OSPEDALE SAN RAFFAELE

RESEARCH INTEGRITY GUIDELINES

(LG RIO 001)

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INTRODUCTION AND DEFINITIONS

Science is based on trust. Without confidence in the integrity of their peers, scientists would lack a foundation on which to build new work. While in particular the basic science community has always enjoyed the privilege of self-regulation and self-policing to ensure the legitimacy of its activities, it must also meet the expectations of stakeholders outside its community (e.g. funding agencies, the general public, regulatory agencies, etc.) of the most stringent standards of integrity.

IRCCS Ospedale San Raffaele (OSR) values the honesty and integrity of its research community in accordance with its mission of conducting innovative fundamental and clinical research. OSR is committed to ensuring the quality, trustworthiness and reproducibility of the research conducted by its investigators[1] and by those from other Institutions operating on OSR premises, by upholding high standards of integrity. OSR also works to foster an environment in which the responsible conduct of research is explicitly discussed and encouraged

Responsible conduct of research (RCR) at OSR is defined by the core principles of research integrity (RI) as outlined in the European Code of Conduct for Research Integrity (ALLEA, 2017):

> ***Reliability*** *in ensuring the quality of research, 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.*

These principles apply to ALL facets of scientific endeavour, including:

1. Research Environment
2. Training, Supervision and Mentoring[2]
3. Research Procedures[3,4,5, 7]
4. Safeguards
5. Research Data Management (RDM)[4]
6. Collaborative Work
7. Publication and Dissemination[6]
8. Reviewing, Evaluating and Editing[7]

> *The failure to abide by such principles and thus to follow good research practices violates professional responsibilities. It damages the research processes, degrades relationships among researchers, undermines public and funder trust in and the credibility of research, wastes resources and may expose research subjects, users, society or the environment to unnecessary harm.*

[1] Unless otherwise specified, the term "Investigators" herein refers to all individuals actively and directly participating in research activities, therefore including staff scientist, post-doc fellows, , PhD students, lab managers, technicians and laboratory assistants..
[2] See OSR guidelines on Mentorship and Supervision of Early Stage Researchers and Post-Doctoral Investigators
[3] See OSR guidelines on Image Presentation for Scholarly Communications and Grant applications
[4] See OSR guidelines on Research Data Management
[5] See OSR guidelines on Research Misconduct and Detrimental Research Practices
[6] See OSR guidelines on Scholarly Publication Authorship
[7] See OSR guidelines on Plagiarism and on Conflicts on Interest in research

OSR fosters a culture of honesty and integrity through RI training and education programmes and provision of clear and applicable regulations governing RCR, to ensure the credibility and trustworthiness of the research conducted by our research community, to protect this community from unsubstantiated allegations of research misconduct, and to uphold OSR's high standards for scientific research.

As an integral part of the OSR Quality Management System the official version of the present Guidelines is available on the OSR intranet repository.

SCHOLARLY PUBLICATION AUTHORSHIP

Introduction

The value and impact of scientific discovery would be very limited without the communication of findings to peers. Such communication may occur under many forms but most typically, as scholarly publications validated by peer-review. OSR values the quality and integrity of peer review and firmly discourages submission of manuscripts to, and their publication in journals that undermine the accepted quality control standards of scholarly publishing[8]. OSR also encourages investigators to avoid wilful participation in the editorial boards of such journals.

Authorship of research articles in scholarly journals is the most visible and prestigious form of academic recognition and credit. Funders, policy-makers and institutions rely on the published record to identify the authors of scientific findings and their interpretation, and consequently to establish resource allocation, funding attribution, career progression and make hiring decisions. Also, intellectual creative work is protected by copyright law, including the right to prevent others from modifying it without consent and the moral right of an author to be named as such (European IPR Helpdesk, 2013). The crucial importance of authorship attribution thus extends well beyond personal gratification. Indeed, authorship has evolved to also confer direct accountability for accuracy and integrity of the work, i.e. with honour comes great responsibility.

Because of this decisive significance and therefore not surprisingly, authorship issues often surface in disputes and allegations of research misconduct (RM). These and other reasons explain why the correct assignment of authorship is a central tenet in RCR. Hence, a solid, transparent and clear authorship policy is of the essence in RCR.

Attribution of Authorship

1) OSR abides by the guidelines set forth by the International Committee of Medical Journal Editors (ICMJE, 2018). The following general statement (McNutt et al., 2017) summarizes the basic principles:

> "Each author is expected to have made substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data; or the creation of new software used in the work; or have drafted the work or substantively revised it; AND has approved the submitted version (and any substantially modified version that involves the author's contribution to the study); AND agrees to be personally accountable for the author's OWN contributions and for ensuring that questions related to the accuracy or integrity of any part of the work, even ones in which the author was not personally involved, are appropriately investigated, resolved, and documented in the literature."

The above also indicates that to omit authors who contributed materially to the work ("orphan" or "ghost" authors) is considered to be detrimental to research and the research community, and as such is at the very least a detrimental research practice (DRP) but

[8] See OSR guidelines on Research Misconduct and Detrimental Research Practices for more details on illegitimate journals

depending on the seriousness and case scenario, may also amount to RM. Therefore, proper recognition must be given when due, regardless of personal conflicts.

2) The corresponding author (CA) of a scholarly manuscript/paper is defined as the person to whom all correspondence pertaining to the work described or the publication process is to be addressed, including after publication, AND who takes responsibility to represent all the authors to the journal and the community AND for the correctness of all the information. A CA by no means has to be the most senior author. However, it is the CA who takes responsibility for underwriting the information presented in a manuscript, even if the most senior scientist listed as author on the paper may well have had responsibility for supervising the project and (some of) the other authors, including even the CA on occasion at the institutional level: e.g. the CA is a senior post-doc and the most senior author is a group/project leader. It should be noted that in some cases designation of a CA other than the group leader may raise issues on responsibility for data integrity and storage[4]. Scholarly journal editors will usually engage in correspondence on a specific manuscript only with the CA, unless the other authors or third parties raise specific issues which may compromise the integrity of the data reported and may thus need to be further contacted.

3) The corresponding authorship of a scholarly paper therefore carries great honour but also great responsibilities. Among the additional obligations of the CA are (McNutt et al., 2017):

   a) To ensure that all listed authors have approved the manuscript before submission or re-submission to a journal and that all authors receive the submission and all substantive correspondence with editors, as well as the full reviewer evaluations and to allow co-authors a reasonable timeframe to re-check revised manuscripts.
   b) To verify that all data, materials (including reagents) and source code, including those developed or provided by other authors, comply with the transparency and reproducibility standards of both the field and journal. This responsibility includes but is not limited to ensuring that original data/materials/code upon which the submission is based are preserved and retrievable for reanalysis, that the data/materials/code presentation accurately reflects the original, and minimizing obstacles to the sharing of data/materials/code described in the work. The CA should also ensure that the entire author group is fully aware of, and in compliance with best practices.
   c) To ensure that the ICMJE and OSR guidelines (the present document) for authorship are applied and that all authors have approved the author list and contribution description[4].
   d) To indicate and justify whether any authors on earlier versions have been removed or new authors added, and to obtain appropriate consent from all authors, including those removed[4,9].

