORI)

3. Research Misconduct

3.1. NPL provides assurance that the processes in place for dealing with allegations of misconduct are transparent, robust and fair and that they are appropriate to the needs of the organisation.

Research Misconduct is defined in our code of conduct. Allegations can be made to our science leadership team escalating from Science Area Leaders (33 groups), Department Heads of Science (9 departments) to the Office of the Chief Scientist or they can be made directly to the Office of the Chief Scientist (see our Research Integrity webpages for contact details). NPL also has a whistle blowing policy. Investigations are conducted according to our disciplinary procedure.

3.2. The NPL Statement on any formal investigations of research misconduct that have been undertaken.

A summary is provided in Table 1 showing the number of formal investigations completed in this period and of those, the number which were upheld (either in whole or in part).

In 2021, NPL has received one allegation of research misconduct as a breach of duty of care. This was investigated and the allegation was upheld.

NPL confirms that we have fulfilled any requirements to make reports to external bodies, including regulatory and professional bodies, regarding the initiation or completion of a formal investigation.

3.3. The NPL Statement on any lessons learnt from formal investigations of research misconduct that have been undertaken.

Following the investigation, the line manager was sent on a training course, and we learned the importance of keeping training records up to date and regularly revisited. We will improve our processes accordingly.

**Professor JT Janssen
Chief Scientist
National Physical Laboratory (NPL)**

Table 1 Research Integrity Statement – 1st January 2021 to 31st December 2021

	Number of allegations for which an investigation has been undertaken	Number of allegations upheld (in whole or in part)
Fabrication	0	0
Falsification	0	0
Plagiarism	0	0
Misrepresentation	0	0
Breach of Ethics	0	0
Breach of Duty of Care	1	1
Authorship disputes	0	0
Other e.g., unprofessional behaviour relating to research misconduct	0	0