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BEYOND Guidelines for Preventing and Addressing Research Misconduct

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Abstract

This article presents the BEYOND Guidelines for Preventing and Addressing Research Misconduct. The Guidelines are grounded in the BEYOND project's evidence-based, behavioural, and complexity-informed approach to research misconduct (RM), viewing the latter not through the simplistic and plainly individualistic "bad apples" approach but from a research ecosystem perspective. In this manner, the project and the Guidelines view research behaviour as shaped by the interaction of individual factors with organisational structures, incentives, norms, cultures, and wider social and institutional conditions.

Based on these considerations, the Guidelines promote a multi-stakeholder and shared-responsibility approach to preventing and addressing RM, involving researchers, research performing organisations (RPOs), research funding organisations (RFOs), research ethics and research integrity (RE/RI) bodies, publishers, policymakers, citizen scientists, and other actors across the research ecosystem. They also emphasise prevention and effective responses to RM while addressing the socio-economic consequences of RM, and promoting researcher health and well-being, public trust, supportive research

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cultures, and the need for clear, accessible, and context-sensitive RE/RI policies.

The Guidelines provide principles for the fair, independent, timely, and proportionate handling of RM allegations; safeguards for whistleblowers and others involved in proceedings; institutional learning from RM cases; and measures to address politically sensitive allegations and prevent misuse of investigative processes. They also acknowledge rehabilitation and reintegration as potentially appropriate responses following RM, subject to considerations of proportionality and appropriateness in light of the circumstances of the case, and emphasise institutional support, mentoring, training, and opportunities to rebuild trust.

Finally, the Guidelines highlight preventive behavioural and educational approaches, including ethically designed nudges and RE/RI training that is reflective, participatory, context-sensitive, and subject to meaningful evaluation. Taken together, the Guidelines propose a prevention-to-reintegration approach to RM that combines individual and institutional responsibility and seeks to foster more supportive, fair, trustworthy, and resilient research environments across diverse European research contexts.

Plain Language summary

Research misconduct (RM) such as falsifying, fabricating, or plagiarising research, can cause harm across science, policy, business, researchers' careers and well-being, and public trust. The BEYOND Guidelines views RM not simply as the wrongdoing of individual "bad apples". Researchers work within environments shaped by institutional rules, incentives, expectations, workplace cultures, pressures, and relationships, all of which can influence research behaviour, because of this, preventing and addressing RM must be considered a shared responsibility. Research organisations, funders, ethics and integrity bodies, publishers, policymakers, researchers, and other actors in the research community all have roles to play.

Prevention of RM requires clear expectations, supportive research environments, attention to risks that may encourage poor research practices, and proportionate responses when RM occurs. At the same time, institutions should also protect researchers' health and well-being, provide access to confidential support, and address discrimination, harassment, and other conditions that may undermine a responsible research culture.

Allegations of RM should be handled fairly, independently, promptly, and with appropriate confidentiality. Whistleblowers and others involved in investigations should be protected and supported, while safeguards are also needed to prevent allegations and investigation processes from being misused. [Institutions should learn from RM cases instead of treating them only as isolated individual failures.

Where appropriate, researchers who have committed RM should also have opportunities for rehabilitation and reintegration, with requirements and support proportionate to the seriousness and circumstances. Preventive approaches can include small changes in the research environment that encourage researchers to reflect before making decisions, improvements to research incentives, and effective training in ethics and integrity. Overall, the Guidelines propose an approach that extends from prevention through investigation and institutional learning to rehabilitation and reintegration, with the aim of creating research environments that support responsible behaviour and sustain public trust in science.

Keywords
Research ethics, Research integrity, Research misconduct, Guidelines, Prevention, Researchers, Research performing organizations, Research funding organizations.



