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PUSHING THE FRONTIERS OF INNOVATIVE RESEARCH

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Towards a Research Integrity Culture at Universities:

From Recommendations to Implementation

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About LERU

LERU was formed in 2002 as an association of research-intensive universities sharing the values of high-quality teaching in an environment of internationally competitive research. The League is committed to: education through awareness of the frontiers of human understanding; the creation of new knowledge through basic research, which is the ultimate source of innovation in society; the promotion of research across a broad front, which creates a unique capacity to reconfigure activities in response to new opportunities and problems. The purpose of the League is to advocate these values, to influence policy in Europe and to develop best practice through mutual exchange of experience.

Executive summary

The excellence of, and trust in, research produced by universities is inherently linked to the integrity of their researchers. Given that the research process increasingly involves collaboration that transcends disciplinary, institutional and national boundaries, universities have a collective responsibility in developing and implementing a research and educational environment which supports research integrity, thereby maintaining and strengthening confidence in their researchers' work.

As a network of 23 research-intensive universities within Europe, LERU wants to endorse this collective responsibility by encouraging its members and others to commit to making issues of research integrity part of their strategy (e.g. by developing a research integrity development plan which may be part of, or complimentary to, their general strategic plan). This paper outlines how this could be done. We propose five key actions which could support research integrity within universities:

1. **Universities should empower sound research**

   Universities should ensure that the research performed by their researchers is both sound and verifiable. This can be done by implementing measures to guard against suboptimal research practices, some of which are referred to as 'sloppy science' or 'questionable research practices' and can be applied across the whole project lifecycle. These include measures to improve research design and conduct, improving the soundness of reporting results, valuing negative results and replication studies, facilitating cooperative and multidisciplinary team work and ensuring a continuous effort is made in improving approaches to research integrity within a university.

2. **Universities should educate researchers in research integrity at all academic career levels**

   It is important that all researchers have the necessary skills to be able to conduct their research and themselves with integrity. Training could focus specifically on research integrity as a specific topic, or focus on providing further guidance on practical measures to promote research integrity. The overall aim of research integrity training should be to empower researchers to recognise and deal with problems of research integrity that they may face. Research integrity training should be available across all career levels from undergraduate to senior researchers and should cover all disciplines. Supervisors should receive specific training on how to supervise with integrity. Given the international nature of research, local, national and international differences in research integrity should be addressed and common standards developed for joint projects.

3. **Universities should ensure that institutional guidelines and support structures are put in place**

   The development of institutional guidelines and the establishment of institutional support structures and functions are essential in the framework of a research integrity policy. Staff with a specific responsibility for research integrity should be appointed to execute and monitor the university's research integrity policy. Staff should be able to raise any concerns so confidential counsellors or advisors should be appointed at both the university and faculty level. Safe harbours should be developed to avoid anonymous reporting, and anonymous complaints should only be investigated in exceptional circumstances. Universities should develop a committee or committees to handle allegations of misconduct if not installed at a national level.

4. **Universities should be transparent and accountable**

   In recent years there has a been a cultural change in which the outcomes of research are expected to be available to a wider public, in what has been termed 'open science'. This brings both opportunities and challenges with regard to research integrity and researchers should be made aware of this. With research open to a wider public, there are opportunities for greater awareness and scrutiny of research results. Universities should encourage researchers to make research data 'open' and provide a research infrastructure in which responsible management of research data is facilitated. Guidance should be

developed for researchers on the appropriate use of secondary data from other sources. Research should be credited in a proper and transparent way through responsible authorship or acknowledgment, and previously published research should be properly cited.

More broadly, universities should also be transparent at the level of the commitment to research integrity starting with an easy access to documentation on research integrity, procedures for handling allegations, and a way of reporting allegations. Finally, universities are encouraged to participate in the research integrity debate at the regional, national or international level.

5. Universities should foster a research integrity culture

Research integrity should be part of the global research culture at universities. This will require a realignment of incentives within the university environment, where a reward system is introduced which is fairer to researchers who may conduct excellent but not newsworthy research. Universities should monitor and improve the research integrity climate by looking at the effectiveness of research integrity measures over time to assess the impact of initiatives taken to improve integrity.

This paper consists of three parts:

- In Part 1, we present an overview of the recommendations of the paper in an easy to read manner. This section can be used by readers as a quick guide to check an individual universities research integrity strategy against or to identify particular elements of the main paper which they may be particularly interested in.

- In Part 2, we present the main part of the paper which outlines the five actions in more detail, together with a more detailed rationale for each of the recommendations mentioned within each of these actions.

- In Part 3, we outline some of the actions LERU universities have done to improve research integrity at their universities. We hope that this will act as an inspiration to other universities in developing their own ways to improve research integrity culture within their institutions.

This paper has been written to provide universities with an aspirational framework for developing their own research integrity strategy. The actual recommendations which will be employed will, of course, depend on the specific circumstances at a particular university.

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Part 1 Summary of recommendations

This section is a summary of the recommendations presented in the paper. They should be viewed as a non-prescriptive and aspirational list of what universities could do to improve the research integrity culture at their universities, as the particular circumstances of each university will determine what is actually implemented and when.

Universities should empower sound research

1. Improve the design and conduct of research.
   a. Improve knowledge of, and use of, statistics;
   b. Ensure all researchers receive guidance in research design, methodology and analysis, to be able to analyse research relevant to their own field of knowledge according to the newest standards and understand the limitations of their own research design and analysis;
   c. Encourage the use of checklists to improve research design.

2. Improve the soundness of reporting.
   a. Encourage the use of clear reporting guidelines where appropriate;
   b. Encourage researchers to pre-register studies where appropriate;
   c. Encourage researchers to publish all relevant components regarding their experimental design.

3. Value negative results and replication studies, perhaps by using the university-based portals where other means are not available.

4. Facilitate cooperative and/or multidisciplinary team work in research.
   a. Further encourage teamwork between staff working on projects, for example the interaction between research technicians and project staff;
   b. Further encourage the formation of research teams with overlapping skills, in order to independently check and maintain oversight of research data, cross-training team members, and do overlapping tasks, thereby minimising the risks associated with individual researchers carrying too much responsibility;
   c. Provide guidance supporting good interaction between supervisor and PhD students.

5. Instil a continuous improvement mindset with regard to research integrity.

Universities should educate researchers in research integrity at all career levels

1. Make research integrity education mandatory for PhD researchers and research students and offer training for more senior researchers.
2. Integrate research integrity education at the undergraduate and taught Masters level in existing or new courses.
3. Broaden the scope of research integrity training, cover all disciplines and address the differences in culture between disciplines.
4. Support good mentorship.
5. Empower researchers to perform in line with good research practice and challenge potential problems in research.

Universities should ensure that institutional guidelines and support structures are put in place

1. Develop institutional guidelines on good research practice.
2. Appoint personnel with special responsibility for research integrity. Universities could appoint an individual who has responsibility for the execution and evaluation of (parts of) the research integrity policy of the institution and evaluating its practices and results.
3. Appoint confidential counsellors or advisors. We advise the appointment of easily accessible confidential counsellors/ advisors whom staff can approach to raise concerns, not only at the university level, but also at the faculty level.
4. Appoint a Committee or Committees to handle allegations of research misconduct. Universities could appoint an independent Committee or Committees to handle allegations of researcher misconduct (if not installed at a national level). Such committees may be established as standing panels, or on an *ad hoc* basis in response to specific cases. The former is preferred because expertise in handling allegations can be built over time. Committees should be able to rely on external and independent experts.
5. Universities could develop safe harbours in order to avoid the need for anonymous reports. Anonymous allegations should only be considered in exceptional cases.

Universities should be transparent and accountable

1. Ensure all researchers are aware of the Open Science and Scholarship principle and the benefits and limitations of Open Science with regards to research integrity.
2. Develop guidance about the secondary use of research data from other sources to ensure such analyses are appropriate.
3. Develop guidance on how researchers can make their own data open with due consideration of the limitations to future reuse by third parties and/or attribution to the original creators.
4. Provide a research infrastructure in which responsible management of research data is facilitated (FAIR principles).
5. Encourage researchers to make raw data available, either through journal supplementary data sections or through dedicated university-based portals or discipline-specific data repositories.
6. Ensure research is credited in a proper way and be transparent in author's contributions and responsibilities.
7. Ensure previously published research is properly cited.
8. Have clear and accessible documentation regarding research integrity.
9. Commit to providing easy access to procedures for handling allegations of researcher misconduct, including whistle-blower protection, and easy access to a means of reporting allegations.
10. Each university could produce a publicly accessible annual statement on research integrity.
11. Universities could encourage participation in the debate on research integrity, for instance by attending events on research integrity at the European or national level.

Universities should foster a culture of research integrity

1. Make research integrity part of the global research culture.
2. Install the right incentives, by introducing a reward system which is fairer to those researchers who conduct excellent, but maybe not newsworthy research.
3. Monitor and improve the research integrity climate, making evaluations of the effectiveness of the research integrity measures over time to assess the impact of initiatives taken to improve research integrity.

Part 2 What can universities do to encourage research integrity?

Introduction

The excellence of research produced by universities is intrinsically linked to the integrity of their researchers. As research increasingly encompasses global collaboration and the new paradigms of inter- and multi-disciplinary research, universities should be at the forefront of developing and implementing new approaches to research integrity that will maintain and strengthen the confidence of the public, governments, research funders and end-users in their research work, and also researchers of different disciplines in each other's work. Consequently, universities have a collective responsibility to ensure and demonstrate how they support and promote the integrity of their research and their researchers and embed a culture of research integrity within their organisation.

Trustworthiness of researchers is a core part of research, so universities and other research institutions have increasingly taken measures towards securing research integrity. By paying particular attention to addressing issues of researcher integrity they can demonstrate that their research is being conducted responsibly and they are taking their responsibilities seriously.

The importance of research integrity is also reflected in some important developments at the European level. The proposal for the Regulation of the European Parliament and of the Council establishing the next Framework Programme for Research and Innovation, called Horizon Europe, explicitly mentions that research integrity will play a central role[1]. Research Integrity is also one of the eight priorities that were defined by the Open Science Policy Platform[2].

Several codes of conduct have been developed at both the international and national level. The European ALLEA-code is the leading code of conduct in Europe[3]. LERU participated in the revision of this European Code in 2017. In most countries, there are also important codes (and revisions taking place of these codes) at the national level[4]. At the institutional level, many universities have already established structures or procedures for dealing with issues of research integrity including setting up (*ad hoc*) committees, appointing confidential counsellors, employing research integrity officers, setting up training programs, and organising conferences. LERU universities acknowledge the important role of networks formed around research integrity to share experiences and good practices.

Ensuring the integrity of research requires the involvement of a range of actors in the research community. Core to this, of course, is the behaviour of researchers (researcher integrity). Through conducting their work in an honest, rigorous, open and transparent manner, researchers can help to ensure that the integrity of their research is not called into question. As institutions we need to support researchers to meet such high standards. However, creating a culture of research integrity also requires broader steps to be taken. Institutions

1 European Commission (2018) Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing Horizon Europe – the Framework Programme for Research and Innovation, laying down its rules for participation and dissemination. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52018PC0435 on 26th November 2019.

2 European Commission (2019) Open Science Policy Platform. Retrieved from https://ec.europa.eu/research/openscience/index.cfm?pg=open-science-policy-platform on 26th November 2019.

3 ALLEA (2017) The European Code of Conduct on Research Integrity. Retrieved from https://allea.org/code-of-conduct/ on 26th November 2019.

4 A Mutual Learning Exercise (MLE) on Research Integrity has recently taken place in Europe in order to support EU Member States and associated countries in designing, implementing and/or evaluating different policy instruments in relation to some topics in the field of research integrity. See https://rio.jrc.ec.europa.eu/en/policy-support-facility/mle-research-integrity for more information.

need to build and apply principles, standards, policies and processes that encourage good practice and ensure that research findings are accurate and trustworthy. Applying these principles and standards in specific research contexts can help researchers to do their research in a way that maximises its value to research users.

It is an organisation's responsibility to maintain a research and educational environment that supports integrity[5,6]. LERU recognises this organisational responsibility and supports its members, especially their leaders, to develop further institutional policies with regard to researcher integrity. LERU encourages its members and others to commit to making issues of research integrity part of their strategy (e.g. by developing a research integrity development plan which may be part of or complimentary to their general strategic plan).

This document has been developed by the LERU Thematic Group on Research Integrity in cooperation with the LERU Thematic Group on Ethics. We aim to help university research leaders further develop their research integrity policies and fulfil their duty of care to their research communities. Their engagement with these issues, with institutional leadership in efforts to improve the integrity of their research and researchers, will be a crucial factor in driving change. Institutional commitment should also include allocating sufficient resources (including funding, human resource and senior management focus as necessary) to support research integrity initiatives and structures.

Five broad topics are covered in this paper:

1. Empowering Sound Research
2. Training and Supervision
3. Establishing Professional Structures
4. Transparency and Accountability
5. Fostering a Research Integrity Culture

LERU refers to the fundamental principles to which all research at LERU universities should adhere and that are included in the European ALLEA Code of Conduct: reliability, honesty, respect and accountability[7]. The ALLEA Code defines them as being:

- ***Reliability*** in ensuring the quality of research is reflected in the design, the methodology, the analysis and the use of resources.

- ***Honesty*** in developing, undertaking, reviewing, reporting and communicating research in a transparent, fair, full and unbiased way.

- ***Respect*** for colleagues, research participants, society, ecosystems, cultural heritage and the environment.