   The CA may also be subject to other requirements depending on the nature of the study and the policy of the journal to which the manuscript is being submitted.

4) The following conditions do not qualify, per se, for authorship:

   a) "guest/gift/honorary" authorship for any reason;
   b) fundraising responsibilities;
   c) providing rooms, funds/equipment, personnel or other resources;
   d) training/instructing co-authors in the use of established methods;
   e) reading the manuscript without being involved in shaping its content;
   f) managing the institution or organisational unit in which the publication was created.

   The above exclusions are especially cogent for key authorship positions i.e. first and CA and

[9] It should be noted that most reputable scholarly journals require such proof of consent in case of author changes during the manuscript evaluation and publication process

also the last authorship if different from the CA. As typical examples, being a Head Physician/Division Director or generally a "senior" figure, does not automatically confer any right to any form of authorship without a significant contribution as mentioned above (ICMJE, 2018; McNutt et al., 2017).

OSR investigators should not presume/expect or even worse, impose authorship based on the above conditions alone. Conversely, OSR investigators are expected to refuse authorship if offered under the same conditions. See also item 5 below.

5) Recognition of at least the key authorships, i.e. first and corresponding authorship(s) should be discussed and ideally decided upon by the senior investigator/group leader very early in the research project. Indeed, this process should accompany the natural process of task assignment. It is acknowledged that the physiological evolution and the experimental requirements of any research project are in constant flux and that therefore authorships and especially co-authorships (and acknowledgments), are subject to change, typically by addition, including during post-submission revision of manuscripts, and can be properly assessed at latter stages of project development or even upon manuscript drafting. However, for the sake of transparency, discussions on authorship should occur as early as possible and as frequently as necessary to communicate such changes. The designated CA should be rigorously consistent across different manuscripts and projects in applying their own judgment and criteria in the establishment of authorship.

6) Accepting to be named as a co-author implies accepting to share responsibility in ensuring that the publication meets scientific requirements. OSR does not endorse the view that each author should be held responsible for the entire content of a manuscript. However, in addition to being responsible for the correctness of their own contributions, co-authors have a duty to ensure that these contributions are incorporated into the publication in a scientifically sound way. Being a co-author therefore always entails active participation and clear responsibilities.

7) Regardless of whether the journal to which a manuscript is being submitted requests the listing and definition of each authors' contributions, the CA should ideally create and store an authorship agreement where the source data is also located, indicating each author's level of contribution to the manuscript, together with acceptance emails or other evidence of agreement among authors, prior to submission. Investigators may refer to available resources on best practice in reporting author contributions (Clarke, 2009). This applies also to multi-institute collaborations.

8) OSR scientists named as co-authors of a publication without their permission ("conscripted" authorship) are expected to make their opposition expressly clear to the primary responsibility holder and where this is not possible or does not lead to appropriate action, to the editor of the journal or publisher affected. OSR recognises that unfortunately, action may be possible only after publication, as the conscripted author might not have prior knowledge of their involvement. Similarly, where the basic requirements for authorship are met, it is the right and duty of a collaborating scientist to demand appropriate recognition as a co-author from the primary responsibility holder and where this is not possible or does not lead to appropriate action, from the editor of the journal or publisher affected. Again, it is recognised that unfortunately, such action may be possible only after publication when the potential co-author becomes aware of the omission.

9) OSR strongly encourages author adoption of ORCID (ORCID, 2017), to reduce name confusion and ensure appropriate attribution of publications and citations to the correct authors. Indeed, many reputable publishers, major journals and funding agencies are already

requiring ORCIDs for at least CAs as useful tool against author identity theft.

10) In the event that conflicts arising from the alleged breach of any of the above norms cannot be resolved by direct mediation within the research group and with the CA, it is strongly advised that OSR RIO is contacted for counsel and mediation before escalating to the journal/publisher level. This is mandatory should the conflicts occur between OSR scientists, and desirable if the conflict includes non OSR investigators.

Dissemination of findings to the general public

Scientists have a general responsibility to contribute to science outreach and popularisation. This may occur in many forms, including the dissemination of scientific knowledge (including their own findings), through books directed at the general public, participation in public outreach events, first-hand accounts or interviews in newspapers or magazines, and often via press releases issued by one's own institution/company/scientific association/funder etc.

It is recognised that many of these activities sometimes carry a dual ambition. On one hand, they fulfil the high purpose of making research findings accessible to a non-expert audience, who might benefit from the information, in the true spirit of the concept of Responsible Research and Innovation (RRI) (European Commission, 2017). On the other hand, there is the legitimate goal to promote the institution and the investigator in the public sphere to attract patients, students, donors and funding. There is therefore the potential of a conflict between communication for promotion and communication for transparency, with potential effects on the public good, of which investigators and communicators should be aware of (Tattersall, 2018).

It is acknowledged that communication offices place some emphasis on promotion and marketing and that in general, the press aims to publish impactful messages. Unfortunately, science reporting often exaggerates advice, causality, relevance to humans of animal studies and proximity to clinical implementation, with obvious implications for public expectations and even with potential dangers for health.

Scientists therefore, have an obligation to ensure, within the limits of their possibilities, that exaggeration and misrepresentation do not slip into the dissemination of their findings to the general public. This especially applies to institutional press releases, in which the scientists have a direct say and therefore clear accountability. It is appreciated that, conversely, it may not always possible for scientists to vet newspaper and magazine articles before publication.

In general, OSR investigators should strive to:

- Remain accurate and faithful to the study when popularising research findings
- Ensure that the story is presented so that members of the public/people outside of the field can understand with minimal room for misinterpretation
- Have realistic expectations about which audiences may actually be receptive to their research
- Make sure that the writer (if a professional other than the investigator) has not overlooked something notable or topical related to their research
- Realise that OSR cannot control how the research is publicised by journalists, which highlights the importance of issuing accurate press releases.

Furthermore, OSR investigators should avoid:

- Misleading the public or make sensationalist claims
- Exaggerating the impact of their research
- Drawing conclusions that are not directly supported by evidence

- Expecting/assuming every research paper to be of direct public interest.

Finally, and not least importantly, OSR investigators are required to contact the Press Office[10] prior to any interaction with the mass media.

[10] intranet.hsr.it/jumpNews.asp?idLang=IT&idChannel=10&idUser=0&idNews=42

RESEARCH DATA MANAGEMENT

Introduction

Research data management (RDM) is the effective and secure handling of information created in the course of research. Such information is typically the foundational evidence of published findings. Effective RDM spreads over a long lifecycle and continues well after the initial research has been published.

