COMMITTEE ON DATA
INTERNATIONAL SCIENCE
COUNCIL

POLICY BRIEF: Data Ethics and Research integrity

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Summary and recommendations

UNESCO Recommendation on Open Science emphasizes creating the scientific data and knowledge openly available, accessible, and reusable for everyone, thereby helping to ensure the well-established values and norms of the academic community and expand their scope. The UNESCO Recommendation stresses that Open Science and research integrity are inseparable. Research integrity and data ethics are deeply intertwined along the full cycle of research and they are highly dependent on the perspective of multiple stakeholders. Therefore, in the context of data ethics, collaborative efforts to support research integrity need to be further strengthened in areas such as transparency, reusability, and overall quality and impact of research in terms of research data collection, management, interpretation, and dissemination.

Recommendations

1. **Establish policies and practical guidelines** to advance global norms on data ethics
2. **Foster data sovereignty** of researchers by creating support structures
3. **Strengthen the role of research methods** as a key part of data ethics
4. **Develop training and educational resources** on data ethics

1. Introduction

Over the past few decades, the questions of research integrity and data ethics - as part of the entire research cycle - have been emphasized among scientific and indigenous communities (e.g., Floridi & Taddeo, 2016; Mejlgaard et al., 2020; Titus et al., 2008).

Researchers and policy makers attempt to come up with principles or guidelines on research integrity and data ethics (e.g., analyzing regulatory frameworks regarding research integrity in European countries (Godecharle, Nemery, Dierickx, 2013); the US National Academy of Sciences' resources for research integrity (Titus et al., 2008); the US National Institutes of Health (NIH)'s grant policy statement regarding Research Misconduct). With the introduction of the UNESCO Recommendation on Open Science, collaborative efforts for research integrity are yet to reach consensus on how to best support the transparency, reusability,

and the overall quality and impact of research in data collection, management, interpretation, and dissemination.

Research integrity in data ethics covers not only data but also methods and infrastructures surrounding data. Integrity is essential for supporting the key values and academic norms related to *quality, documentation, authorship,* and *impact* of research (data).

Quality of research covers aspects of careful conduct of research but also other aspects, such as transparency, replicability, reproducibility, reusability, and broad accessibility. However, reproducibility in research is often bound to remain limited [1], and reproducibility may not be an objective in its own right [2] [3].

Impact of research refers to both academic impact (metrics/altmetrics) for scholarly research and communication as well as positive societal, economic, ecological, and political effects beyond both scientific practices and the science system(s). Outreach efforts, reusability, and openness can support the impact of research and scholarly communication, from traditional publications to platform publishing, events, and other forms of outreach.

Responsible research evaluation recognizes different forms of quality and impact. It is essential to take into account the difference between research fields and the regulatory environment, and advance the translation of best practices across research fields.

Integrity covers data management, analysis and interpretation of scientific data across the full cycle of research from multiple stakeholders' perspective including but not limited to the research community and other data users, data providers, data collectors, data managers, funders, publishers, research organizations, and research participants. Scientific integrity and the ethical use (and storage) of data should be upheld during all stages of research from conducting/collecting/managing data, to communicating scientific research, to making use of the scientific information in decision making, following good research and research integrity guidelines in Data Ethics [4].

These key values are reflected in researchers' normative impetus [State of open data report 2022?]. Overall, there is a strong ethical dimension about research conduct, transparency, and misconduct such as plagiarism, falsification, and unjustified interpretation of data. The normative dimension covers at least three necessary perspectives: a) the universal, supranational level and international law, b) national jurisdictions and policies, c) subnational organizational structures, processes, and communities. Implementing research integrity in data ethics requires an iterative approach in order to address these levels of governance and the views of those involved.

Collaborative efforts are required in research integrity in data ethics between data providers, data management agencies, funders, and researchers to create new research resources, tools, and knowledge. The collaborative nature of research can be challenged by difficulties to bring about collegiality, and trust, which are essential for research integrity. Moreover, collegiality and trust are a prerequisite for an open "error culture" in research and data management, and a supportive environment where research integrity in responsible data-intensive research is embraced. Institutions and research culture have an important role in mitigating the many practical bottlenecks for collaborative research. These vary by

stakeholders, including study participants, data users, data providers, managers, sponsors, other stakeholders.