- ***Accountability*** for the research from idea to publication, for its management and organisation, for training, supervision and mentoring, and for its wider impacts.

Non-compliance with these principles undermines the integrity of and trust in research. Infringements can include fabrication, falsification and plagiarism (FFP) as well as wider and more common unacceptable research practices (e.g. manipulating authorship or denigrating the role of other researchers in publications, duplicating publications and 'salami slicing' publications).

5 PRINTEGER (2018, February 7th) Working with research integrity – guidance for research performing organisations: The Bonn PRINTEGER Statement. Retrieved from https://printeger.eu/the-bonn-printeger-statement/ on 26th November 2019

6 Universities UK (2019, October). The Concordat to Support Research Integrity. Retrieved from https://www.universitiesuk.ac.uk/policy-and-analysis/reports/Documents/2019/the-concordat-to-support-research-integrity.pdf on 26th November 2019

7 ALLEA (2017) The European Code of Conduct on Research Integrity. Retrieved from https://allea.org/code-of-conduct/ on 26th November 2019.

1. Universities should empower sound research

This section considers the different mechanisms universities could employ to enhance the rigour of research carried out at their institutions. A range of suboptimal research practices relating to study planning, design, conduct and reporting (some of which have been considered 'sloppy science') can limit the validity or the usefulness of the research claims made[8]. These lost opportunities to improve research soundness may, in aggregate, have a great impact. To enable and support reproducible and rigorous research, we recommend that universities develop strategies to:

1.1 Improve the design and conduct of research

Weaknesses in the design, conduct and analysis of quantitative and qualitative research can have a major effect on the reproducibility and usefulness of research. Improvements could be facilitated by ensuring that these are embedded into training initiatives, support structures[9] and organisational codes of conduct for research. This could be achieved by:

- **Improving the knowledge of, and use of, statistics.** There are many disciplines where effective statistics management is required but under-provided. Universities should empower sound research by emphasising the central importance of the appropriate and effective use of statistics. This will help improve the actual science and also the soundness of the results obtained.

- **Ensuring all researchers (including aspiring and advanced) receive guidance in research design, methodology and analysis[10] to be able to analyse research relevant to their own field of knowledge[11] according to the newest standards and understand the limitations to their own experimental design and analysis.** Where appropriate this should include taking active steps to encourage and enable research teams to standardise their research procedures and where applicable, engaging with statisticians as part of their research[12]. Given that different disciplines have different needs (e.g. quantitative data analysis versus qualitative data analysis) and no one can effectively cover all disciplines, it is important that people with knowledge in experimental design and analysis familiar with the needs of different disciplines are available for consultation, and are consulted. Another interesting and possibly more efficient approach is to incorporate statisticians and data scientists as collaborators in a research team from the outset of the project. Sufficient financial resources for methodologists need to be secured within project funding or provided by other sources. Collaborative settings are likely to attract and retain well qualified and highly motivated persons to such positions (see also section 1.4 regarding teamwork).

- **Encouraging the use of checklists to improve research design.** In the biomedical sciences area, PREPARE[13] and SPIRIT[14] guidelines provide a series of detailed checklists for researchers to design their studies. Similar initiatives could be envisaged in different fields as appropriate.

8 Munafò, M., Nosek, B., Bishop, D. et al (2017). A manifesto for reproducible science. Nat Hum Behav 1, 0021 https://doi.org/10.1038/s41562-016-0021

9 For example, the University of Zurich (through the Centre for Reproducible Sciences) and the University of Utrecht have support structures in place to aid experimental design and statistics.

10 PRINTEGER (2018, February 7th) Working with research integrity – guidance for research performing organisations: The Bonn PRINTEGER Statement. Retrieved from https://printeger.eu/the-bonn-printeger-statement/ on 26th November 2019

11 Macleod M.R., Mitchie, S., Roberts, I. et al (2014) Biomedical research: Increasing Value, Reducing Waste. https://doi.org/10.1016/S0140-6736(13)62329-6

12 Science and Technology Committee (Commons): Research Integrity. Retrieved from https://www.parliament.uk/business/committees/committees-a-z/commons-select/science-and-technology-committee/inquiries/parliament-2017/research-integrity-17-19/ on 29th November 2019

13 Smith, A.J., Clutton, R.E., Lilley, E., et al (2017) PREPARE: guidelines for planning animal research and testing. Laboratory Animals. https://doi.org/10.1177%2F0023677217724823

14 SPIRIT (2019) Welcome to the SPIRIT Statement Website. Retrieved from https://www.spirit-statement.org/ on 26th November 2019.

1.2 Improve the soundness of reporting

Institutions could take a range of actions to improve the soundness of their research reporting:

- **Universities could encourage the use of clear reporting guidelines where appropriate.** These can be valuable in improving consistency and soundness in reporting. The Equator Network[15] provides a series of reporting guidelines in the biomedical sciences domain. One of the guidelines, the ARRIVE Guidelines[16], provides detailed checklists for researchers conducting animal pre-clinical studies to report their studies, and thus help improve the integrity of their research. However, in our view, such guidelines should only be part of a broader strategy[17,18], and they cannot be seen as a panacea.

  Registered reports, whereby a scientist pre-registers a study prior to carrying it out, and other pre-registered studies have been successfully used within the biomedical and animal sciences communities for several years. There are now also some calls for preregistering qualitative studies[19]. Recent innovations include the registered funding model, where journals participate in grant peer review and undertake to **publish the findings whatever they show**. Although not necessarily relevant for all disciplines, **universities could encourage researchers to pre-register studies where appropriate. This is already legally mandatory for clinical trials in most countries.** Moreover, scientists should be required to publish the results of clinical trials. LERU agrees with the Science and Technology Committee in the UK that "selective non-publication of the results of research distorts the published evidence base and is a threat to research integrity." [20]

- Well-documented study protocols are a pre-requisite for enabling attempts at replication faithful to the original study design, a cornerstone of self-correcting science. In practice, the materials and methods section of journals are necessarily limited for space, and thus only the bare minimum of data on experimental conditions is given. Publishing the full experimental conditions is possible through the supplementary data sections of many journals or repositories. **Universities could encourage their researchers to publish all relevant components regarding their research design**, but this should be done in a way that is cognisant of disciplinary difference and the views of researchers as to what components are important and where these should be published.

1.3 Value negative results and replication studies

There is a distinct bias towards valuing data which report significant novel findings. Negative results and replication studies, often discarded or overlooked, could, in our view, be valued more[21]. Whilst many journals decline the opportunity to publish replication studies or those which provide neutral

15 Equator Network (2019) Enhancing the QUAlity and Transparency Of health Research. Retrieved from http://www.equator-network.org/ on 26th November 2019.

16 du Sert NP et al. (2019) The ARRIVE guidelines 2019: updated guidelines for reporting animal research. https://www.biorxiv.org/content/10.1101/703181v1

17 Macleod, M.R. The NPQIP Collaborative group (2017) Findings of a retrospective, controlled cohort study of the impact of a change in Nature journals' editorial policy for life sciences research on the completeness of reporting study design and execution bioRxiv 187245: https://doi.org/10.1101/187245

18 Hair, K., Macleod, M, Sena, E (2018) A randomised controlled trial of an Intervention to Improve Compliance with the ARRIVE guidelines (IICARus). bioRxiv https://doi.org/10.1186/s41073-019-0069-3

19 Haven, T.L. Van Grootel, L. (2019) Preregistering qualitative research, Accountability in Research, 26:3, 229-244, https://www.tandfonline.com/doi/full/10.1080/08989621.2019.1580147

20 Commons Select Committee (2018, October 30th) Failing to publish results from clinical trials presents risk to human health. Retrieved from: https://www.parliament.uk/business/committees/committees-a-z/commons-select/science-and-technology-committee/news-parliament-2017/clinical-trials-transparency-report-publication-17-19/

21 KNAW (2018) Improving reproducibility in the empirical sciences. Amsterdam, KNAW. Retrieved from https://www.knaw.nl/shared/resources/actueel/publicaties/pdf/20180115-replication-studies-web on 26th November 2019. The advisory report of the Royal Netherlands Academy of Arts and Sciences recommends that replication studies in the empirical sciences "*should be conducted more frequently and systematically than is currently the case*" but that "*researchers should make careful assessments of the desirability of replication studies and consider the expected costs and benefits of conducting such studies compared to alternative approaches.*" Original studies without replication should actually be valued less and replication should become the norm. The importance of replication should be incorporated into the education of all empirical scientists. Funders, journals, research performing institutions and researchers are jointly called to action.

or negative results, they have scientific value. In a context where the findings of many published studies cannot be repeated, such studies may prevent further losses in time and money. In the latest version of the Declaration of Helsinki it is stated that "Every research study involving human subjects must be registered in a publicly accessible database before recruitment of the first subject" and that "Researchers have a duty to make publicly available the results of their research... Negative and inconclusive as well as positive results must be published or otherwise made publicly available"[22].

While recognising that greater publication of negative results requires action from across the research community, universities could encourage their researchers to publish such results where possible.
Institutions may wish to utilise university-based portals (subject to appropriate quality review) where other means of publication are not available. **Universities should also give more credit to authors reporting such studies and to authors of replication studies within the university ecosystem.** As KNAW acknowledges, replication studies appear to account for only a few percent of published studies in most disciplines, so more replication studies are desirable and researchers and institutions have a responsibility to perform them[23] (*c.f.* section below on incentives and open science).

1.4 Facilitate cooperative and /or multidisciplinary team work in research

The complexity of modern research challenges often requires a multidisciplinary approach[24], and one which makes use of specialised resources as and when needed. Today's science and scholarship frequently entails teamwork. This brings advantages in terms of scientific and scholarly understanding but also brings challenges to ensuring research integrity and rigor.

Universities could take steps to ensure that the benefits of collaboration for research soundness are captured and that the challenges are tackled. This could be achieved in several ways:

- **Universities could further facilitate and encourage teamwork, for instance the interaction between research technicians and project staff.**
  Misunderstandings on both sides can significantly hinder the quality (or soundness) of the research and could largely be avoided[25].

- **Universities could further encourage the formation of research teams with overlapping skills, in order to check independently and maintain oversight of research data, cross-training team members, and to do overlapping tasks, thereby minimising the risks associated with individual researchers carrying too much responsibility**[26].

22 WHO International Clinical Trials Results Platform (ICTRP) (2015, April 9th) WHO Statement on Public Disclosure of Clinical Trial Results. Retrieved from https://www.who.int/ictrp/results/reporting/en/ on 26th November 2019

23 KNAW (2018) Improving reproducibility in the empirical sciences. Amsterdam, KNAW. Retrieved from https://www.knaw.nl/shared/resources/actueel/publicaties/pdf/20180115-replication-studies-web on 26th November 2019

24 LERU published in 2012 a report on the future of social sciences and humanities providing examples of this interdisciplinary work, see van den Doel, W. et al (2013, September) Retrieved from https://www.leru.org/files/The-Future-of-the-Social-Sciences-and-Humanities-in-Europe-Full-paper.pdf on 26th November 2019

25 This could be as simple as having short group meetings to agree objectives at the beginning of the day (for example University Medical Centre Utrecht) or having places for people to meet and discuss issues. It could also be facilitated by introducing interdisciplinary training where different aligned team members learn about the roles of others (for example Trinity College Dublin School of Health Sciences)

26 Lee, Y-N, Walsh, J.P. (2019, February 5th), Building reliable teams, a cure for research pathologies. Retrieved from https://blogs.lse.ac.uk/impactofsocialsciences/2019/02/05/building-reliable-teams-a-cure-for-research-pathologies/ on 26th November 2019

- **Universities could provide guidance supporting good interaction between supervisor and PhD student**, e.g. a supervisor has an important role in reviewing the raw data of the PhD student.

1.5 Instil a continuous improvement mindset with regard to research integrity

Universities could further develop a continuous improvement approach (such as the *Kaizen*[27] approach) to assessing research integrity at their universities. Even for the best researchers, it is likely that some aspects of their performance could be improved, leading to further improvements in the soundness and value of their work. It is therefore important to see research improvement as something which is important for all of those involved with research, no matter their current level of performance. Institutions could become more directly involved in partnering with their research teams to facilitate and support research excellence not just in funding, publication and commercial exploitation but also in design, conduct, analysis and openness. **An institution might achieve this through articulating a research improvement strategy, seeking improvements in various aspects of research performance.** Some of these indicators may be relevant across all research domains (publication in open access, availability of datasets) while others might be specific to individual research domains (delay to publication of results of registered clinical trials; randomisation and blinding of *in vitro* and *in vivo* experiments). There will be an important role for sharing best practice and benchmarking between institutions. In the short-term, this could start from a departmental base and cover a wider, perhaps institutional, perspective over time.

Institutions would develop and implement strategies to improve performance; and either embed the strategy into their routine working (if successful) or develop alternative strategies (if unsuccessful). It is likely that a successful research improvement strategy will establish a long list of potential targets for improvement, then select from these a smaller number of prioritised targets for their first efforts. As these targets are reached, focus may then shift to other targets, with continuing improvements in research soundness.