The definition of "data" extends beyond the information and observations that are the typical result of scientific investigation. In fact, it also includes the materials, products, procedures, and other data sources that are part of the research project, including materials submitted to and approved by the IRB, IACUC or other research oversight committees (e.g., applications, outreach/advertising materials, sample consent forms, survey routines/questionnaires), signed consent forms; and any other records or source documentation in any form necessary for reconstruction, evaluation or replication of reported or otherwise published results.

Essentially, data are considered to be anything and everything that informs the way in which individuals are able to understand, process and replicate the experimental process leading to the observations and then the conclusions.

For the practical purposes of this document, research materials that do not fit into the definition of information and observations arising from scientific research, e.g. reagents, products, etc., will be discussed separately further below. Furthermore, there may be specific provisions set forth by the applicable law, for instance in the case of studies involving human samples/clinical data, which supersede the current guidelines.

Storage, preservation, traceability and retrievability of research data

The original/source (unprocessed, raw) data and experimental protocols and the books and digital media where they are stored, and which are originated from research conducted at OSR, are the property of OSR, unless otherwise established though specific contracts with third parties, and may not leave the premises without a legal basis at any time. OSR-sanctioned group leaders are granted management privileges over the project data and may govern their publication and copyright (the latter subject to OSR evaluation). However, they are duty-bound to report any invention to the OSR Office of Biotechnology Transfer in accordance with OSR regulations[11].

All primary data must be stored, in real-time, on a remotely backed-up research-dedicated central OSR server and/or specifically allocated OSR-provided cloud-based storage accounts, and must remain accessible to the authorized employees for at least five, ideally ten, years after its

[11] Regolamento in materia di proprietà industriale e intellettuale (dirsan.hsr.it/Docs/ProprietIndustriale.pdf)

collection[12]. It is acknowledged that data generated by analytical instruments (e.g. FACS, PCR, ELISA readers, etc.) might not be immediately backed-up by the instrument hardware and generally needs to be transferred to the personal OSR-provided PC/account of the user, upon which the data becomes available for back-up and storage[13]. All data should be associated with README files providing legends and appropriate indications to allow understanding (for an expert reader) of content and including referral to the appropriate entries in the log books (whether digital or paper-based). Failure to comply with these indications is considered to be at the very least, a DRP but depending on the seriousness and case scenario, may also amount to research misconduct (RM). Investigators are also required to comply with OSR internal policy on the use of IT resources[14].

It is also a DRP if at any given time the sole repository of primary data is a non OSR computer and/or a computer that is not in the immediate availability of the project leader (and later the corresponding author[6]) during the editorial process or after publication and not accessible by an authorised IT official. In case of a dispute that requires consultation of original data, failure to have complied with the above indications may amount to RM.

For the above reasons and in general to preserve the integrity of the data, upon submission of a scholarly article, book, or PhD dissertation manuscript, throughout the editorial or revision process and after publication, all files containing the underlying data[15], should be compiled into a clearly identified directory (folder) for each publication accompanied by appropriate README files; this directory must remain accessible for the legally required length of time, but for no less than five years following the publication of the manuscript[12,16]. A thoughtful and comprehensive organisation of file/folder structure is key to make it easy to locate and organise data and versioning. Collaborative work, which is often the norm, enhances the need for clear, organised file structure[17]. Furthermore, data safety and integrity and clear metadata are also relevant for industrial collaborations or in the process of patent protection, particularly in the case of any arising dispute.

In the case of collaborative studies with third parties (e.g. academia, industry, etc.), and if the corresponding author (CA)[6] of the consequent publication(s) is an OSR investigator, it is their duty of care to unsure that an integral copy of the source data underlying experiments conducted by all the collaborating scientists(s) and used in the publications (s) is stored at OSR according to the provisions set forth in this document. Should this not be possible because of the extremely large size of the files (e.g. genomic or imaging data), the collaborating Institution should sign an agreement to make such data readily available upon request from the CA or OSR. In the case of collaborative studies with third parties and if the participating OSR investigator is not the project leader (and later the corresponding author[6]) it is nevertheless the OSR investigator's duty to ensure that his/her data contributed to the manuscript is collected and stored at OSR as defined above.

Typically, a legitimate request to produce the original (source) data underlying a publication e.g. from a scholarly journal requesting clarifications and/or an investigation body and/or an author, should be addressable within a day or two.

The responsibility for data storage for a research group lies with the respective OSR-sanctioned group leader, who is also responsible for its appropriate and unambiguous logging. It should be noted however, that for all intents and purposes, the scientific community will consider the CA

[12] Different journals/publishers or funding agencies may have different requirements, to which the CA adheres upon publication or funding. It should be noted that some scholarly journals and funding agencies expect a 10-year accessibility period

[13] Solutions are being sought to improve backup options from OSR legacy instrument-associated computers.

[14] OSR Internal Policy 002: *Regolamento generale per l'utilizzo delle risorse informatiche*.

[15] With the exception of extremely large source data files (e.g. genomic or imaging data) which may be stored in appropriately safe and backed-up core facility databanks. Such locations should be nevertheless clearly indicated in the README file.

[16] The OSR Centre for Technical Services in Research together with the IT department are exploring solutions to ensure accurate time-stamping and logging of revision history.

[17] There are many available sources of information and tips on research data organisation. One good example is here: ukdataservice.ac.uk/manage-data/format/organising

ultimately responsible for the storage, preservation, retrievability and shareability of the original data underlying the publication even if said CA is not the group leader[18].

All researchers participating in a given study are permitted to make/store copies of the data if this is compatible with the applicable law and provisions of data protection in case of studies involving humans/clinical data.

Finally, OSR investigators must make exclusive use of their OSR email account for all professional exchanges.

Experimental protocol and data tracking

The primary verification of any scientific finding is its reproducibility. It is recognised that this may be a difficult endeavour given the highly complex and specialised nature of many experimental procedures; nevertheless, experiments and numerical calculations can only be reproduced when all important steps can be retraced. They should therefore be documented with sufficient thoroughness that a person familiar with the subject would be able to reconstruct the experiments and considerations involved. Many reputable scholarly journals encourage or mandate rigorous, detailed reporting of research methods and materials. OSR fully supports and adheres to such principles, regardless of the journal to which the manuscripts(s) is submitted for publication.

The log/workbook a.k.a. the "lab book" (paper-based or digital) is the central repository for the logging of experimental protocols and procedures. If paper-based, a lab book must have a hard cover and numbered pages; pages must not be torn out. Original data disappearing from a laboratory violates basic rules of scientific diligence, and may form a justification for suspecting negligent or dishonest behaviour. The same applies to data that, by its nature, can only be stored on electronic media, e.g. typically as data files. These files AND their location must be clearly listed in the log book. Paper-based experimental records account for 17% loss of all research data (Vines et al., 2018) and lab books are becoming bottlenecks in RDM. This impinges on research reproducibility, represents a financial burden and produces limitations for data sharing within an organization and the community[19].