Open science and FAIR principles provide many practical recommendations for the implementation of good practices in Data Ethics. There is an unavoidable tension between openness and protection in Data Ethics. Key aspects of ethics for sensitive and otherwise protected data are covered by Protection of personal data chapter. Protected data does not only cover personal information but also commercial data, information on endangered species, or dual use. This may have lock-in and other undesirable effects of proprietary/commercial services for researchers. There are also path dependencies in publicly funded data infrastructures and clouds such as EOSC, national data infrastructures and GOSC.

Methods and Infrastructures play a key role in data management and interpretation. Methods cover both DMPs and broader research methods [Finnish policy on open research methods].

Ethical AI is one aspect but data methods/skills comprise much more than just AI; for analyzing data more often machine learning and "weak" AI systems are being used. Sometimes interpretation is just manual. Therefore we need to identify central topics and challenges of the "ethics of AI" which overlap with normative questions of data management and data sharing. Refer e.g. to UNESCO and both EU policy making and policies [5] on AI.

Other aspects of Data Ethics that need consideration include ethical use of grant funding, and economic, societal, and other power imbalances. Researchers and their institutions must ensure that the funds and resources are optimally utilized in the process of research (e.g., data collection, data management, publications, support for student researchers) as well as outside of the research setting (e.g., conflict of interest). Funders could implement training sources for their fund recipients and institutions to mitigate misconduct regarding research integrity and ethical use of data. It is also important to consider the power imbalances surrounding research integrity, which will be discussed in a separate chapter.

2. Complementing UNESCO Recommendation

What's the link to the UNESCO recommendation here? Integrity does not jump out as a major theme as mentioned only 4 times, maybe it should

What needs to be added to the UNESCO Recommendation (what are the gaps, what additional detail is needed?)

UNESCO recommendation on Open Science emphasizes scientific knowledge and scientific data creating the knowledge openly available, accessible, and reusable for everyone, beyond the traditional scientific community. On the one hand UNESCO Recommendation is a highly idealistic codification / code, on the other hand it comprises normative tensions in the principles and key values of open science (practices). Here, research integrity plays a key role for normative orientation when conflicting practical goals (e.g. commercial vs. public interest, short-term use vs. long-term availability) [7] need a compass for action. Ethics

helps to reflect on and integrate conflicting values, it lays out principles, rather than practices that can complement UNESCO’s recommendations both regarding data and the “ethic” of open science.

Research integrity in data ethics should strengthen and expand data sovereignty in research and scholarship and shape it as a more comprehensive understanding of digital sovereignty of science and research and implement it practically. However, it is not only the issue of sovereignty in the handling of research data that must be made a topic in the scientific community and given practical institutional form with certified data trustees or neutral "trust agencies". Rather, the research communities as well as the individual researchers (as digital producers, as end users, as consumers) are well advised to act "on the pulse of time", i.e.: to comprehensively understand responsible data sovereignty - with dimensions such as anonymization and pseudonymization, "data economy", personal information management systems - as digital sovereignty, accompanying the development of transnational digital infrastructures (GOSC, EOSC, Gaia-X, European Data Spaces) that has already begun.

Data and cloud sovereignty, which includes aspects such as data use contrary to agreements, unnoticed "science-damaging" digital practices, and unwanted data appropriation, must not merely be compatible with the sovereignty of publicly supported science and research. Rather, data and cloud sovereignty must be conceptually united with the sovereignty of science and academia and practically implemented so that the autonomy and self-sufficiency of science and academia can be protected against attack and - where necessary - "rescued" from loss. In particular, the question of how a safe and responsible approach to the digital media revolution can be made possible for all participants in science and research and formulated in terms of public law should be at the center of attention. In this context, approaches to data sharing in a kind of "club model", as discussed under the term "data cooperatives", should be taken into an alternative account along with the option of data trusts and trusteeships, because data trusts and data cooperatives have the potential to become a supporting pillar of the digital culture of science and research. Such constructive digital sovereignty of science and research can, through the "antennae" of such institutions, also contribute significantly to the early recognition of opportunities and risks of emerging trends of digital change as well as of data and digital law, to relate them to the information infrastructures used, and thus to establish responsible scientific sovereignty in the age of Open Science.