27 *Kaizen* (Japanese for Continuous Improvement) is a strategy where employees at all levels of a company work together proactively to achieve regular, incremental improvements to a process. In a sense, it combines the collective talents within a company to create a powerful engine for improvement. See https://www.leanproduction.com/kaizen.html for details)

2. Universities should educate researchers in research integrity at all career levels

Research integrity training in its broadest sense covers a vast range of training, from a single session on what research integrity is and how this impacts research, all the way through to courses on research methodology, statistical analysis for different settings, modules on responsible authorship, on how to conduct peer review, mentoring, academic writing, etc. It also encompasses training on governance areas such as data protection, research data management, research ethics, open access, etc. In addition, it also includes the personal skills researchers require to be able to conduct data collection and recruit participants, to work collaboratively with other researchers and disciplines, and to lead research teams effectively and supportively. Education and training in research integrity in this broad sense is essential to good research practice.

Therefore, LERU universities could offer training and development opportunities for researchers and research students at *all* stages of the academic career. Training courses may focus specifically on research integrity as a specific topic, or focus on providing further guidance on practical measures to promote research integrity, such as research design (including appropriate use of statistical methodology), record keeping and data management, responsible image processing, responsible authorship and publication, avoiding plagiarism and self-plagiarism.

The specific content of the training will differ according to the experience and responsibilities of the researchers and the needs of the institution. However, what is important is that researchers have the opportunity to undertake the training relevant to their research and their learning needs and level of experience, to ensure that they have the requisite skills to be able to conduct their research, and themselves, with integrity. It is therefore important that the institution provides access to such training and highlights the importance for researchers to be aware of their training needs and to attend such training.

In addition to specific training courses, awareness raising, sharing tools and resources, and guidance documents are also a valuable educational tool and could, in some cases, be used as an alternative to creating training courses on specific topics.

Universities should:

2.1 Make research integrity education mandatory for PhD researchers and research students and offer training for more senior researchers

As it is a constitutive element of research literacy and of responsible scientific practice, it is important that the knowledge of and skills to develop research integrity are not seen as addenda to the core curriculum, but rather as an essential competence for future researchers. However, institutions should be allowed flexibility in how they achieve this. It is important not to start from a top-down approach that introduces integrity courses in one single format for universities or courses, but rather one that implements a tailor-made and often discipline-specific approach that is sensitive to the local context.

2.2 Integrate research integrity education at the undergraduate and taught Masters level in existing or new courses

LERU believes that there are strong reasons to introduce research integrity education in the curriculum at undergraduate and taught Masters level, since the training of future scientists needs to begin before the PhD level. Such training is likely to be generic and introductory, and will be tailored to specific topics, but students should be aware of the basic concepts and practices of research integrity (in particular the importance of rigorous research design and documentation, ethics, avoidance of plagiarism and the practice of proper referencing).

2.3 Broaden the scope of research integrity training, cover all disciplines and address the differences in culture between disciplines

Teaching research integrity should include attention to problems of falsification, fabrication and plagiarism. However, it cannot be restricted to these aspects. These obvious problems with researcher integrity form a small proportion of integrity issues. Other poor-quality

research and study practices are more common and also potentially more relevant for student projects. In particular here we refer to the grey areas in Questionable Research Practices or 'sloppy science' (see also section 1). This might include courses addressing misattributed authorship, flawed study design, P-hacking, HARKing (hypothesizing after the results are known) and 'cherry picking' results. It is important that a broad range of integrity issues be addressed in a manner that is tailored to and consistent to the stage of research.

In the practice of teaching, there is a tendency to consider research integrity to be especially relevant for researchers in the field of life sciences. Of course, some debates on research integrity are specific to particular disciplines (as for example issues on authorship or experimental research). However other issues are applicable for all research fields (e.g. power relations between supervisors and students). Therefore, teaching research integrity is important for all academic disciplines. In the teaching methods, the specifics of the different academic fields should be incorporated[28].

2.4 Support good mentorship

Top-level management and permanent staff need to play a key role in mentoring and being role models for younger and more transient staff who may not be aware of the university's research culture. Students and supervisors have a shared responsibility to develop attitudes and skills to deal with issues of research integrity, and to create learning situations that encourage participants to behave with integrity, while maintaining a realistic understanding of the hierarchical structures of academia. There is not only training needed on research integrity for supervisors but also specifically on how to supervise with integrity.

2.5 Empower researchers to perform in line with good research practice and challenge potential problems in research

Research integrity cannot (and should not) be reduced to a mechanical process of making researchers familiar with checklists or anti-plagiarism forms and procedures describing how misconduct is dealt with. Notwithstanding the value of these tools in the process of thesis writing or research design, the aim of the teaching should also be to *empower* researchers to recognise and deal with (potential) problems of research integrity and to understand its relevance.

This entails the promotion of awareness and of the importance of transparency and accountability as well as a focus on the norms and values that lie behind good research practice. Researchers should have the competence to enact these norms in the daily practice of scientific and scholarly work, especially in the grey zones they may encounter where checklists may not provide clear answers on how to act. Importantly, such training should emphasise opportunities to use a focus on best research practice to secure even greater value from what is already good research. In follow up training modules, researchers can also be empowered by discussing real-life cases and dilemmas they have encountered in their daily practice.

Empowering researchers is not only relevant in terms of topics and themes, but also necessary to address adequately the differences in culture between disciplines (e.g. order of authors on a publication or the acceptability of joint publications of a supervisor with a PhD student). Furthermore, local, national and international differences should be addressed and common standards developed. This is important, because research projects are becoming increasingly interdisciplinary and embedded in international consortia. Attention to this element can be achieved by using examples in which cultural or disciplinary dimensions play a role.

28 For example, the Bioethics Commission at the University of Barcelona has developed specific guidelines for social interventions (anthropology, sociology, etc.) to show researchers the ethical issues (and legal requirements) related to questionnaires and surveys. See http://www.ub.edu/comissiobioetica/en/formsheets for information

3. Universities should ensure that institutional guidelines and support structures are put in place

The development of institutional guidelines and the establishment of institutional support structures and functions are essential in the framework of a research integrity policy and include a variety of aspects and roles. LERU encourages universities to:

3.1 Develop institutional guidelines on good research practices

Universities need to develop guidelines or standard operating procedures (SOP) related to research integrity, or at least a position in existing guidelines, to make clear what the expected behaviour is in operational terms, e.g. in dealing with authorship, data management, disclosure of conflict of interest amongst others. It is important that these guidelines are translated into different disciplines and taken up by deans and other senior faculty members responsible for research.

3.2 Appoint personnel with special responsibility for research integrity

Although the reactive side of research integrity policy cannot be neglected, emphasis should be put on the proactive side. It is important to gauge the awareness of issues of research integrity in the organisation, and to develop activities and strategies to increase the awareness of research integrity (in its broadest sense) across the institution. As mentioned previously, it is important to then embed a process of continuous review to then evaluate these activities and measures to strengthen good research practice and to address issues of researcher integrity. **Universities could appoint an individual who has responsibility for the execution and evaluation of (parts of) the research integrity policy of the institution and evaluating the practices and results.** Awareness of the importance of research integrity can be strengthened also by lessons learned from misconduct cases.

3.3 Appoint confidential counsellors or advisors

It is important that researchers are able to seek advice from others and obtain strictly confidential advice. In many cases researchers face problems that they do not immediately want to share with their colleagues. This counts especially when these relate to a relationship in which the researcher is partly dependent for his or her career on the other, as is e.g. the case in the relationship between a PhD and supervisor. Having allocated individuals that researchers could approach to seek advice would provide a safe space for them to raise concerns. Such individuals could also advise on issues relating to ethical issues, authorship amongst others. To enhance both accessibility and understanding of specific research culture **we advise the appointment of easily accessible confidential counsellors/advisors whom staff can approach to raise concerns, not only at university level, but also at faculty level**.

3.4 Appoint a committee or committees to handle allegations of research misconduct

Universities should also take cases of research misconduct seriously, investigating allegations and taking appropriate steps where allegations are upheld. **Universities should appoint an independent committee or committees to handle allegations of researcher misconduct (if not installed at the national level). Such committees may be established as standing panels or on an *ad hoc* basis in response to specific cases. The former is preferred because expertise in handling allegations can be built over time. Committees should be able to rely on external and independent experts**. These committees may also be supported by specific software, for instance plagiarism detection programmes, in order to help detect bad research practices. In case of allegations or presumption of misconduct,

it is important that cases are handled meticulously and within a reasonable timeframe. The reputations of researchers and/or the institution can be rapidly damaged in case of an allegation. Committees should handle cases in a confidential manner and consider the interests of all parties involved. Where allegations are not upheld, institutions should take appropriate steps to ensure that this is made known to any parties who were aware of the allegation (making this public where necessary).

Institutions could also ensure that appropriate protections are in place to protect whistle-blowers. It is vital that whistle-blowers feel able to make allegations in good faith without fear of reprisal (e.g. by the accused person) and that universities make clear in their procedures that they will ensure that whistleblowing in good faith shall not give rise to negative consequences for the whistle-blower. For instance, a university should consider appointing a new supervisor in cases where a junior researcher 'blows the whistle' about his/her supervisor. **Universities should develop safe harbours by offering the right protection to whistle-blowers in order to avoid the need for anonymous reports. Anonymous allegations should only be considered in exceptional cases**. Communication officers should also be well informed on issues of research misconduct, complaint procedures and be able to advise on communication strategies in sensitive cases (see section 4).

Finally, institutions could take active steps to ensure that the research record is corrected, although they are dependent on journals for the implementation of corrections or retractions.

4. Universities should be transparent and accountable

Universities should be transparent and accountable at different levels: at the level of the research outcome (open access, open data, transparency in authors' contributions and responsibilities), at the level of the commitment to research integrity (research Integrity policies should be accessible), at the level of the handling of research misconduct cases, and finally by participating in the debate.

4.1 Be transparent in research

LERU encourages universities to:

- **Ensure that all researchers are aware of the Open Science and Scholarship principle and the benefits and limitations of Open Science with regards to research integrity**

Open Science, the collection of scientific practices through which materials, code and data from all stages of research and reports are made accessible across all levels of an inquiring society, can potentially be a significant benefit to research integrity. By opening findings as early as possible, it gives the opportunity for quality review throughout a project and not just at the end[29]. The TOP Guidelines[30] provide a suite of tools to guide implementation of better, more transparent research.

However, Open Science can bring some research integrity challenges, for example, through the misuse of secondary data or poor *post hoc* analysis of data where the background of the study is not adequately considered (either knowingly or unknowingly). It is also particularly challenging when the original data set has been subject to strict controls over the experimental protocol, for example in clinical studies, in which cases junior researchers may not know how to comply with Open Science principles. **Universities are recommended to develop guidance about the secondary use of research data from other sources to ensure that such analyses are appropriate. Universities are also recommended to develop guidance on how researchers can make their own data open with due consideration of the limitations to future reuse by third parties and/or attribution to the original creators[31]**. Likewise, all researchers within universities need to be made aware in research integrity training of the benefits and limitations to open data, especially with regard to how it applies to their research.

- **Provide a research infrastructure in which responsible management of research data is facilitated (FAIR-principles)**

The responsible management of research data is imperative to research integrity and Open Science more generally. Without this, research has significantly less rigour, and is less resistant to scrutiny. Universities have a crucial role in encouraging and providing an environment where research data are correctly managed throughout the project lifecycle.

Access to primary results, the raw data on which conclusions are based, should be made available to research users (readers) according to the FAIR[32] data principles. This allows experiments to be reproduced and verified. This is an important part of Open Science and, for example, most UK funders require information underpinning a publication

29 Since Open Science's ecosystem is broader than basic science as different stakeholders can be involved in a research project this can increase the complexity of co-operation between stakeholders and therefore breaches of integrity. Therefore, it is important to delineate the responsibilities in the use of data and IPR before submission of a project

30 Nosek, B.A., Alter, G., Banks, G.C. et al. (2015) Science 26 Jun 2015: 1422-1425 DOI: https://doi.org/10.1126/science.aab2374

31 For example, on how the data was gathered, what kind of metadata needs to be provided, and under what conditions it can be reused. It could also include copyright notices. For more information, see Science and Technology Committee (Commons): Research Integrity. Retrieved from https://www.parliament.uk/business/committees/committees-a-z/commons-select/science-and-technology-committee/inquiries/parliament-2017/research-integrity-17-19/ on 26th November 2019

32 FAIR – findable, accessible, interoperable and reusable, and as open as possible, as closed as necessary. See Wilkinson, M.D. et al. (2016) The FAIR Guiding Principles for scientific data management and stewardship. https://doi.org/10.1038/sdata.2016.18

to be made available. **Universities could encourage their researchers to make the raw data available, either through journals' supplementary data sections or through dedicated university-based portals or discipline-specific data repositories**[33] where such data can be uploaded and opened to the community respecting ethical, legal and contractual terms. LERU universities acknowledge that not all data can be published; in particular limitations may be placed on the publication of confidential data, data collected from participants without their informed consent, and data which can be misused and therefore poses security risk.

- **Ensure research is credited in a proper way and be transparent in authors' contributions and responsibilities**

A cohesive and inclusive research culture assumes that all those who contribute towards a research project receive appropriate recognition for their role in producing its results (usually through authorship or acknowledgement). Authorship rules are not always clear to researchers. Universities could "articulate expectations about author roles and responsibilities to provide a point of common understanding for discussion of authorship across research teams"[34]. The ICMJE recommendations[35] on authorship in the medical sciences provide extra guidance on these issues. Within these discussions about authorship, as noted by McNutt et al (2018) attention should also be paid to the important role and accompanying responsibilities of the corresponding authors that includes (but is not limited to) the confirmation that data/materials/code presentation accurately reflects the original[36].