As mentioned above, original data (including raw/source data) and lab books (whether paper-based or digital) are the property of OSR, and may not leave the Division/Institute/Centre without a legal basis at any time. Copies (physical or digital) may be taken by the scientists working on the project, if not contrary to the provisions of data protection and applicable laws. When a Group Leader departs, he/she must document the handing over of original data and log books, including information on date, time, and scope, in an appropriate form countersigned by the receiver of the data, typically the Division/Institute/Centre Director[20] who shall also inform the RIO. The person receiving the data is then responsible for keeping the data safe and monitoring its whereabouts. Digital files are to be stored in their original format on the research-dedicated central OSR server specifically intended for that purpose.

[18] In such cases where the CA is not also the group leader, a co-corresponding authorship with the OSR-sanctioned group leader is encouraged to better ensure compliance with OSR data ownership guidelines

[19] Electronic Lab Notebooks (ELN) are considered by some to increase effectiveness and security while limiting impact on workflow or time commitment: splice-bio.com/the-7-best-electronic-lab-notebooks-eln-for-your-research/ SciNote is one of the most popular due to the fact that it is open source and free to use (scinote.net). eLabFTW from the Institut Curie is also of good quality, open source and free to use (elabftw.net/#intro).

[20] Insofar as these guidelines are diligently applied, this handover process does not apply to investigators other than group leaders. In fact, it is mandated that in no point in time do investigators other than the group leader have responsibility for the custody of original data.

Access to data

The use of privately owned computers a.k.a. the BYOD (Bring Your Own Device) principle, is rather commonly tolerated at OSR as in other research institutions, especially within the Early Stage Researcher[21] and Post-Doctoral groups. While it will take some time to change this state of affairs, it should be acknowledged that it poses significant issues in terms of RDM including avoiding merging work data with personal data, non-employee use of the computer or other device, gaining access to work data and other OSR resources, and for example, dealing with device misplacement and employee resignation[22].

Nevertheless, diligent compliance with the OSR guidelines on RDM described herein, will go a long way in ensuring immediate retrievability and appropriate storage of original data. Ultimately, and as mentioned above, a personal or otherwise non-OSR-owned device should not be, at any time, the exclusive repository of original data or experimental description.

The Chief Operating Officer for Research, the Scientific Director or their representatives or by delegation the RIO Head have the right to inspect original research data without advance notice in case of alleged RM or other proceeding. The procedures and technical means to exercise this right are already in place care of the IT, HR and Legal Offices.

Investigators may be required to comply with additional RDM measures established by their funding agencies/sponsors (e.g. ERC, Horizon 2020, NIH, industry, etc.).

OSR facilities shall also develop specific RDM protocols to ensure effective storage and conservation of data, but also to avoid liability in case of data manipulation allegations.

The RIO, in accord with the Organization and Quality Management Office, will carry out routine exploratory laboratory visits to verify best RDM practice and with the main goal to provide advice and training.

When applicable or if requested by the Chief Operating Officer for Research and the Scientific Director, the Organization and Quality Management Office may audit RDM practice.

Storage, preservation and availability of research materials

Research materials include, but are not limited to, materials that do not necessarily fit into the definition provided above for research data, such as biological specimens (whether unmodified and modified), new or chemical entities, gels and other physical experimental evidence, cell lines and specific reagents, and animals.

Funding agencies, reputable journals, regulatory authorities and indeed the scientific community at large, expect retention of research materials for a period of at least 5 years, ideally up to ten, after the end of a research project or activity, depending also on specific requirements imposed by such entities. In this context, a research project or activity should be considered ended after submission of (whichever is later):

[21] Early Stage Researchers (ESR) are those who are in the first four years (full-time equivalent) of their research careers and have not yet been awarded a doctoral degree.

[22] A BYOD policy is being designed to identify objectives and benefits as well as taking into account RDM issues including security, and data protection requirements.

1. Final technical report to the funder
2. Final financial report of a sponsored research award
3. Final publication of research results
4. Termination of activity on a research project regardless of whether results are published
5. Any end date otherwise defined in the research / sponsorship / data use agreement (if any) governing the project.

There may be cases where a longer retention period and/or specific mode may be required such as in the following cases:

1. Protecting intellectual property that is the subject of patent applications. Research Information associated with a patent application should be retained until the application is rejected, abandoned, or the patent is expired, whichever longer.
2. Research information relative to pending litigations, internal or external investigations and other formal proceedings. For example, in the case of a research misconduct allegation, the records must be retained until the allegation is resolved, even if the process extends beyond the expected storage period.
3. Compliance with applicable law in the case of studies involving human samples/clinical data.

Strict traceability criteria must be observed for long-term storage of research materials, including clear labelling strategies to include simple look-up of owner, content, expected expiry date, etc.

PLAGIARISM

Introduction

Research manuscripts typically build upon or revise previous findings. However, improperly referring to or recycling previous work is a breach of research integrity and, depending on the severity, can amount to research misconduct (RM).

An operational definition of plagiarism is the appropriation (i.e. theft) of others' ideas, processes, results, or words without giving appropriate credit, or in a wider context, misrepresentation of someone else's original thought as your own (Anonymous, 2012; Mudrak, 2017; ORI, 1994; Panter, 2017).

It is understood that each published manuscript includes new thinking, knowledge and results that advance our understanding of the world. This understanding is compromised when a manuscript contains uncited/recycled information.

It can be argued that acts of plagiarism are qualitatively different from other, apparently more serious, breaches of RI, because they do not immediately distort scientific knowledge. However, plagiarism has severe consequences for the careers of the people involved especially the most junior, and thus for the whole scientific enterprise. Therefore, plagiarism significantly affects the integrity of the research record, the process of scientific discovery as a whole and contributes to jeopardising the public's trust in research and science.

Plagiarism takes many forms, a few of which are listed below and all of which amount at the very least to DRP and in many cases to RM.

Definitions

Verbatim plagiarism

Copying word-for-word from someone else's work. Sometimes defined as mosaic or patchwork when content is copied from multiple sources.

Plagiarism of ideas

Uncredited use of others' unique ideas, whether in the form of a theory, an interpretation, data, a method, an opinion, or new terminology, even if explained in one's own words (Anonymous, 2012; Mudrak, 2017; ORI, 1994; Panter, 2017). Such misappropriation includes information obtained through confidential review of others' research proposals and manuscripts and through confidential disclosure of information (Biagioli, 2012).

Loose paraphrasing

Paraphrasing others' work with only slight changes, but maintaining the same logic and mentioning most or all of the same ideas. It should be mentioned here that the logical flow of an argument is to be considered original thought.