3. Open Science, Data Quality, and the Conditions for Digital Research Integrity

Research integrity in data ethics should strengthen and expand data sovereignty in (open) research and scholarship and shape it as a more comprehensive understanding of digital sovereignty of science and research and implement it practically. Particularly, Open Science needs awareness of different (reasons and causes) for both various levels and limits of the openness of certain data. Data ethics therefore strives for an update of requisites of scientific integrity in the digital age of research and scholarship.

A reflective heuristic to UNESCO’s idealism on Open Science has been provided by the German Council for Scientific Information Infrastructures, which has examined the data life cycle “in order to highlight problems which – under the conditions of digital change – in the

day-to-day reality of research processes and research forms stand in the way of the implementation of ideal-typical quality objectives. In particular, the meshing of processing digital and non-digital data poses a challenge. For non-digital data will continue to exist in research processes – for example, physical objects, but also analogue recording methods and the habitualised intellectual techniques of the researchers themselves." (p. 28)

4. Conclusion

Data ethics needs to analyze or – at least keep in mind – each step of these challenges along the data life cycle with regard to research conduct, transparency, and misconduct and misbehaviors such as plagiarism, falsification, and unjustified interpretation of data.

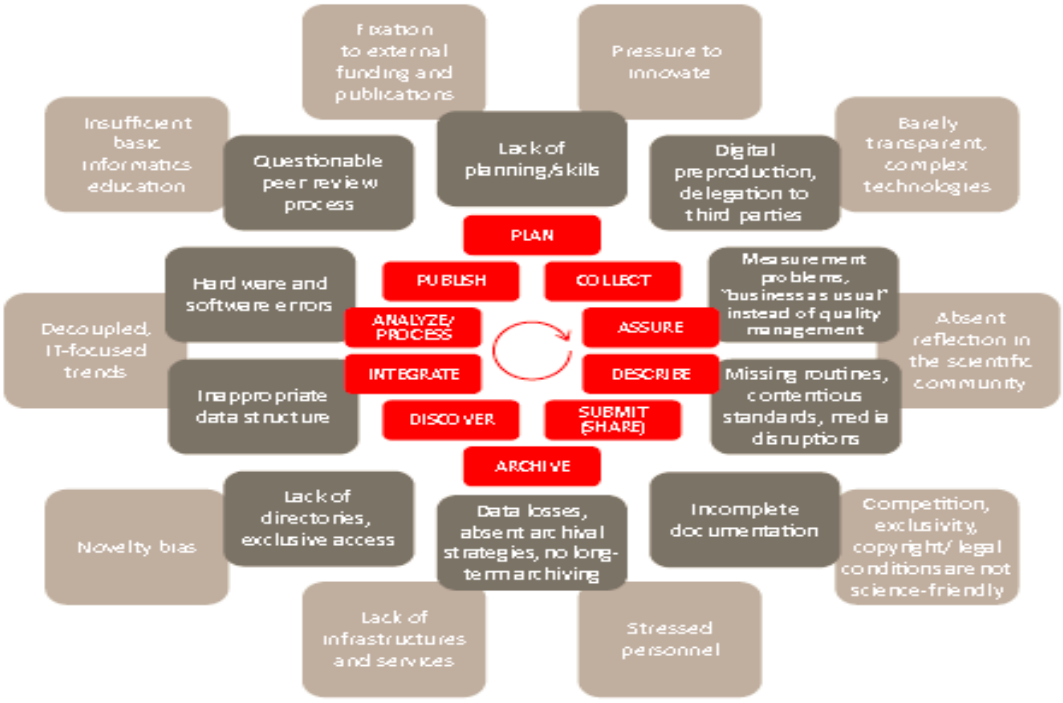

Figure 3: Challenges for Data Quality in the Data Life Cycle, a (Self) Critical View
Key to figure 3
Inner ring: Problems and factors for data quality; middle ring: problems and aspects of data quality along the data life cycle; outer ring: obstructive framework conditions of science.
Source: Own illustration based on Figure 2.

Source: German Council for Scientific Information Infrastructures (RfII): The Data Quality Challenge. Recommendations for Sustainable Research in the Digital Turn, Göttingen 2020, p. 28, urn:nbn:de:101:1-2020041412321918717265

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