LERU members are encouraged to use the CRediT taxonomy[37] (Contributor Roles Taxonomy) or similar tools, as an educational tool within the institution to enhance an open dialogue on authorship within research groups while projects are still in the research phase and to increase transparency around researcher contributions in scientific publications.

Finally, crediting the right persons in the context of a research proposal needs also special attention and could be incorporated in a broader discussion on the culture of proposal writing.

- **Ensure previously published research is properly cited**

Being transparent as a researcher also means that previously published research should be properly cited in new publications when the described research would not have been possible without, and builds upon, that previous research. Checking a text for missed citations and/or duplication prior to submission or publication could prevent plagiarism and helps ensure research integrity. Specific plagiarism detection programs can be helpful in order to detect high similarities to existing sources for instance in draft grant proposals and research manuscripts.

4.2 Transparent research integrity policies

- **Have clear and accessible documentation regarding research integrity**

The commitment of universities to research integrity should be visible and researchers and external stakeholders should find the information about the institutional policies in an easy way. At least, it should be clear that universities endorse the European Code of Conduct for Research Integrity, but some universities are also obliged to align with national codes or may also draw up local/institutional guidelines. In an internal LERU report[38] by Dr. Itziar de Lecuona (Universitat de Barcelona) and Dr. Erika Löfström (University of Helsinki), it was recommended that integrity guidance should be no more than three 'clicks' away from the university home page. Easy access to guidance is an important part of encouraging adherence to university integrity expectations and generating interest in institutional policies. It is also a question of trust

33 For example, the Quantitive Data Repository (https://qdr.syr.edu) aims to provide an open source platform through which researchers can make their data available

34 McNutt, M.K., Bradford M. Drazen, J.M. (2018) Transparency in authors' contributions and responsibilities to promote integrity in scientific publication. Proceedings of the National Academy of Sciences Mar 2018, 115 (11) 2557-2560; https://doi.org/10.1073/pnas.1715374115

35 ICMJE (2019) Defining the Role of Authors and Contributors. Retrieved from http://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html on 26th November 2019

36 McNutt, M.K., Bradford M. Drazen, J.M. (2018) Transparency in authors' contributions and responsibilities to promote integrity in scientific publication. Proceedings of the National Academy of Sciences Mar 2018, 115 (11) 2557-2560; https://doi.org/10.1073/pnas.1715374115

37 CASRAI (no date). CRediT – Contributor Roles Taxonomy. Retrieved from https://www.casrai.org/credit.html

38 De Lecuona, I., Löfström, E., (2015) Report on Codes of Conduct and best practices in research of LERU Universities. (Final version, April 2015, internal LERU use only)

and transparency: Clear, visible and accessible integrity documentation signals that there are clear standards promoting soundness in research. Accessibility also includes availability of the most important integrity documents in the English language. **Universities could commit to review the way they make information on research integrity accessible and available to anyone interested**.

4.3 Be transparent about the handling of allegations

While the importance of openness and transparency in research has widely been accepted, there is a growing awareness that investigations of research misconduct should also be handled in a transparent manner. **Universities could commit to provide easy access to procedures for handling allegations of researcher misconduct, including whistle-blower protection, and easy access to a means for reporting allegations**. Publishing adequate information about these procedures and contact details on the university websites is not only important for the researchers, journals or funders involved, it is also helpful for universities to learn from each other's procedures.

But transparency can go one step further, by providing information about the outcome of an investigation process. Within these often-delicate investigations, there is a tension between transparency and privacy. Universities should strive for an appropriate balance, considering the legal and ethical requirements for confidentiality.

- Being open about the number and nature of received allegations is laudable and should not attract criticism; it is a sign of a healthy, engaged institution and stimulates organisations' capacity to learn from experience. Publicly accessible annual statements on how institutions have taken actions to embed and support a culture of research integrity, including initiatives about ensuring good practice, as are now required of institutions within the UK[39], can be useful and valuable. These annual statements also include a statement about research misconduct investigations. Universities acknowledge that publishing the entire reports of investigations is not so straightforward because some discretion may be required in order to consider the legal and ethical requirements for confidentiality. However, in an individual case, there might be good reasons to publish the report of an investigation. **It is recommended that each institution produces a publicly accessible annual statement on research integrity.**

- The extent to which information about allegations that cross institutional boundaries can be shared or the extent to which relevant sections of reports of misconduct investigations can be disclosed to other organisations, e.g. the new employer, journals, funders, need to be assessed on a case-by-case basis and in adherence to national law. But as also stated in the UK Parliament report on research integrity[40], many universities fully acknowledge the need for all parts of the system to work together – including employers, funders and publishers of research outputs.

4.4 Participate in the debate on research integrity

- **Universities are encouraged to participate in the debate on research integrity, for instance by attending events on research integrity at the European or national level.** The presence of universities at these fora shows that research integrity really matters and that research integrity is a top priority within universities. Indeed, it is expected that LERU universities, amongst the principal research-intensive universities in Europe, play a leading role in developing and implementing research integrity practices both in their institutions and in the wider context, for instance at the regional, national or even international level. It also ensures that staff are aware of the latest thinking in this fast-moving and sensitive area.

39 Universities UK (2019, October). The Concordat to Support Research Integrity. Retrieved from https://www.universitiesuk.ac.uk/policy-and-analysis/reports/Documents/2019/the-concordat-to-support-research-integrity.pdf on 26th November 2019

40 House of Commons Science and Technology Committee (2018) Research Integrity. Retrieved from https://publications.parliament.uk/pa/cm201719/cmselect/cmsctech/350/350.pdf on 29th November 2019

5. Universities should foster a culture of research integrity

Maintaining the highest standards in research requires the right environment; one that is based on good governance, best practice and support for the development of researchers[41]. It is important that rectors, presidents, principals and other university governors take leadership in this and put research integrity on the agenda of important events. Leadership support can have a tremendous effect on researchers and supports all of those who are committed to responsible research. This section builds upon the previous sections and highlights how a culture of research integrity could be built. Universities are recommended to:

5.1 Make research integrity part of the global research culture

Knowing about principles and standards of good research practice is not enough to assure that researchers will act according to these, and know how to or have the skills or resources to apply these in real-life cases. These principles and standards have to become a living part of the global research culture. Therefore, education and training in research integrity are necessary (see section 2). Research integrity also has to become an integral part of research quality assurance (see section 1).

To be able to live up to the principles and standards of good research practice it is important that researchers and support staff are sufficiently supported and enabled by the institutions to do so. They have to be encouraged and facilitated to learn about requirements of good research practice, including updating skills, such as raising awareness of up-to date research methods and reporting conventions, and, for support staff, how to assist researchers in difficult situations where mistakes or misconduct might arise. Researchers also need to be supported by a good governance infrastructure that enables researchers to meet their requirements and supports them in their professional role to produce high quality, rigorous and verifiable research. To enable this, it is equally important that the governance structures are sufficiently resourced in relation to the amount of research and researchers.

5.2 Install the right incentives

Despite some positive steps in recent years, particularly the adoption by institutions of standards such as those set out in the San Francisco Declaration on Research Assessment (DORA)[42], there remain strong practical and cultural incentives for researchers to focus on publishing large number of papers. In such a culture, it is easy to see how the pressure to publish could be stronger than that to ensure the science is robust and how predatory journals, where the peer review is poor or non-existent, could flourish.

LERU acknowledges that the number of publications and citations is not indicative of high-quality research and that, in the long term, quality needs to be a priority over quantity in research evaluations. The addition of a short section into evaluations where researchers describe their most significant accomplishments (sometimes known as bio sketch) could help to overcome any bias compared to where there is a focus only on the number and type of research publications.

Universities could require a statement on Open Science practices in the hiring process of new professors or during promotion. The *Hong Kong Principles for Assessing Researchers: Fostering Research Integrity*[43], give additional practical and sensible suggestions.

41 Universities UK (2019, October). The Concordat to Support Research Integrity. Retrieved from https://www.universitiesuk.ac.uk/policy-and-analysis/reports/Pages/the-concordat-for-research-integrity.aspx on 26th November 2019

42 DORA (no date) Improving how research is assessed. https://sfdora.org Accessed on 26th November 2019.

43 Moher, D., Bouter, L. Kleinert, S. (2019) The Hong Kong Principles for Assessing Researchers: Fostering Research Integrity. OSF Preprints. Retrieved from https://osf.io/m9abx/ on 26th November 2019.

Universities could introduce a reward system which is fairer to those researchers who conduct excellent, but maybe not newsworthy research. This would apply to those publishing for example in negative results journals, doing replication studies, making research data and or code available, and those performing a valuable support function. In this way, it is easy to see how an environment more conducive to team working and better support for researchers develop as a result. Transparency and reproducibility can play an important role in awarding prizes for Masters theses, PhD theses and other research projects[44].

5.3 Monitor and improve the research integrity climate

Research integrity is important for the whole university, regardless of discipline and position and as a result it is important that all staff are aware of what research integrity is and the institutions position with regard to fostering a culture of research integrity. **It is recommended that institutions make evaluations of the effectiveness of the research integrity measures over time to assess the impact of initiatives taken to improve research integrity.**

One route by which the research integrity climate of a university could be determined and improved is through a research integrity climate survey, e.g. the Survey of Organisational Research Climate (SORC)[45]. This survey considers, amongst other issues, "the degree to which researchers are aware of research integrity policies, whether they feel like their organisational leaders take integrity seriously, whether they feel as if their department had set fair expectations for them regarding publishing and obtaining grants, among other things"[46,47]. This could be done at a group, department or wider level to look for trends over time, and to identify areas for further discussion or action. But other more short-term approaches (focus groups, smaller surveys, etc.) can also be very valuable in determining and improving the research integrity climate.

44 For instance, accessibility of data and code according to Open Science principles, plagiarism or sound design decisions could be checked. Universities could even go one step further and award prizes specifically for research projects adhering closely to these principles of research integrity, transparency and reproducibility.

45 Survey of Organisational Research Climate (2012) Retrieved from https://sites.google.com/site/surveyoforgresearchclimate/ on 26th November 2019.

46 Survey of Organisational Research Climate (2012) Retrieved from https://sites.google.com/site/surveyoforgresearchclimate/ on 26th November 2019.

47 Academic Research Climate Amsterdam (2018, November) Research Gate. Retrieved from https://www.researchgate.net/publication/328967204_Academic_Research_Climate_Amsterdam on 26th November 2019.

Part 3 Examples of Best Practice in Research Integrity at LERU Universities

This section gives a flavour of the different ways in which LERU universities encourage research integrity within their institutions.

These examples were collected from our members in the course of summer 2019. The examples here are non-exhaustive, in that they do not represent everything which our universities do to promote research integrity, rather they are a snapshot of what each university feels are important to highlight about its activities in this important area. Other universities may have similar activities which are not mentioned in this document. They may act as inspiration for others in designing research integrity policies within other institutions. We have broadly categorised them according to Part 2 of this advice paper, but we acknowledge that in some cases, the examples may fit across several categories so we have placed them according to what we felt was the best location.

This is a 'living' document and will be updated periodically to ensure it represents the current best practices employed at our universities with respect to research integrity.

I. Empowering Sound Research

LEIDEN RESEARCH SUPPORT (LRS) (Universiteit Leiden)

The aim of the LRS project is to offer a better, and above all, a more integrated form of support to scientists across the entire project cycle (from the initial idea for the research project until the final publications and the (financial) accountability). The aim of the project is to set-up a network structure in which researchers will be assisted such that questions related to the preparation of research grants, management, legal and ethical issues and scientific integrity can be much easier addressed and answered more quickly. This allows the researcher to focus more on the primary process of the research project hence leading to a better quality output. The project is still in an explorative phase.

SUPPORT FOR STATISTICS (Utrecht University)

In the Faculty of Social Sciences, a Professor of Statistics has a special task to advise (young) researchers on statistical analysis in their research. This is on a voluntary basis, but many of the researchers indeed request the assistance of the professor. The aim of the initiative (pilot for five years) is to improve the quality of statistical analysis. The professor is also responsible for implementing and improving the ethical policies with regard to research.

ASSESSMENT TOOL FOR MEASURING RIGOUR IN THE DESIGN AND REPORTING OF *IN VIVO* RESEARCH (University of Edinburgh)

Rigour in the design and reporting of *in vivo* (animal) research is increasingly important for research assessment exercises, for research funders and for journals. How might institutions seek to maximise the rigour of their *in vivo* research? To improve rigour, we first need to be able to measure it. Previously, this has been done by trained human reviewers annotating publications

according to whether they report rigorous study designs (for instance randomisation, blinding, sample size calculations – see bibliography), but this is too complex and resource intensive to be done routinely by institutions. Our key performance indicators are based on Landis et al[48]. At present we consider three items:

1. Random Allocation to Treatment or Control (Were animals randomly allocated to treatment and control groups before the start of the experimental treatment?)
2. Blinded Assessment of Outcome (Did the researchers measuring the outcome know which treatment group the animals belonged to and what treatment they had received?)
3. Sample Size Calculation (Did the manuscript report the performance of a sample size calculation and describe how it was derived?).

Our tool is developed for automated preclinical document classification based on machine learning and natural language processing techniques, with the input being a full-text research manuscript. We use pre-trained word embeddings for feature extraction, which converts words to vector representations of meaning and relations. We trained classifiers using deep learning models (convolutional neural networks, recurrent neural networks such as GRU and LSTM). The tool makes a prediction of whether the full-text manuscript it received reported risk of bias items such as randomisation, blinding and sample size calculation. Preliminary results, using 4,232 full-text annotated stroke publications (80% for training, 10% for validation and 10% for test), show a promising performance, approaching the performance achieved by trained human annotators. We are currently optimising processes by:

1. Developing a pipeline to extract full-text manuscripts (a) from the institution's PURE system and (b) from PubMed Central OA, selected for in vivo research and categorised by institution;
2. Optimising machine-learning predictions using larger labelled and proxy labelled training sets;
3. Implementing local classifiers with an API to allow incorporation into institutional reporting systems.