Self-plagiarism

The limited (e.g. the recycling of a paragraph (s) from the methods section of another manuscript), or extensive (e.g. the publication of the same manuscript in two separate journals a.k.a. duplicate publication), re-use one's own previously published text.

OSR does not consider the limited re-use of identical or similar expressions describing a standard methodology or previous research, especially from one's own previous publications, to be RM. In fact, although they remain questionable and possibly in breach of copyright law and thus to be avoided as much as possible, it is acknowledged that such practices do not mislead the reader as to proper attribution.

Conversely, duplicate publication is highly unethical and considered to be RM[5].

Manuscript screening

The OSR RIO offers a manuscript screening service based on professional plagiarism detection software to help avoid unwitting plagiarism and self-plagiarism. All OSR investigators are encouraged to take advantage of this service for both original research and review manuscripts, prior to submission. Screening results will be treated confidentially, and counselling will be available from the RIO to address potential issues. Manuscript screening will not significantly hamper or slow down the submission process as it takes, on average, about 1-2 hours (mostly due to software processing time, plus 5 minutes editorial review).

Plagiarism screening is mandatory for doctoral and specialisation theses based on research work carried out on OSR premises.

IMAGE PRESENTATION FOR SCHOLARLY COMMUNICATIONS AND GRANT APPLICATIONS

Introduction and general advice

These guidelines[23] are intended to complement or integrate specific indications from funding agencies and scholarly journals. The ultimate goal is to ensure data integrity and reliability and to protect OSR investigators from unfounded post-publication allegations of misconduct originating from non-malicious but poor image processing and handling.

Image-based data (gels, micrograph photographs, etc.) should be scanned or captured at the highest resolution possible and saved in lossless formats. This can be achieved by saving images as TIFF while ensuring that no compression option is selected in the application used for acquisition/export of the images. It should be noted that 300 dpi at print size is usually considered the lowest acceptable resolution for original images for most journals; therefore, the default settings on imagers, scanners, and cameras should always be checked. Screenshots should never be used to capture images. If image file size is a concern, it is best to use lossless image compression such as LZW and in any case, to avoid quality-degrading compression formats such as JPEG. This is important because failure to provide sufficiently high-quality images leads to delays in publication, also due to the impossibility to verify data integrity. Many issues related to image quality, resolution (e.g. compiled figure vs. image resolution), format and others are due to misunderstanding of these basic concepts. It is therefore suggested that authors familiarise themselves with them[24].

In preparation for submission e.g. of a manuscript to a journal or a grant application to a funding agency, a certain degree of image processing is acceptable (and for some experiments, fields and techniques unavoidable), but should be minimal (for instance, to add arrows to a micrograph) and the final image must accurately reflect the original data and conform to community standards.

The corresponding author should retain unprocessed (source) data and metadata files and be prepared to promptly make them available, as editors or any authorised office/person may request them at any time[4]. It should be noted that if source data are unavailable, further consideration of a submitted manuscript may be stalled until resolution of the issue or stopped altogether.

It is suggested that the authors list all image acquisition tools and image processing software packages used in the preparation of figures and store this information in the README file associated with the manuscript folder[4]. Authors should also document, or be prepared to document upon request, key image-gathering settings and processing steps in the Methods or other section of the manuscript, depending on journal policy.

Images gathered at different times or from different locations should not be combined into a single image, unless it is stated that the resultant image is a product of time-averaged data or a time-lapse sequence. If juxtaposing images is nonetheless deemed essential, the borders should be clearly demarcated in the figure and described in the legend. Typical scenarios in this respect are the "splicing" in of western blot sections and combination of different image fields into a single image (see further below).

The use of touch-up tools, e.g. cloning and healing tools in Photoshop or any other tool that deliberately conceals manipulations, must be avoided.

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[23] The OSR Guidelines on Image Presentation are mostly taken from the EMBO Molecular Medicine Guidelines for Authors: embomolmed.embopress.org/authorguide#datapresentationformat

[24] From EMBO Press and The Journal of Cell Biology:
embopress.org/sites/default/files/EMBOPress_Figure_Guidelines_061115.pdf
jcb-biowrites.rupress.org/2015/10/everything-you-need-to-know-about-image-screening-at-rockefeller-university-press-in-10-posts-1.html

Image processing (e.g. changing brightness and contrast) is to be used with restraint and should not cause data loss (see further below). Furthermore, it is appropriate only when applied equally across the entire image including controls. In fact, processing to emphasize one region in the image at the expense of others is inappropriate and can amount to data falsification.

The policies for image processing and handling in reputable journals are quite stringent and provide clear instructions on responsible conduct and disclosure when certain image manipulations are necessary. For instance, the display of cropped gels and blots in a manuscript is usually permitted when aimed at improving the clarity of the presentation. Nevertheless, even when journal policies may be more permissive, OSR investigators should respect the following general data integrity indications for image presentation.

Electrophoretic gels and blots

1. Cropped gels should preserve all important bands, and sufficient space (several band-widths) should be retained above and below the relevant band(s).

2. Vertically spliced images that juxtapose lanes that were not originally adjacent must be declared and have a clear white space or a black line indicating the splices. Quantitative comparisons between samples on different gels/blots are discouraged; if this is unavoidable, the figure legend must reflect that the samples derive from the same experiment and that gels/blots were processed in parallel.

3. Highly-contrasted or otherwise-filtered gels and blots are far from optimal, as these manipulations may hide data. Ideally, exposures with grey backgrounds are preferable. If, however, this is unavoidable and necessary to reveal otherwise difficult-to-see details, then multiple exposures should be provided.

Microscopy

1. Items (cells/colonies/portions of tissue/etc.) from different fields should not be collated into a single field. While the principle of showing representative fields remains valid, the authors should offer, or be prepared to show multiple representative fields.

2. As noted above, linear transformation adjustments such as brightness and contrast adjustments are acceptable only if a) applied to the entire image, b) applied identically to all images within the same experiment (e.g. treatment vs. control) and c) does not lead to under- or over-saturation with subsequent loss of information. Threshold manipulation, expansion or contraction of signal ranges and the altering of high signals must be avoided. If 'Pseudo-colouring' and nonlinear adjustment (for example 'gamma changes') are used, this must be disclosed. It is appreciated that adjustments of individual colour channels are sometimes necessary on 'merged' images but, again, this should be disclosed in the figure legend.

3. Best practice on data integrity would suggest the inclusion of the following information in a scholarly publication:
    a. The type of equipment (microscopes/objective lenses, cameras, detectors, filter model and batch number);
    b. Acquisition software used;
    c. Equipment settings for critical measurements.

4. Authors should also have the following information readily available for each image:
    a. Acquisition information, including time and space resolution data (XYZT and pixel dimensions); image bit depth;

b. Experimental conditions such as temperature and imaging medium;
c. Fluorochromes (excitation and emission wavelengths or ranges, filters, dichroic beam splitters, if any);
d. The display lookup table (LUT) and the quantitative map between the LUT and the bitmap, especially when rainbow pseudocolour is used. If the LUT is linear and covers the full range of the data, that should be stated;
e. Measured resolution at which an image was acquired and any downstream processing or averaging that enhances the resolution of the image.