At deployment, the system will allow the institution to monitor the rigour of reporting of *in vivo* research, to inform improvement activity and to allow the impact of improvement activities to be measured. The system has the potential to be adapted to measure other characteristics of research outputs in the same or in different research domains. In the first instance, this will be through reporting to our Animal Welfare and Ethical Review Body.

CENTER FOR REPRODUCIBLE SCIENCE (CRS, University of Zurich)

The objective of the CRS is to improve the reproducibility of empirical research at the University of Zurich and to promote research in replication studies and methodology related to reproducibility. It brings together methodologists from across the University of Zurich, working in fields which typically do not communicate with each other intensively. This methodological think tank allows traditional barriers between fields to be overcome, and aims to determine sound state-of-the-art solutions to scientific challenges.

As a result, UZH researchers who are invested in replication or reproducibility efforts can get together with the methodologists of the CRS through training activities or direct collaboration.

METHODOLOGICAL COLLABORATION PLATFORMS (University of Zurich)

At the University of Zurich methodological collaboration platforms help to easily connect researchers with methodologists for consultation or collaboration. They are organised at the faculty/institute level:

48 Landis et al (2012) A call for transparent reporting to optimize the predictive value of preclinical research Nature. 2012 Oct 11; 490 (7419): 187-191) https://doi.org/10.1038/nature11556

- Research Methods Consulting at the Faculty of Medicine
- Psychological Methods, Evaluation and Statistics in the Department of Psychology
- Applied Statistics Consulting at the Faculty of Science
- Statistical consulting within the Animal Welfare and 3R department

DATA SERVICES OF THE MAIN LIBRARY (University of Zurich)

In close cooperation with other departments the main library supports researchers of all disciplines in the handling of data: From writing workshops and individual advice to the provision of legal advice on copyright issues. These include:

- Individual advice in the handling of data;
- Feedback on data management plans or specific contact points, e.g. regarding legal questions;
- Regular courses to promote data literacy providing security, increase efficiency and successfully use and re-use data;
- Help to find the right repository, publish data and preserve it for the long term.

THE UNIVERSITY JOURNALS CONSORTIUM (University of Zurich)

A consortium of 14 university libraries from five European countries have initiated University Journals[49] as an alternative to the current journal ecosystem. If a scientific paper in a repository is eligible for the University Journals, it will feature as a reviewed publication on this accredited open access platform and give researchers the recognition they need.

ENCOURAGING MULTIDISCIPLINARY TEAM WORK (Lund University)

The Pufendorf Institute for Advanced Studies (Pufendorfinstitutet) is an interdisciplinary institute at Lund University where researchers from all faculties – from science and medicine to the humanities and arts – are invited to work together. The aim is to be a creative forum, an incubator for new ideas and a springboard for new research initiatives. All researchers at Lund University can propose a 'Theme' or an Advanced Study Group (ASG) – and accepted groups spend 8 months at the Institute. Every year the Institute welcomes several international visiting research fellows within its guest researcher programme who work with it on its themes. Since 2009, more than forty scholars and scientists from all over the world have taken part in the programme. The Pufendorf Institute also arranges conferences, workshops and symposia and issues a series of publications that describe what is happening in the various projects hosted by it.

FOSTERING CRITICAL SELF-REFLECTION: THE MARSILIUS KOLLEG (Universität Heidelberg)

In addition to other important measures, research integrity can also be supported by fostering critical exchange between academics in very different fields. Intensive interdisciplinary discussions can increase transparency of research and encourage scientists to reflect on their methods and on their ethical standards - both methodologically and in respect to the impacts of their results. These critical interdisciplinary discourses need an institutional framework. For this reason, Heidelberg University has founded the Marsilius Kolleg – an interdisciplinary Institute for Advanced Study that brings together faculty members of very different fields of study. The Marsilius Kolleg is open to all senior scientists of the University and the surrounding research institutions who aim to bridge the gaps between very different disciplines, for example, between the sciences and the humanities. Fellows are appointed for one year to work on a small interdisciplinary project and to participate in a weekly seminar and in other joint activities. Within this forum, questions on ethical foundations and normative standards of conducting cutting-edge research play an important role (e.g. ethical and legal implications of whole genome sequencing, artificial intelligence or germline editing) and stimulating critical self-reflection and a sense for the societal responsibility of academia.

49 University Journals (no date) For Universities. Retrieved from https://universityjournals.eu/index.php/for-universities/ on 26th November 2019.

II. Education and Training into Research Integrity

RESEARCH INTEGRITY TRAINING FRAMEWORK (University College London)

The UCL Research Integrity Training Framework is based on what research projects would require to have integrity and therefore what a researcher would need to know in order to enable this and to conduct research with integrity. It takes a very broad view of necessary training as it includes research methods, what it terms the 'elements of integrity' (ethics, data protection, research data management, open access) and the personal skills researchers need to be able to conduct their research. So, for example, active listening skills if you are doing focus groups and semi-structured interviews or oral histories. The Framework also has a clear focus on supporting a culture of research integrity, for example an important aspect of the induction level is to understand the culture of the organisation and disciplines within which you work. It also extends to levels 3 and 4 regarding training needs such as conflict resolution for managers to support a healthy supportive research environment, and training for new supervisors to support and enable them in supporting new researchers. The web link[50] gives fuller descriptions of the framework and each level.

COMPULSORY RESEARCH INTEGRITY TRAINING FOR NEW DOCTORAL RESEARCHERS AND NEW SUPERVISORS (KU Leuven)

Integrity training is a compulsory component of the KU Leuven PhD programme. All new doctoral researchers (approximately 900 a year) are required to attend a university wide lecture on Research Integrity. This 3 hour-long lecture, given by a didactical team of five professors from the three Science Groups, aims to empower starting PhD researchers with the ability to understand the difference between what is and is not acceptable, and to prevent them from making mistakes they would later regret because of the adverse consequences to others, with regard to science and for their own career. As a follow up and at the level of the Doctoral Schools, specific actions are also undertaken towards the training of young researchers. The doctoral school of biomedical sciences brings PhD students in the third year of their doctoral trajectory together in workshops where they discuss integrity issues from their own experience with peers under the supervision of experienced academics. The other two doctoral schools are also developing initiatives for third year PhD students.

As from the academic year 2018-2019, the first phase of supervisor training includes a module on research integrity that is compulsory for all new professors. This module is taught by the same didactical team from the PhD programme to ensure that a consistent message is given to students and supervisors.

TRAINING PROGRAM FOR YOUNG RESEARCHERS (Universiteit Leiden)

In the past year the University of Leiden has revised its (compulsory) training on scientific integrity for young researchers completely. The current programme is set up along the following three lines:

- Start with a general introduction course on the PhD track in Leiden (within the first three months after starting the PhD track). A significant part of the programme is dedicated to scientific integrity by showing a theatrical piece which addresses a number of integrity issues and a discussion of the issues that were presented in the play;
- The second part of the program is an on-line module which has been developed by the HRM department of the University of Leiden;
- After the online-module a more in-depth course on scientific integrity is offered. Groups which take part are smaller in size which allows for a more discipline specific approach.

50 University College London. Research Integrity Training Framework. Retrieved from https://www.ucl.ac.uk/research/integrity/research-integrity-training-framework on 6th January 2020

COURSE ON RESEARCH ETHICS AND INTEGRITY (University of Helsinki)

At the University of Helsinki, research ethics is mandatory at the doctoral level and this covers all faculties. A university-wide training course on research ethics also includes research integrity. The training is 1-2 ECTS and ensures fulfilment of mandatory ethics requirements. Students complete the course, firstly, by writing a short essay in which they reflect the ethical issues of their own research and by peer-reviewing others' essays. Secondly, they are divided into small groups where they discuss misconduct cases, and finally they rewrite their essay and reflect the ethical issues again based on what they have learned during the course. This all will give them the mandatory 1 credit. They can get an additional 1 credit by attending on-site teaching 2 times 3 hours during the on-line course. The on-line course brings together students from all around the university from all doctoral schools and disciplines, with the idea that they can learn new ethical viewpoint from students of other disciplines. The training includes basic information on each topic: research planning, conducting research, publishing and sharing the results. The training course has been developed in collaboration with all Finnish universities. Universities in Finland use it differently. The University of Helsinki offers the course twice a year[51]. Several hundred doctoral students have taken the course so far.

MANDATORY COURSES IN RESPONSIBLE CONDUCT OF RESEARCH (University of Copenhagen)

The University of Copenhagen has made it mandatory for all PhD students and PhD supervisors to attend a course on responsible conduct of research, and efforts are underway to establish equivalent mandatory courses for post-doctoral researchers and assistant professors. These courses typically include content on fabrication, falsification and plagiarism, as well as on topics such as authorship, conflicts of interest and research data management. In addition, the course participants are informed about local initiatives on research integrity, as well as how cases of questionable research practice and research misconduct are handled at the University and in Denmark.

RESEARCH TRAINING THROUGHOUT THE EDUCATION CYCLE (Trinity College Dublin)

Trinity College Dublin positions research at its heart. It is proud of its research-led approach to teaching and embeds research training across the academic cycle.

Undergraduates: Trinity is currently in the process of implementing the Trinity Education Project (TEP), a major reform of undergraduate education, which is structured around five key principles, one of which is that the curriculum is research-focussed. Implementation of TEP will see every undergraduate complete a 20 ECTS Capstone Project, which facilitates opportunities where they can embed focus on research methods/integrity earlier in the lifecycle.

Postgraduates All PhD students registered at Trinity since 2018 must complete a mandatory 5 ECTS structured PhD module, 'Research Integrity and Impact in an Open Scholarship Era', which includes a research integrity component. This module aims to introduce participants to the existing and emerging challenges and opportunities connected with researching, presenting and publishing in an open scholarship era. This course seeks to provide all Trinity PhD students with the tools necessary to navigate these issues as they proceed with their research.

Researchers Trinity College Dublin is a member of the Irish Universities Association's Research Integrity Forum. This Forum negotiated a National Subscription for an on-line Research Integrity Training Course for research students and faculty from Epigeum. This is funded by key stakeholders in the Irish research (and research funding) landscape. Two online modules are available: (1) an introductory course for new researchers, PhD students, post-doctoral researchers, and early-career faculty on the topic of Research Integrity and (2) A more concise 'refresher' course for experienced researchers such as PhD supervisors and Principal Investigators, and particularly those who hold/are planning on applying for funding from these funding agencies.

51 The course can be accessed at https://findocnet.fi (there may be a need to register as a guest).

TEACHING GOOD SCIENTIFIC PRACTICE (University of Freiburg)

According to §3 of the legally binding "Regulations of the University of Freiburg on Safeguarding Academic Integrity"[52] at the University of Freiburg, lecturers, working group leaders, supervisors and all scientific institutions are obliged to familiarise students and doctoral candidates with the principles of good scientific practice. For doctoral candidates and post docs, special courses in good scientific practice are offered. In order to ensure that all students are familiar with the principles of good scientific practice from the beginning, it is planned to include in the Strategic Plan 2019-2023 that these rules should be an integral part of the curriculum at all faculties and all course of studies.

MAJOR INFORMATION EVENTS IN THE LIFE SCIENCES (Ludwig-Maximilians-Universität München)

Initiated by the GraduateCenter^{LMU}, the various graduate programmes of the LifeScience Campus have teamed up to work toward the common goal of providing doctoral researchers an excellent education with a sound foundation based on good scientific practice. Large-scale information events on responsible research and on sustainability are supplemented by a toolbox containing material or weblinks that have been recommended by the invited speakers and guests.

TRAINING FOR MASTER'S AND DOCTORAL STUDENTS (Ludwig-Maximilians-Universität München)

The GraduateCenter^{LMU} organises workshops on good scientific practice for doctoral candidates from various disciplines. Some of these workshops are especially tuned to the needs of doctoral candidates in the Humanities. In the near future, these training activities will be supplemented by a modularised e-learning tool that will give Master´s and doctoral students from all disciplines the opportunity to check their current knowledge in the field of research integrity and good scientific practice and, if necessary, refresh or expand it.

MANDATORY EDUCATION ON GOOD SCIENTIFIC PRACTICE IN MEDICAL STUDY PROGRAMMES (Ludwig-Maximilians-Universität München)

The Faculty of Medicine has recently updated its doctoral regulations for various areas of medical education (general medicine, dentistry and human biology). For these subjects, participation in the "Good Scientific Practice" lecture series is obligatory. The lectures are held in English and are generally open to all research students and doctoral students of the Medical Faculty.

COURSE ON RESEARCH ETHICS/RESEARCH INTEGRITY FOR ALL PhD STUDENTS (Lund University)

The Vice Chancellor at Lund University has decided that all PhD students must complete a two-week course in research ethics/research integrity. Several versions of this course will be developed in order to meet the needs of different disciplines.

TESTS ON PLAGIARISM AND INTEGRITY (Université de Genève)

At the Faculty of Medicine of the University of Geneva, every medical student must pass an on-line test in the form of a webinar before the second year of Bachelor. The test consists of an examination on plagiarism. Moreover, every staff member (from scientific collaborator to professor), whose contract has to be renewed during the year, must pass a test on plagiarism and integrity. 109 staff members passed this evaluation in 2018.

52 University of Freiburg (no date) Regulations of the University of Freiburg on Safeguarding Academic Integrity http://www.uni-freiburg.de/forschung/redlichkeit_in_der_wissenschaft/Uni-Freiburg-Ordnung-Redlichkeit-in-der-Wissenschaft-mit-2ter-Aenderungssatzung-en.pdf Retrieved on 26th November 2019

TRAINING ON RESEARCH INTEGRITY (University of Strasbourg)

Since 2016, French law enforces research bodies and universities to deliver training on research integrity at the doctoral level. The University of Strasbourg, which has been involved in the promotion of good practices in research by editing its Charter of Deontology in 2015, offers a number of training activities centred on the doctoral degree, but also earlier in the curriculum of its students. From the first year, and in about 80% of its faculties, the University of Strasbourg provides disciplinary training on the methodologies needed to perform good research, depending on the specificities of each field. All the students also receive a letter from the Referent for Scientific Integrity that states the policy of the University on that important aspect and which gives the fundamental reasons to respect research integrity rules. When reaching the doctoral degree level, all students must read, accept and sign the Charter of Deontology of the University before their first registration. To register for the second year, they need to attempt a compulsory course of 3 hours on research integrity (for all disciplines), as well as succeed in a MOOC on research integrity which requires about 20 hours of work. In addition, a software for plagiarism (compilatio) is provided and easily accessible, and training can be provided to use it at an advanced level. Students are encouraged to make use of it when writing their PhD thesis in order to check that citations are properly handled. The software is also directly accessible to PhD advisors.

GOOD RESEARCH PRACTICE, RESEARCH INTEGRITY AND RESEARCH ETHICS COURSES (University of Zurich)

The Graduate Campus is a one-stop source of information and activities for PhD candidates and postdoctoral researchers at the University of Zurich. A variety of courses and events provide opportunities to gain further qualifications, engage in research-relevant topics and exchange insights and ideas with peers. The Center for Reproducible Science offers Good Research Practice Courses through the platform of the Graduate Campus reaching the entire population of the University without having to negotiate with a large number of individual programmes. The Graduate Campus continuously offers an on-line course on Research Integrity in five discipline specific versions. Life Science Zurich Graduate School consists of 17 individual PhD programs across the life sciences. The Graduate School and individual programs offer optional and compulsory Research Integrity and Research Ethics courses.

TEACHING ON RESEARCH INTEGRITY INTEGRAL PART OF CURRICULUM (University of Amsterdam)

As part of its report and recommendations, a university-wide working group on research integrity (2015-2017) at the University of Amsterdam addressed the issue of research integrity in education and training. Central to its advice is that faculties should ensure that '*research integrity is truly integrated into the curricula* of the Bachelor and Master levels: each topic of research integrity (as addressed in the advice report as well as in the national code) should be taught at the appropriate moment (*just in time*) during the curriculum. Students should, for example, learn about citing other people's work (and preventing plagiarism) when they do their first writing assignment. Their knowledge, skills and attitude regarding citation and plagiarism should be deepened as part of the larger topic of research integrity when they do a larger writing assignment in their second and third year, so that, when they write their Bachelor's thesis, they have *internalised the concept and the practice*. Next to the integration of these topics in the BA and MA curriculum, faculties are advised to consider offering *an on-line course on research integrity*, especially in order to ensure a shared starting point and vocabulary among an internationally diverse group of master students or among PhD students with different educational backgrounds.' Such a course has now been created by the Faculty of Economics and Business and will be made suitable and available to other faculties.

III. Establishing Institutional Guidelines and Professional Structures

CONFLICT OF INTEREST POLICY AND PROCEDURE (University of Oxford)

The University of Oxford has a longstanding and comprehensive policy on conflict of interest[53], a summary extract of which is reproduced below.

> *"The University of Oxford is a major research university with global reach and influence. It encourages members of its staff to engage in a wide variety of external activities, such as serving on government, business and community boards, providing expert advice, media commentary, professional practice, schools outreach, international projects and collaborations with the commercial world, including via consultancy, research and development, intellectual property (IP) licensing and involvement in 'spinout' companies.*
>
> *The University considers that such activities are in the public interest and are also of benefit to the University and the individuals concerned. On occasion, however, they may give rise to conflicts of interest, whether potential or actual, perceived or alleged.*
> *All University staff and students are required to recognise and disclose activities that might give rise to conflicts of interest or the perception of conflicts and to ensure that such conflicts are properly managed or avoided.*
>
> *If properly managed, activities can usually proceed as normal whilst at the same time upholding the person's obligations to the University, meeting regulatory and other external requirements and protecting the integrity and reputation of the University and its members. By contrast, conflicts which are not managed effectively may jeopardise the University's public standing and may cause serious damage to the reputation of the University and of the individuals concerned.*
>
> *It is therefore the University's policy to encourage and foster external activities whilst ensuring that when conflicts or perceived conflicts of interest arise they are acknowledged and disclosed, and, properly managed."*

To improve awareness of, and compliance with, the Conflict of Interest policy, the University has introduced a range of resources[54] including: illustrative examples of potential conflicts of interest (not defined solely as financial conflicts of interest); guidance for University Departments on managing conflicts of interest associated with spinout companies (incorporating advice on producing a conflict of interest management plan); a process for seeking approval of outside appointments to be held; and guidance around meeting research funder requirements relating to conflict of interest.

INCLUDING RESEARCH INTEGRITY TOPICS IN THE WEB PORTAL OF THE ETHICS REVIEW COMMITTEE (University of Amsterdam)

Not only does a good research practice involve attending to the various aspects of research integrity, it also requires attending to privacy, other GDPR-requirements, ethical considerations, research data management, etc. Next to establishing that there are large differences between research domains as to how they can ensure good research practices, therefore, a central outcome

53 University of Oxford (no date) Statement of policy and procedure on conflict of interest. Retrieved from https://researchsupport.admin.ox.ac.uk/governance/integrity/conflict/policy, on 26th November 2019.

54 University of Oxford (no date) Statement of policy and procedure on conflict of interest. Retrieved from https://researchsupport.admin.ox.ac.uk/governance/integrity/conflict/policy, on 26th November 2019.

of a university-wide working group on research integrity (2015-2017) at the University of Amsterdam was the need for operational structures that would prevent researchers from drowning in having to accommodate all those requirements separately. In the Faculty of the Social and Behavioural Sciences, researchers had been using an on-line portal for the ethics review of their research proposals for years. It was advised – and this has been operationalised – to include requirements for GDPR and privacy impact assessments, data management plans, pre-registration of research protocols, research data management (including FAIR archiving) into this same on-line portal, since many of the questions relating to ethics review are similar to those pertaining to research data management, GDPR and privacy. This ensures that there is, for example, a data management plan before the start of a project, without the need for extra bureaucratic paperwork by researchers and their supervisors. In due course, the portal will also connect to new infrastructure for secure publication of research data. In addition to the advice to include adjoining requirements into the portal, the working group also advised rolling out the portal in other faculties as well, such as Law, the Humanities, and Economics and Business, which increasingly deal with (personal) data, privacy and ethics review. This is currently being operationalised.

GUIDELINES FOR RESEARCHERS IN THE SOCIAL SCIENCES (Universitat de Barcelona)

The bioethics commission at the University of Barcelona has developed specific guidelines for social interventions (anthropology, sociology, etc.) to show researchers the ethical issues (and legal requirements) about questionnaires, surveys etc.[55]

ETHICAL REVIEW (Universiteit Leiden)

The new code of conduct of the Netherlands demands 'a duty of care' of the Universities. One of these duties is setting up a structure for ethical review of research proposals. The University of Leiden has chosen for a domain-specific set-up in which a number of committees (Humanities and Archaeology, Law, Science, Social Sciences (including two separate committees; one for Pedagogy and one for Psychology), Governance and Global Affairs and the ethical committee for the Medical Faculty) are able to review but also advise scientists on ethical issues regarding their research plans. It is currently working on connecting ethical review to a structure called 'Leiden Research Support' which helps research staff in all various steps of setting up a research programme (e.g. advice on research funding, legal issues, ethics, finance etc.).

RESEARCH INTEGRITY ADVISORY PANEL (University of Cambridge)

During the 2019-20 academic year the University of Cambridge is launching a Research Integrity Advisory Panel. Adapted from a model used by the University of Glasgow, the Panel will be made up of volunteers from across the University's six schools. Staff and students will be able to contact the Panel for expert and discipline-specific advice on research integrity challenges and questions. Volunteers will receive training on University processes and expectations and will receive support from the University's Research Governance and Policy Team.

NAMED PERSONS (University of Copenhagen)

Each Faculty at the University of Copenhagen appoints one or two 'named persons' for three-year periods. Named persons operate independently from faculty leaders and have been given a number of responsibilities: 1) they promote and contribute to initiatives concerning responsible conduct of research at their faculty, 2) students and researchers can contact a named person for advice regarding scientific conduct and 3) the named persons handle allegations of breaches of the rules laid out in the Codes of Conduct for Research Integrity. All inquiries are treated confidentially, but the Named Persons do not deal with anonymous inquiries. Named Persons can provide guidance into whether and how cases of questionable research practice

55 University of Barcelona (no date) Form Sheets. Retrieved from http://www.ub.edu/comissiobioetica/en/formsheets on 26th November 2019.

are submitted to the University's Practice Committee, as well as cases regarding misconduct (e.g. fabrication, falsification and plagiarism) to the Danish Committee on Research Misconduct.

PRACTICE COMMITTEE (University of Copenhagen)

The University of Copenhagen's Practice Committee is a committee established by the rector that is responsible for dealing with questions of questionable conduct of research. The members of the Committee are university professors and associate professors appointed for a period of 3 years by the academic councils at each of the faculties. The responsibilities of the committee are: 1) helping to clarify the existing norms for good scientific practice, 2) taking steps to ensure that the norms for good scientific practice are discussed and 3) ruling on specific cases regarding questionable conduct of research. The Practice Committee does not handle cases of research misconduct, defined as fabrication, falsification and plagiarism committed wilfully or through gross negligence in planning, performing or reporting of research. Danish universities have an obligation to report cases of reasonable suspicion of research misconduct directly to the Danish Committee on Research Misconduct.

RESEARCH INTEGRITY GUIDELINES (University of Milan)

In January 2019 the University of Milan adopted its new Code of Ethics (CoE), incorporating a substantive section on Research Integrity guidelines[56]. The CoE was the output of long and careful preparatory work by the University's Ethics Committee, a body which is also entrusted with the task of receiving and examining complaints on misconduct cases, and proposing sanctions to the Rector and Senate. The University of Milan is currently devising a comprehensive plan for the dissemination of the CoE (a conference will be organised this coming autumn) and for Research Integrity education at all levels of studies and research. Research Integrity education has already been offered in PhD courses since 2017.

GENERAL INFORMATION ON REGULATIONS AND STRUCTURES (Ludwig-Maximilians-Universität München)

In 2002, Ludwig-Maximilians-Universität München issued regulations for self-control in science which are binding on all scientists at LMU, who have to sign a form to this effect in the process of getting employed. In line with the recommendations of the German Research Foundation (DFG), they contain rules on good scientific practice and the supervision of young scientists as well as the procedure and possible consequences in the event of suspected cases of research misconduct. Regarding the latter, LMU established an ombudsperson and a deputy as well as an investigating commission as permanent structures.

INCLUDING RESEARCH INTEGRITY IN THE FIVE-YEAR STRATEGIC PLAN (University of Freiburg)

The University of Freiburg is currently revising its five-year strategic plan. The plan for 2019-2023 will include a separate chapter on research integrity. It describes both prevention measures and institutional structures. The explicitly stated goal is to strengthen sustainably the structures of good scientific practice.

The University of Freiburg is going to provide the required institutional and personnel structures:

1. The University has appointed a Representative for Academic Self-Regulation: The representative for academic self-regulation works as an ombudsman and is the first contact in cases of possible academic misconduct. The representative investigates the concreteness and significance of the allegations in accordance with plausibility criteria and informs the responsible bodies – mainly the investigative commission – whether he/she deems further action to be necessary.

56 Code of Ethics and for Research Integrity. University of Milan (2019) Retrieved from https://www.unimi.it/sites/default/files/2019-07/Code%20of%20Ethics%20and%20for%20Research%20Integrity%20%28EN%29.pdf on 3rd January 2020.

2. The University has appointed an Investigative Commission: The Investigative Commission on Academic Integrity investigates allegations of academic misconduct. The Commission consists of members of all faculties who work as volunteers. Two external high-ranking judges lead the commission. That means a good mix of specialist expertise (by the faculty members) and independence (by the judges).

3. To date, the University of Freiburg is the only university in Germany with a member of the university leadership specifically responsible for all issues relating to research integrity. Established in 2014, the Vice President for Research Integrity, Gender and Diversity is responsible for implementing preventative measures and awareness-raising activities in order to promote good scientific practice.

4. In order to permanently ensure the high standards achieved in the field of research integrity, it is planned to establish a research integrity office. The office should bundle all tasks in the field of RI research integrity in one hand. The research integrity officer should develop preventive measures, advise researchers, support the unsalaried investigation bodies, distribute information materials, and advise the Rectorate. In this way a sustainable institutional anchoring of research integrity can be ensured.