CONFLICTS OF INTEREST IN RESEARCH

Introduction and definitions

Scientists may often find themselves in circumstances whereby two or more competing personal and/or professional interests may produce the perception of, or actual increased risk of bias, prejudice or poor judgment. These circumstances are collectively referred to as conflicts of interest (COI) (UCSD, 2016).

COI are not intrinsically bad and are to be expected as in any other human endeavour. It is also acknowledged that COI more often than not, lead to unintended rather than deliberate bias. If, however, the potential for personal gain is considerable, the COI can determine significant breaches of the principles of RCR and amount to RM.

A common perception is that financial COIs (FCOI) are the main concern in science, potentially leading to research or even criminal misconduct. However, COI other than financial can also severely compromise RCR if not appropriately managed.

A COI is rarely a particular problem in itself. Rather, what is done with the conflict when it is not made apparent (i.e. disclosed), or when it is not properly assessed or managed, is of the essence. The correct and transparent handling of COI is therefore vital to ensure RCR and to allow all stakeholders to make informed judgments and evaluations on scientists' work. Scientists also have a specific responsibility towards the general public and in this respect, perceived wrongdoing (often simply due to a lack of transparency and appropriate disclosure) can be just as damaging as actual misconduct.

OSR firmly discourages sponsored research agreements that call for unlimited restriction to the freedom of investigators to submit certain findings for publication. In fact, such limitations would lead to the suppression of data, and limitation of academic freedom. This freedom is obviously important to investigators, but also to patients participating or with a direct interest in a research project with the assumption that the data will contribute to medical progress and will be published in full and thus available for public scrutiny. In the case of industry-funded and/or IP-driven research a publication strategy is always agreed upon and implemented by balancing the legitimate aspiration for academic/research hospital institutions to publish the results of their research and potential commercial interests.

Financial conflict of interest

A financial conflict of interest (FCOI) occurs when an investigator has a financial interest that may compromise, or have the appearance of compromising, professional judgment in the design, conduct, or reporting of research. FCOIs are neither new to research nor inherently negative. Furthermore, the current landscape has been revolutionised by a recent change in thinking about intellectual property (IP) and financial interests. Many funding agencies, including public ones, now encourage and sometimes even mandate protection and commercialisation of researchers' ideas and findings to attract additional investors (biotechnology firms, pharmaceutical industry, venture capitalists, etc.) to further research and develop the results for the benefit of the public. OSR as most large institutions, has an Office of Biotechnology Transfer[25], which directly handles these issues and advises researchers on intellectual property. The fact remains however, that when there is a

[25] research.hsr.it/en/support-offices/office-of-biotechnology-transfer.html

potential for financial gain, it is imperative that the public, legislators, the judiciary, and the scientific community at large are convinced that results were not biased for personal gain.

On the other hand, while FCOIs might be perceived to be more serious than other COIs, they are possibly less complicated to recognise, can be measured and are usually highly regulated. It is therefore important to understand how FCOIs can affect a project, grant application and/or scholarly publication and how they should be reported and managed.

Research grant applications

OSR fully adheres to the requirements set forth in the US PHS revised Financial Conflicts of Interest regulations (42 C.F.R. Part 50) for all research grant applications to US government agencies funded by the US Public Health Service (PHS) or other funding agencies requiring the adoption of said regulations. Compliance forms, resources, training materials, and other related information are available on OSR institutional web pages[26].

For all other funding agencies, OSR investigators must disclose relevant financial interests to funders of research as required by them. When there is no explicit request for disclosure of relevant financial interests, OSR investigators are nevertheless encouraged to contact the RIO to discuss whether a potential FCOI should be ascertained and disclosed to the funding agency.

Publication of research findings

Scholarly journals and their publishers, including scientific societies, provide guidance and/or mandatory indications on the management of FCOIs (James and Horton, 2018). OSR investigators must rigorously adhere to the provided indications and fully disclose the required information[5].

When there is no explicit request for disclosure of relevant financial interests, OSR investigators are nevertheless encouraged to contact the RIO to discuss whether a potential FCOI should be ascertained and disclosed to the publisher.

Public appearances

OSR investigators are expected to communicate relevant financial interests when making an appearance, either in person or in writing, before any public body, commission, group, or individual, to present findings or to give an opinion with respect to any issue or matter up for consideration, discussion, or action, and even when not explicitly requested.

Non-financial conflicts of interest

A non-financial COI (NFCOI) is in general terms, each and every condition other than financial, that can generate, or be perceived as generating bias at any stage in the scientific process. NFCOIs (sometimes called "private interests") can be personal, political, academic, ideological, or religious (Marcovitch et al., 2010; PLoS Medicine Editors, 2008).

Examples of NFCOIs that might conflict with RI include, but are not limited to

1. Career advancement
2. Recognition for professional achievement
3. "Conflicts of commitment" i.e. the loss of time or focus from the primary appointment to attend to a secondary project

[26] research.hsr.it/en/research-integrity.html

4. Institutional affiliations and/or academic associations
5. Relatives and friendships
6. Enmities
7. Personal beliefs (e.g. religious) and nationalistic considerations
8. Personal relationship with someone who has the disease or condition under study
9. Intellectual, theoretical, or school of thought commitments
10. Academic competition or rivalry
11. Dominant researcher in area of research
12. Published opinions or advocacy positions
13. Other ethnic or cultural bias.

NFCOIs can be much more difficult to assess and manage, compared to FCOIs and can sometimes be even more powerful generators of bias. As a general indication, it would be appropriate for individual investigators to excuse themselves from any decisional process on manuscripts, grant applications or career evaluations concerning friends, close colleagues, relatives or antagonists or that in general fall into the broad categories listed above. However, OSR appreciates that in many cases this broad-brush approach may not be applicable, e.g. in a *reductio ad absurdum*, if the few available expert reviewers for a given niche field all excused themselves, it would be nearly impossible to properly evaluate a grant application or manuscript from that field. Therefore, a strong sense of awareness, respect and ethos should always inform investigators evaluating the work of their peers (see also below in General considerations).

Finally, while public disclosure of NFCOIs may neither be necessary nor even appropriate, in case of doubt investigators should seek advice from the RIO or the official handling the process (e.g. journal editor, funding agency contact, chairperson of a search committee, etc.).

General considerations

It is expected of OSR investigators engaged in peer-reviewing of manuscripts and/or grant applications to be exceptionally judicious and transparent, especially when there is a lack of clear and specific guidelines. Any potential COI, real or potentially perceivable as such, should be promptly discussed with the journal editor or funding agency, respectively. Similarly, OSR investigators involved in internal or external career advancement and recruitment committees, should immediately discuss any possible COI with the appropriate chairperson.