ROBUST HANDLING OF ALLEGATIONS OF RESEARCH MISCONDUCT (Trinity College Dublin)

Trinity has a robust process in place for handling allegations of research misconduct, outlined in the College's Statutes and Schedule. It is currently in the process of considering the Schedule with respect to changes that are to be included into the Irish Universities Association's National Policy Statement to reflect evolution in international best practice. It is also seeking to incorporate reference to research misconduct by members of the administrative, technical and support staff, and by students. Finally, the advent of the GDPR imposes additional obligations upon researchers and upon the process of dealing with research misconduct, and they seek to incorporate reference to this too.

PROFESSIONAL STRUCTURES FOR RESEARCH INTEGRITY AND RESEARCH ETHICS (Utrecht University)

The University has created a permanent Committee of Research Integrity (CRI) in which every faculty is represented. A confident for research integrity has been appointed at university level. Every faculty has its own confident for research integrity. Besides this, every faculty has an ethical committee for advising researchers, e.g. when designing research projects. Members of the CRI, confidents, and chairs of the ethical committees meet yearly to discuss general issues.

RESEARCH INTEGRITY ADVISERS (University of Helsinki)

The University of Helsinki has four voluntary, trained Research Integrity Advisers[57] whose tasks include:

- Providing advice at the organisational level (e.g. higher education institution, research institution, or regional body);
- Promoting responsible scientific conduct;
- Offering research integrity advice to individuals;
- Offering an opportunity for confidential discussion of integrity-related issues in the organisation;
- Supporting practices that aim to prevent scientific misconduct; and
- Increasing familiarity of appropriate guidelines and procedures in the organisation providing low-threshold support for notifications of suspected scientific misconduct.

The Advisers' tasks are comparable to the tasks of Ombudspersons at some universities, but also important distinctions exist. It

57 Finnish National Board on Research Integrity (no date) Activities of Research Integrity Advisers. http://www.tenk.fi/en/research-integrity-advisers

is important to note that the Adviser is not a lawyer or a spokesperson for the client. Maintaining a neutral position is likely easier when keeping in mind the task of providing objective information on process and procedure, not being the advocate for any party. In Finland, an integrity adviser neither serves an investigation board nor participates in investigation processes of alleged misconduct. Allegations of misconduct are handled separately and there is an established procedure for that. The Integrity Advisers have been trained by the Finnish National Board on Integrity. Their tasks are performed as part of other duties and it is not a paid position at the University of Helsinki. The following might be included among the activities of a research integrity adviser[58]:

- Advising and supporting researchers and other employees in higher education institutions and research institutions;
- Providing guidance on the processes related to handling allegations of scientific misconduct both at the beginning of, and during, a process;
- Directing clients to appropriate staff, bodies or committees;
- Advising on how to write an allegation of misconduct;
- Communicating with senior management of the organisation in matters related to responsible scientific conduct and misconduct;
- Updating own competence related to research ethics and integrity; and
- Duties may primarily pertain to one's own organisation, but the task may also include national duties, e.g. related to dissemination and networking.

STRUCTURES TO ADVISE AND DEAL WITH RESEARCH MISCONDUCT CASES (Lund University)

A Research Ethics Advisor assists researchers in matters that concern research ethics regulation. Employees can also consult a scientific ombudsman, present at each faculty, who will give advice in matters that concern good scientific practice. A special committee deals with cases of suspected misconduct. Its chair and secretary guide employees, in among other things, how to deal with a suspicion of misconduct. Accusations can be made anonymously, but is then much more difficult to investigate. Although confidentiality is important, all documentation is regulated by the Swedish Public Access to Information and Secrecy law. University employees who conduct animal trials in other countries must, if they believe that other principles may apply than those in the EU-directive (2010/63/EU), seek clearance from a special university board.

REFERENT FOR RESEARCH INTEGRITY (University of Strasbourg)

Since 2017, the President of the University of Strasbourg has nominated a Referent for Research Integrity. This practice is part of a National Plan which encourages each public research body, and each University, to endow itself with a person in charge of research integrity issues. All the referents from the various research bodies are then in close contact with the other referents at the national level through the national Office for Research Integrity (OFIS) and through the informal RESINT network in which they can discuss various issues and find help in expertising cases of misconducts. The role of the referent at the University of Strasbourg is to promote its Charter of Deontology, and to favour trainings on research methodology at all levels. In addition, he/she is in charge of handling cases of misconduct. He/she can be contacted at any time by researchers and students on specific problems and can decide to open instructions when needed. The confidentiality of the procedure and of the names of the people involved is preserved; the referent can set up a commission of inquiry (with external advisors) as necessary. The instruction is fully independent of the Presidency of the University, and only its conclusions are given to the President of the University, who is the only one to decide about the possible disciplinary sanctions and about the possible communications on each case. The policy on research integrity will be evaluated in the near future by the independent Office for Research Integrity (OFIS) which acts at the national level, and which is part of the main French evaluation agency for scientific research (HCERES).

58 Partly reproduced from Finnish National Board on Research Integrity (2018) Activities of Research Integrity Advisers. http://www.tenk.fi/en/research-integrity-advisers; and Löfström et al., 2018. ENERI Deliverable 4.5. www.ENERI.eu

COMPREHENSIVE RESEARCH INTEGRITY POLICY ADVICE, WITH SCOPE FOR DISCIPLINE-SPECIFIC IMPLEMENTATION (University of Amsterdam)

In 2015, the University of Amsterdam established a university-wide working group on research integrity, to give advice on policies and implementation. The working group consisted of experienced researchers from various disciplines and high-level staff (e.g. chair of the research integrity complaints committee, head of the department of legal affairs, etc.). The working group first identified 12 areas of research integrity policy, as well as 10 principles that should underlie a research integrity policy at the UvA. Subsequently, the working group thoroughly catalogued the existing policies and instruments available at the seven faculties and their research institutes. In order to accomplish this, it asked the deans of these faculties to name research integrity contact persons, who not only delivered the existing materials to the working group but also served as communication channels for the activities of the working group to the faculties and their research institutes. The working group described the existing policies, evaluated these in the light of the principles, and formulated recommendations for university policy and implementation to ensure good research practices for each of the 12 aspects of research integrity policy, resulting in a list of 41 individual recommendations. The advice report was finalised in 2017[59] and was discussed with the deans of the faculties by the Board of the University. They decided that, because of their discipline-specific nature, most recommendations would be addressed under the responsibility of the faculties. In addition, some topics were also addressed by university-wide endeavours, such as implementation of the GDPR, collaboration with non-academic parties and knowledge exploitation. Each faculty and their research institutes now have research integrity policies that are consistent with the report and with the national code on research integrity, and that are findable for and communicated to the faculty members. Faculties report annually on the implementation of research integrity policies and on their progress in those aspects that still need to be executed to their full extent.

59 A summary of the advice report can be found here (in Dutch): https://www.uva.nl/binaries/content/assets/uva/nl/onderzoek/wetenschappelijke-integriteit/samenvatting-integriteitsbeleid-en-onderzoekscultuur-adviezen-ter-bevordering-van-integere-wetenschapsbeoefening.pdf

IV. Transparency and Accountability

UZH REPRODUCIBILITY DAY 2019 (University of Zurich)

The UZH Reproducibility Day 2019 was a day devoted to transparent and reproducible research practices. All researchers could:

- get information on issues of reproducibility;
- learn about solutions and offers at UZH;
- practice with experts from CRS in hands-on workshops;
- participate in a satellite Software Carpentry Workshop.

The reproducibility day is planned to be organised at regular intervals.

ZURICH OPEN REPOSITORY AND ARCHIVE, ZORA (University of Zurich)

ZORA provides open and worldwide access to the research and scholarly output of the University of Zurich, Switzerland. A focus is on qualified scientific publications. ZORA is operated by the Main Library together with the Zentrale Informatik of the University of Zurich.

OPEN ACCESS PUBLICATIONS (University of Strasbourg)

The depository of all publications from the University of Strasbourg in open access will be mandatory on Univoak (https://univoak.eu/) from January 1st 2020. This database will be automatically connected to, and synchronized with, other databases such as HAL (https://doc.archives-ouvertes.fr/en/homepage/) in order to spread further the publications and to share the open access policy with other research organisations such as the CNRS.

GRASS ROOTS DISCUSSION FORUM FOR RESEARCH INTEGRITY AND ETHICS (ReproducibiliTea) (University of Oxford)

ReproducibiliTea[60] is a journal club with a difference. Established in 2018 at Oxford University, it has now spread to 34 institutions, including several LERU members (Cambridge, Leiden, Zurich and UCL). ReproducibiliTea is a grassroots initiative, organised by young researchers, although all levels of researchers are welcome to attend. Journal Club papers are selected that are relevant to open science and reproducibility. Each club focusses on which areas concern them the most, thus allowing disciplinary aspects to be addressed[61].

RESEARCH DATA PROTOCOL (Utrecht University)

Discussions on academic integrity mainly focus on the transparency and replicability of research. Both these factors require access to qualitative or quantitative research data, detailed descriptions of research materials and approaches, and an overview of the data processing and publication processes. Utrecht University has developed guidelines for archiving academic

60 Reproducibilitea (no date) About. Retrieved from https://reproducibilitea.org/about/ on 26th November 2019.

61 Orben A., (2019) A journal club to fix science. *Nature* 573, 465 (2019)

publications as well as the information needed to replicate the results discussed in such publications[62]. This document thus relates to the archiving of published academic research and should not be regarded as guidelines concerning data management, data processing agreements and privacy aspects. The document can be seen as an initiative that is part of a broader effort to promote academic integrity among researchers focusing on quantitative and qualitative studies at the faculties of Behavioural and Social Sciences in the Netherlands. Rather than functioning as a strict straitjacket, it intends to provide a clear orientation, which can be further fleshed out under the motto 'apply or explain' for each individual faculty depending on its circumstances.

These guidelines for the archiving of academic research set out the preconditions for the archiving of data, materials and information that form the basis for publications – in other words, descriptions of data, materials and information that are needed in order to replicate research results, as well as their storage. These guidelines relate to the data, materials and information with respect to publications that appear in their definitive form as of 1st June 2018. The guidelines are based on the principle of retroactive accountability, i.e. reporting after a publication has appeared. The principle behind these guidelines is that each researcher is responsible for archiving data, materials and information, and the publications based on them, in a responsible and transparent way. In situations where this document does not provide clear-cut rules, researchers are expected to act in the spirit of these guidelines rather than observing them to the letter.

DATA STORAGE GUIDELINES (Utrecht University)

This research data protocol for 2016[63] lays down the conditions within the Faculty of Social and Behavioural Sciences for storing (archiving) research data. The protocol concerns publications that have appeared since January 2016. The basic principle of this protocol is that every researcher is personally responsible for ensuring that his or her research data is stored responsibly and transparently. If this protocol lacks specific guidelines for certain cases, researchers are expected to act in the spirit of this protocol.

Divisions (departementen) and Departments (afdelingen) are at liberty to formulate more detailed specifications within these faculty-wide conditions. If a given department feels the need to significantly depart from this protocol, it must submit a substantiated request to this effect to the Faculty Board, which will then seek advice from the Committee for Academic Integrity (commissie wetenschappelijke integriteit).

RESEARCH DATA MANAGEMENT STEWARDSHIP (University of Copenhagen)

In 2020, the University of Copenhagen will establish five data labs across the organisation, where data stewards and scientists will be employed to support researchers in the management of their research data. The data labs programme will complement expertise on GDPR, information security, data management planning and the FAIR principles offered by the central administration and the university library.

ENCOURAGING RESEARCHERS TO LODGE THEIR PUBLICATIONS IN OPEN ACCESS REPOSITORIES (Trinity College Dublin, University of Freiburg and Lund University)

Trinity College Dublin encourages its researchers to lodge their publications with TARA, its open access repository (www.tara.tcd.ie). It encourages its researchers to report their data and capture information on this via its Research Support System (RSS)

62 University of Utrecht (2018) Guidelines for the archiving of academic research for faculties of Behavioural and Social Sciences in the Netherlands Version 2.1, April 2018. Retrieved from https://www.google.nl/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKEwiK9JHZzOnkAhWQ16QKHW45DTYQFjAAegQIARAC&url=https%3A%2F%2Fwww.ru.nl%2Fpublish%2Fpages%2F826378%2Fengels_-_richtlijn_archivering_wetenschappelijk_onderzoek_voor_nederlandse_faculteiten_maatschappij-.pdf&usg=AOvVaw1b-Gae7mCEZfq73Mefj6uZ on 26th November 2019.

63 University of Utrecht (2016) Faculty of Social and Behavioural Sciences Research Data Storage (Archiving) Protocol 2016 Retrieved from https://www.uu.nl/sites/default/files/faculty_of_social_and_behavioural_sciences_research_data_storage_archiving_protocol_2016.pdf on 26th November 2019.

and support them in making their data as open as possible, employing embargoes where necessary. This information is made visible on TCD's researchers' profiles and reported for the institutional research productive metrics. Information on datasets, where included in the RSS, also appears on academic promotions submissions.

In 2018, the University of Freiburg adopted a new set of Research Data Management Principles[64]. All researchers at the University of Freiburg are committed to it. The University itself is committed to creating the necessary preconditions. To publish research data, the University has set up a professional publishing platform called "FreiDok plus"[65].

At Lund, a policy on promoting the sharing of research data is under development, and a support network is under way.