MENTORSHIP AND SUPERVISION OF EARLY STAGE RESEARCHERS AND POST-DOCTORAL INVESTIGATORS

Introduction

A mentor is someone who places a special effort in helping another develop into a competent and successful professional.

Research training is typically a complex, long-term developmental process. Under the supervision of experienced researchers, trainees gradually progress from initially undertaking task-oriented activities to becoming independent investigators with increasing competence in all aspects of the scientific process. This support, under the form of mentoring, can dramatically reduce the learning curve for someone new to a field or a profession. Mentoring is influential for one's early career in establishing competence in the many roles to be fulfilled, but also in future development. Mentoring is recognised as the social foundation of research.

Mentor-trainee relationships are based on the establishment of a working relationship between an experienced and a less experienced researcher. Each brings to varying levels something in the relationship. The experienced researcher will have knowledge and skills that the inexperienced researcher wishes to learn and might provide financial support for the trainee's research, education and livelihood. On the other hand, inexperienced researchers at various stages of development, i.e. undergraduate or doctoral students, post-docs, research staff, or junior researchers, provide fresh mind-sets and of course, labour.

While the role of a mentor is theoretically different from that of a supervisor or adviser, these formal academic roles frequently develop into a mentoring relationship. A mentor is in fact, at the same time an adviser, teacher, role model, and an advocate of the trainee when necessary.

The goal of these guidelines is not to indicate an ideal path to mentorship or to suggest specific techniques or approaches. There are in fact, many dependable sources that can be drawn upon for specific advice (Lee et al., 2017; Pain, 2012). Furthermore, while it is acknowledged that each mentor will have their own strengths and weaknesses, style and inclinations, the OSR assumes that each one will act with a strong sense of responsibility and commitment to the future of the trainee. The aim of the present guidelines on mentorship is rather to provide an outline of what is expected of a mentor with respect to RCR, and what should be avoided. Of relevance are the results of a recent study (Bouter et al.) finding that even more than outright fraud (which remains a very rare occurrence), inadequate mentoring of junior co-workers appears to be one of the most negatively impactful misbehaviours in science. Other studies have reported (Anderson, 1996) that RM occurs more often in those departments in which the climate favours fierce competition and discourages collaboration and openness, and least often where students feel that their mentors, or others, provide useful feedback and evaluation. In conclusion, there is good reason to endorse the view that the risk of RM is diminished in environments in which good mentoring is provided.

General Indications

It might be useful here to remind ourselves that Doctoral students and Post-Doctoral Investigators who of course significantly contribute to the advancement their groups' research, are nevertheless persons-in-training. They should undergo personal development planning with their mentors and mentors should not shy away from discussing exit strategies. However much one wants a trainee to work on a specific project and with a high level of commitment, sometimes a mentor should

honestly and unselfishly recognise that not everybody wants to be a group leader, and some have skills that would make them better suited to other occupations. Therefore, trainees should be helped in making decisions about alternative career directions early enough in their research training. Preferably, a doctoral trainee should have the opportunity to discuss their studies with a third party – someone other than their direct supervisor - to obtain independent support.

Characteristics of a suitable mentor

Ideally, a mentor should have the following features:

1. Experience with the sort of challenges and life-work balance issues that are typically faced by a trainee
2. Ability to communicate their experience,

and effective mentors should:

1. Inspire trainees in their current work
2. Provide assistance in understanding and adhering to the standards of conduct
3. Teach research integrity and responsible conduct of research explicitly and by example
4. Provide advice on working in teams and leadership
5. Socialise trainees in the political, ethical, economic, and social dynamics of scientific endeavour
6. Inform about administration, planning, and budget management
7. Address special circumstances related to gender, race, national origin, language, or disability
8. Teach about teaching and mentoring
9. Be appreciative and somewhat tolerant of individual differences in style and approach, within of course the tenets of RCR
10. Treat as equally and as fairly as possible each trainee. Especially considering that some projects may have higher priorities than others for the mentor
11. Assist trainees with the job market.

It is appreciated that junior group leaders, due to less experience may have yet to develop their supervising and mentoring skills. OSR commits to exploring the possibility to provide newly promoted/recruited junior group leaders with laboratory management training and to exploring the establishment of a co-mentorship programme to assist both the trainee and the group leader in developing appropriate skillsets.

RCR training

As mentioned above, one crucial responsibility of a mentor is to guide the trainee in understanding and adhering to the codes of conduct within their profession. Within a small research group, this can occur through example, counsel, and open discussion. On the other hand, it must be acknowledged that some research teams are simply too large and/or the environment too competitive for this to occur with acceptable success.

At the very least, a good mentor should ensure that their trainee gets the maximum appropriate credit for any joint publications, encourage them to attend national or international conferences, workshops, and symposia and to present research at such events, promote their work among colleagues, and help them create professional networks and ultimately, develop an independent career.

The current thinking however, is that RCR is not discussed frequently enough and that teaching the traditions and standards of science is mostly by unwitting and serendipitous example. OSR agrees with the view that clear and open discussion of ethical principles, and with inclusion of all

investigators, is necessary. Indeed, the principles of decision-making are often open to interpretation, and many important responsibilities of scientists (e.g. peer-review or initiating collaborations) are not witnessed and/or experienced early enough by trainees.

The OSR RIO, in collaboration with the scientific staff, provides RCR training for ESRs and Post-Doctoral investigators but acknowledges that there is no substitute for responsible, quality mentorship. Indeed, proper supervision and oversight play an important role in quality control. Trainees can make mistakes or may inappropriately compromise data integrity either due to lack of training or and inexperience or maliciously. A mentor, especially if also the supervisor, should therefore carefully review work done under their supervision to assure that it is well done and accurate. This monitoring activity should include (but is not limited to):

- reviewing laboratory notebooks and other compilations of data;
- reading any written output prepared by trainees carefully to assure that they are accurate, well-reasoned, and give proper credit to others;
- meeting with trainees on a regular basis to keep in touch with the work they are doing;
- encouraging trainees to present and discuss data at laboratory meetings;
- avoid as much as possible discrimination among trainees based on the mentors' degree of interest for their projects.

It is accepted that some of this responsibility can be delegated to trusted collaborators. For instance, postdocs often supervise graduate students and laboratory technicians might teach specific laboratory skills, but the mentor, especially if also the supervisor, must assume ultimate responsibility.

Abusing the mentor-trainee relationship

Mentors should always be conscious of the fact that the mentor-trainee relationship features an extraordinary imbalance of power. Mentors have more knowledge, experience, and status, and might hold formal authority over the trainee. A trainee has obviously much to gain from this, but the fear of compromising this support amplifies the imbalance and dependency. International trainees are especially vulnerable to this power disparity.

Mentors should never profit from this power to manipulate or take advantage of the trainee, whether wittingly or unwittingly. Examples of this range from the failure or refusal to give proper credit for the trainee's contributions[6] to a project, to outright seeking personal or even sexual favours[27]. A mentor may also abuse of their power by withholding it and thus abdicating from their duties to serve as champion, sponsor, or advocate.

In conclusion, the guiding principle should be the interest of the trainee. OSR stresses the importance for mentors to schedule regular meetings with trainees, to openly discuss issues of authorship and intellectual property (further on this below), and to fairly address grievances.

Commercial and/or IP interests of the mentor

Additional issues can arise from the mentor's financial and career interests vs. their responsibilities to their trainees. For instance, in the case of industry-funded research, there may be a provision to delay publication of results for a significant time period[28]. A mentor should consider the consequences for any trainee involved in such research and above all be transparent with them and openly discuss possible impacts on the trainee's career progression. This particular scenario is especially problematic when the mentorship and supervision coincide.

[27] Obviously, such behavior would also present criminal implications that are beyond the scope of this document
[28] See OSR guidelines on Conflicts of Interest

Rewarding good mentorship

OSR commits to recognising good mentorship practices by making an effort to include them in internal promotion and external recruiting decisions.

RESEARCH MISCONDUCT AND DETRIMENTAL RESEARCH PRACTICES

Definitions and provisions

Scientists should be familiar with the definitions of research misconduct and the procedures for dealing with it, regardless of whether they will ever be accused of misconduct or otherwise involved in a misconduct case.

Research misconduct (RM) is a breach of OSR standards and of those expected by OSR funders and sponsors, a betrayal of the trust placed in OSR by the public, and the failure to comply with the high expectations of the scholarly community for research integrity (RI) and accurate and experimentally-supported communication. OSR commits to vigorously investigating, and if warranted, taking action on any credible allegation of research misconduct (RM), pursuant to this document[29].

Of note, due to increased media, regulatory, and public scrutiny, research institute and investigator reputations and funding depend as much on perceptions of integrity as on integrity itself.

Any activity that seriously violates the core principles of RI is considered to be RM. Such activities essentially amount to cheating, lying or stealing. More in detail they include, but are not limited to:

1. Fabrication of data and/or results and their publication or inclusion in grant applications;
2. Falsification (data manipulation, suppression, or modifications to experimental conditions that are not reported or disclosed e.g. to editors and peer-reviewers);
3. Plagiarism including serious self-plagiarism (duplicate publications)[30];
4. Conscription of authorship without consent[6];
5. Wrongful denial of authorship to deserving persons[6];
6. Wrongful and deliberate obstruction of other scientists' research activity or attempts to diminish another person's scientific reputation;
7. Deliberate damage of research work (including damaging, destroying or manipulating experimental designs, equipment, documents, hardware, software, chemicals, or other materials needed by another person to carry out their research);
8. Deliberate destruction of primary (source) data and violation of good RDM practices[5];
9. Gross neglect of supervisory duties including, but not limited to inducing, directing, encouraging, or knowingly allowing others to engage in fabrication, falsification, or plagiarism;
10. Non-compliance with scholarly journal policies (both journal-specific and general), including, but not limited to: multiple simultaneous submissions to different journals, re-publication of one's own prior work (duplicate publications) (see also item 3 above), failure to rectify/correct one's own published record when errors or inaccuracies are found or reported by self or third parties;
11. Not acting (e.g. by reporting) on directly acquired knowledge of others' potential RM;
12. Forceful imposition of undeserved key authorship of scholarly communications such as manuscripts, conference abstracts, etc., by power harassment (i.e. via the abuse of hierarchical superiority), whereby refusal to comply might be perceived as being professionally very disadvantageous;
13. Failure to disclose substantial financial or other conflicts of interest to internal or external monitoring bodies, organisations or publishers upon preparation, submission or publication of a manuscript or a grant application, or while acting as a reviewer for scholarly journals, funding agencies, or as a member of internal and external career advancement and

[29] The current OSR procedure (PSQ 017) for dealing with allegations of RM is available at http://www.hsr.it/wp-content/uploads/2018/01/017-1CattivacondottainRicerca2017.10.31.pdf
[30] See OSR guidelines on Plagiarism

recruitment committees or other professional duties.

Other breaches of RI, not so serious as to amount to RM, are referred to as questionable or detrimental research practices (QRP or DRP) and are nevertheless firmly discouraged and may also be sanctioned. Examples of DRP of varying seriousness include, but are not limited to:

1. Misrepresenting research achievements;
2. Knowingly supporting, or publishing in journals that undermine the accepted quality control standards of scholarly publishing[31,32] (COPE, 2017; Kolata, 2017; Shamseer et al., 2017) ;
3. Unauthorised removal of research samples or test materials, log books, and primary data from OSR premises;
4. Acceptance or presumption of underserved/unsubstantiated authorship of a scholarly publication of scientific authorship or co-authorship;
5. Ignoring putative RM by others or being party to inappropriate responses to RM (depending on the gravity of the case/allegation, this may imply RM, see point 12 above);
6. Selective citation of papers that support one's own findings or to please certain parties (reviewers, editors, colleagues);
7. Exaggerating the importance and applicability of one's own findings;
8. Self-plagiarism, excluding duplicate publications (which qualify as RM, see above) and limited re-use one's own previously published text[7];
9. Failure to fully disclose experimental conditions and materials;
10. Failure to report negative (i.e. not respondent to one's expectations) data;
11. Directly connected to point 8 above, selective reporting, a.k.a. p-hacking or unduly influencing the data collection or inclusion process or statistical analyses performed to produce a statistically significant result. In general, the practice of reanalysing data in many different ways without a clear scientific rationale to yield a target result, or deciding to collect more data after failing to see the expected result within properly sampled groups are also instances of DRP;
12. Failure to disclose potential financial or other conflicts of interest to internal or external monitoring bodies, organisations or publishers upon preparation, submission or publication of a manuscript or while acting as a reviewer for scholarly journals, funding agencies, or as a member of internal and external career advancement and recruitment committees or other professional duties.

Seeking guidance on RCR, RM and DRP

Any individual who has questions/doubts on RCR practices and/or what might entail a possible RM or DRP is advised to contact the Head of the RIO (HRIO) for counsel and advice. This contact is confidential and need not be reported to other officers. Should the HRIO learn of a potential/alleged case of RM, s/he will ensure the prompt activation of the relevant internal procedure[29].

The HRIO provides an annual report on the RIO activities to the Chief Operating Officer for Research, the Scientific Director, the committee of Research Directors, the OSR Supervisory Body (Organismo di Vigilanza; OdV) and the Director of Human Resources.

[31] The RIO is available for advice and assistance on establishing whether journals are of a questionable nature
[32] Of note, the NIH has issued a guidance note on this very same issue (NIH, 2017).

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