COMMITMENT TO DISCLOSING OUTSIDE INTERESTS AND FUNDING SOURCES (University of Zurich)

The University of Zurich's (UZH) commitment to disclosing outside interests and funding sources covers three main areas:

- **Outside Professional Activities and Interests**
  The University of Zurich discloses the outside professional activities and interests of its professors. The activities listed include commitments in management or supervisory committees, long-term leadership and consulting engagements in bodies or foundations, and collaboration in commissions and bodies of the municipal, cantonal or federal government;

- **Third-Party Funded Projects**
  Third-party funds make up an important part of UZH's revenue. UZH provides information about its sponsors and the beneficiaries in its transparency list;

- **Endowed Professorships**
  Through donations for an endowed professorship, companies, private individuals and foundations can promote existing disciplines or initiate new areas of research. UZH discloses its endowed professorships and the parties that donated them as well as the donated amount.

COMMUNICATION ON TOPICS ABOUT RESEARCH INTEGRITY (Universitat de Barcelona)

The University of Barcelona developed communications on topics about research integrity. Once it realises that the same doubt/problem/issue is posed by researchers from different fields, it produced communications to raise awareness[66]. For example, the University of Barcelona's Bioethics Commission (CBUB) has discussed possible ethical problems that should be considered when publishing research results along with the recommendations issued by such institutions as the International Committee of Medical Journal Editors (ICMJE) and the Committee on Publication Ethics (COPE). So as to reduce the incidence of such problems in scientific communications, the CBUB has deemed it timely to issue a communiqué on possible ethical problems in scientific publications[67].

64 Freiburg University (2019) Freiburg University Research Data Management Principles. Retrieved from http://www.uni-freiburg.de/forschung-en/uni-freiburg-grundsaetze-forschungsdaten-senat.pdf on 26th November 2019.

65 Freiburg University (no date) FreiDok plus https://freidok.uni-freiburg.de/ accessed on 26th November 2019.

66 University of Barcelona (no date) CBUB Communiques. Retrieved by http://www.ub.edu/comissiobioetica/en/comunicats on 6th January 2020.

67 University of Barcelona Communiqué of the CBUB on possible ethical problems in scientific publications. Retrieved from http://www.ub.edu/comissiobioetica/en/communique-cbub-possible-ethical-problems-scientific-publications on 6th January 2020.

CHECK ON PLAGIARISM (Universiteit Leiden)

The University of Leiden has recently decided to review all doctoral dissertations on plagiarism using one specific software programme.

ANNUAL RESEARCH INTEGRITY REPORT (University of Cambridge)

The UK's Concordat to Support Research Integrity expects that all UK universities provide an annual research integrity report to their governing body and that this report be published. This report must include anonymised statistics on the number of formal research misconduct investigations undertaken by the University during the preceding year. The University of Cambridge, along with a number of other UK universities, has sought to use this reporting system to publicise the work it is doing to strengthen its culture of research integrity. To increase transparency, Cambridge has also chosen to include all research misconduct investigations, including preliminary investigations, in its reports.

ANNUAL RESEARCH INTEGRITY STATEMENT (University of Oxford)

In line with the recommendations of the UK Concordat to Support Research Integrity, the University of Oxford has, since 2014, produced an annual research integrity statement which is considered by its Research and Innovation Committee before being published on the University's website. Each annual statement includes information about how the University has supported and promoted research integrity, through policy development, training and external engagement initiatives, as well as an anonymised summary of research misconduct allegations received in that year, how these were assessed and investigated, and the outcome of any investigations. All of these annual statements are publicly available[68]

INTEGRITY CLEARANCE IN APPOINTMENT PROCEDURE (KU Leuven)

For a specific KU Leuven call in 2019 to appoint research professors, KU Leuven has integrated a research integrity clearance in the application procedure for a senior academic staff position. The candidates that were selected, were requested to sign a "declaration on honour" in which they declare that they have not had an allegation of research misconduct against them upheld (within the last 6 years), and that they are not subject to an ongoing investigation (see Section 3.1 of the European Code of Conduct for Research Integrity). From 2020 on, this practice will be expanded to all appointment procedures for senior academic staff positions within the university.

RUSSELL GROUP STATEMENT OF COOPERATION IN RESPECT OF CROSS-INSTITUTIONAL RESEARCH MISCONDUCT ALLEGATIONS
(University College London, Imperial College London, University of Oxford, University of Cambridge and University of Edinburgh)

The Statement[69] was created through the Russell Group Research Integrity Forum, of which UCL, Imperial, Oxford, Cambridge and Edinburgh are members. This Statement sets out publicly the Russell Group's desired standards on managing cross-institutional investigations of alleged research misconduct between Russell Group members and other universities and/or research organisations (including those outside the UK). The Statement is intended as a set of principles regarding the *approach* to

68 University of Oxford (no date) Research Integrity Reports. Retrieved from https://researchsupport.admin.ox.ac.uk/governance/integrity/reports on 26th November 2019.

69 Russell Group (2018) Research Integrity Statement of Cooperation. Retrieved from https://russellgroup.ac.uk/policy/policy-documents/research-integrity-statement-of-cooperation/ on 26th November 2019.

managing the review of cross-institutional research misconduct allegations, not how the *process* itself would be conducted as this would be dictated by the relevant institution's policies.

INVOLVEMENT IN NATIONAL AND INSTITUTIONAL NETWORKS OF RESEARCH INTEGRITY OFFICERS (Sorbonne University, Lund University)

In France, most research units depend on two or more institutions: the university and CNRS (National Center for Scientific Research), Inserm (Center for Biomedical Research) or some other research institution. This gives Sorbonne University's Research Integrity Officer at least one other Research Integrity Officer to discuss Sorbonne Research Integrity investigations with. Such collegiality is incredibly useful (even though time consuming). In addition, there is a French national Research Integrity Officer network (with about 100 members today). Sorbonne takes part in this national network, especially to emphasise that fundamental and applied research do have different requirements with respect to Research Integrity.

At a national level Lund is represented in collaborations on promoting open science and research integrity. The medical faculties in Sweden have developed a course in research integrity for international post docs, which is planned to launch in 2020.

CREATION OF A NATIONAL NETWORK TO SHARE PRACTICES (Universitat de Barcelona)

The University of Barcelona created a Spanish network to share practices, protocols, etc in bioethics, called the "Bioethics and Law Observatory (OBD)-UNESCO Chair in Bioethics[70]".

70 University of Barcelona UNESCO Chair in Bioethics at University of Barcelona. Retrieved from http://www.bioeticayderecho.ub.edu/en/catedra_unesco/unesco-chair-bioethics-university-barcelona on 6th January 2020.

V. Fostering a Research Integrity Culture

REPRODUCIBLE RESEARCH OXFORD (University of Oxford)

Over the past decade, concerns have been raised that incentive structures in academia can lead to scholarly outputs that are not robust, reliable, or reproducible. Reproducible Research Oxford (RROx[71]) is a grassroots network set up by academics to address these issues and ensure the continued credibility of research conducted at the University of Oxford, leading the way in the promotion of research integrity. RROx was originally set up in October 2016, with funding from the University's IT Innovation Seed Fund, as a project aiming to provide training in effective computing for research reproducibility. In January 2019, it was expanded into a wider initiative focused on fostering a culture of open scholarship and research reproducibility at Oxford. It is run by a Steering Group with representation from all Divisions in the University (Social Sciences, Medical Sciences, Humanities and Mathematical, Physical and Life Sciences) from all career stages - from PhD student to senior professor - as well as from the University's Libraries and from Research Services. The objective of the network is to provide leadership across ongoing and planned activities, ranging from training, outreach and meta-research, to funding bids, policy, and seminars, with the aim of contributing to long-term culture change at the University of Oxford. The network also links to national and international endeavours through its involvement in the UK Reproducibility Network. The UK Reproducibility Network (UKRN[72]) is a peer-led consortium, founded in September 2018, that aims to ensure the UK retains its place as a centre for world-leading research, by investigating the factors that contribute to robust research, providing training and disseminating best practice, and working with stakeholders to ensure coordination of efforts across the sector.

OPEN SCIENCE CENTRE (Ludwig-Maximilians-Universität München)

LMU's interdisciplinary Open Science Center aims at promoting the transparency of scientific research and strengthening its self-correcting mechanisms by facilitating the replication of published work. These goals are pursued by offering advanced training programmes and workshops for early career researchers and senior faculty members, public talks, the development of core curricula on open research practices, and original research on meta-science and reproducibility. Moreover, the Centre seeks to connect existing initiatives at LMU and beyond to foster open science practices.

CENTER FOR REPRODUCIBLE SCIENCE (CRS) (University of Zurich)

The reproducibility of scientific findings is crucial for the credibility of empirical research. The objective of the CRS is to train the next generation of researchers. With the development of novel methodology related to reproducibility and replicability, the Center will improve the efficiency of scientific investigation using meta-science.

RESEARCH INTEGRITY SESSIONS IN RESEARCH UNITS (Sorbonne University)

Sorbonne University feels that the research integrity culture should be developed in the lab, in connection with methodological topics. This is why its first actions have been to propose research integrity sessions in the weekly or monthly seminar of some research units. These sessions are on the same footing as the usual research sessions presenting hot topics of the discipline. Sorbonne finds it important that the research integrity sessions are presented by two colleagues: one senior researcher and one

71 Reproducible Research Oxford (2019) Welcome to Reproducible Research Oxford. Retrieved from http://ox.ukrn.org on 26th November 2019.

72 The University of Bristol. The UK Reproducibility Network (UKRN). Retrieved from https://www.bristol.ac.uk/psychology/research/ukrn/ on 26th November 2019.

younger, closer to PhD students and post-doc. It also finds it important that the speakers talk to, and answer questions of, every member of the research teams, including technicians and engineers. In biology, technicians and engineers have been very keen to discuss research integrity questions. Sorbonne have designed the following method, which is based on the French Charter for Research Integrity[73]. The speakers basically follow this text and comment and illustrate each point by choosing relevant examples relative to their audience (which means that they have a lot of work to prepare the session). They do so according to a general position that has been defined by the Committee of Research Integrity of Sorbonne (composed of 12 colleagues from all scientific fields), which is basically that research integrity is a matter of epistemic vigilance. Vigilance may apply to image processing, data sharing, authorship, etc. The important point is that the form it takes is domain-specific and should thus be addressed by specialists. Sorbonne is sensitive to potential counter-productive effects of rigid, top-down interventions (like defiance towards the hierarchy).

IMPROVING AWARENESS OF RESEARCH INTEGRITY (Lund University)

Lund University has an ethics board that organises seminars on various topics such as threats to academic freedom, and ethical aspects of collaborating with pharmaceutical companies. The board also occasionally makes statements, such as that research ethics should be mandatory for all PhD students (that was implemented). The board also publishes guidelines. One of these concerns students who do part of their work in countries with standards other than those in Sweden/EU.

IMPROVING AWARENESS OF RESEARCH INTEGRITY AMONGST SUPPORT STAFF (Sorbonne University)

Sorbonne University has been raising awareness amongst the lawyers at the university on what a research integrity claim is and how (some of them) can be settled. Furthermore, because lawyers and human resource people may come into contact with research integrity issues, it was important to let them know that it is better that these problems are examined by the scientific community (that is, the experts that can be found) before they go to court, or before an administrative sanction is taken on statutory grounds. Good relations with the lawyers of the university are important, especially when research integrity staff do not have a legal background.

BIOSKETCH IN DOSSIER FOR CAREER DECISIONS SENIOR ACADEMIC STAFF (KU Leuven)

As of this academic year (2019-2020), the dossier submitted by professors for a promotion or permanent position at KU Leuven will also include a biosketch. The biosketch consists of a short summary of the main realisations achieved during the career, the current strategic positioning and plans for the future. This allows the advisory committees to focus more on the main contributions of professors and to view the information from the CV holistically and in a broader career perspective. As such, more weight can be given to the quality of the achievement and to the unique contribution of the university. The professor will have the opportunity to emphasise certain aspects and is invited to include less visible efforts with regard to research integrity, next to open science and leadership. Advisory committees will explicitly take positive efforts related to research integrity into account.

73 Multiple Stakeholders (2019) French Charter for Research Integrity. Accessed via https://www.hceres.fr/sites/default/files/media/downloads/2015_French_RI_Charter_0.pdf on 6th January 2020.

OBLIGATION TO REPORT SUSPECTED CASES OF SCIENTIFIC MISCONDUCT (Lund University)

Employees are obliged to report suspected cases of scientific misconduct. Cases that involve fabrication, falsification and plagiarism must by law be forwarded to, and investigated by, a new governmental body (starting 1st January 2020). Other kinds of misconduct are investigated by a special board at Lund University. Accusations, decisions and documentation related to suspected cases of misconduct is, as a general rule (and by law), open to the public.

OBLIGATION TO REPORT SUSPECTED CASES OF SCIENTIFIC MISCONDUCT (University of Strasbourg)

Employees of the University are obliged to report suspected cases of scientific misconduct (the confidentiality of the whistle-blower is preserved, although anonymous allegations are not allowed). All kinds of misconduct are investigated by the referent for research integrity at the University of Strasbourg, but the instruction can involve external reviewers in dedicated commissions, and other referents from other bodies or Universities can be subsequently alerted if the problems involve several employers.

LERU publications

LERU publishes its views on research and higher education in several types of publications, including position papers, advice papers, briefing papers and notes.
Advice papers provide targeted, practical and detailed analyses of research and higher education matters. They anticipate developing or respond to ongoing issues of concern across a broad area of policy matters or research topics. Advice papers usually provide concrete recommendations for action to certain stakeholders at European, national or other levels.
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