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Abbreviations

CRPs: Contestable Research Practices
ECoC: European Code of Conduct for Research Integrity
RE: Research Ethics
RFOs: Research Funding Organisations
RI: Research Integrity
RIO: Research Integrity Offices
RM: Research Misconduct
RPOs: Research Performing Organisations

Introduction

Many current approaches to promoting research integrity (RI) and addressing research misconduct (RM) are rooted in the so-called "bad-apples theory",[1,2] i.e., which attributes research misconduct primarily to individual moral failure. This highly simplistic framework overlooks other structural, cultural, and organisational aspects of research behaviour. Moreover, this individualistic framing is increasingly at odds with insights from the behavioural and social sciences, which emphasise that research behaviour is shaped by context, incentives, norms, and organisational cultures. It also fails to adequately account for situations in which problematic practices arise not from deliberate intent, but from ambiguity, misinterpretation of norms, or insufficient awareness of methodological and ethical distinctions. As a result, methodologies derived from the "bad apples" assumption are often insufficiently equipped to address the complexity of RM in present-day research ecosystems.[1,2]

These limitations are reflected in governance arrangements across many European research systems, where detection relies heavily on whistleblowers, an approach with well-documented limitations. Preventive interventions at the organisational level remain underdeveloped,[3] partly due to assumptions about scientific self-correction. Together, these factors limit the effectiveness of current approaches and underscore the need for more comprehensive, preventive, and research ecosystem-based strategies. In parallel, EU-level efforts to harmonise definitions and coordinate RE/RI governance are advancing, and BEYOND builds on these developments by promoting systemic, preventive, and context-sensitive approaches consistent with the European Commission's approach to RI and the principles of the ALLEA European Code of Conduct for Research Integrity.[4]

The guidelines presented in this document reflect the BEYOND project's evidence-based, behavioural, and complexity-informed understanding of RM as a challenge arising within the wider research ecosystem and emphasise the role of organisational structures, policies, incentives, and cultures alongside individual factors in shaping research behaviour. The articles that follow set out principles and recommendations designed to support researchers, RPOs, RFOs, policymakers, and other stakeholders in preventing and addressing RM more effectively, while recognising that responsibility for promoting RI is shared across the research ecosystem. By moving beyond the simplistic and purely individualistic "bad apples" framing and grounding recommendations in empirical evidence, stakeholder perspectives, and contextual awareness, these guidelines aim to contribute to more preventive, proportionate, context-sensitive, robust, fair, and sustainable approaches to fostering research integrity across diverse European research environments.

The BEYOND guidelines for preventing and addressing research misconduct

The BEYOND Guidelines for Preventing and Addressing Research Misconduct are an aspirational document intended to guide research communities in cultivating environments that promote responsible research conduct and institutional accountability. Rooted in the belief that research integrity (RI) is a shared responsibility, these Guidelines are addressed to all actors in the research ecosystem, including researchers, research performing organisations (RPOs), research funding organisations (RFOs), citizen scientists, ethics and integrity bodies, publishers, and policymakers.[5]

This document follows the lead of the European Code of Conduct for Research Integrity (ECoC) and affirms its core principles of reliability, honesty, respect, and accountability. In particular, it endorses the ECoC's emphasis on the importance of the research environment in sustaining RI. The BEYOND Guidelines adopt and further develop this perspective by explicitly advancing an ecosystem approach to research misconduct (RM), one that recognises how systemic, organisational, epistemic, socio-technical, and psychological factors interact to shape research culture and behaviour.

Rather than treating RM solely as an individual failure, the Guidelines recognise the institutional, socio-economic, and cultural contexts in which research is conducted. They offer recommendations that balance aspirational norms with practical considerations for prevention, mitigation, and rehabilitation.

By addressing RM not only as individual wrongdoing but also as a systemic challenge, the BEYOND Guidelines contribute to a culture of continuous learning and improvement.

1. **Definition of Terms**

   a) Research Misconduct (RM) refers to fabrication, falsification, or plagiarism, along with other unacceptable research practices.

   b) Contestable Research Practices (CRPs) refer to research behaviours whose ethical acceptability is not universally agreed upon and may vary depending on the disciplinary, methodological, or epistemological context. These practices are not inherently unethical but may raise concerns about RI when used inappropriately. For example, HARKing (hypothesising after the results are known) is considered RM in quantitative approaches under most conditions, while inductive data-driven research is common in qualitative methodologies.

   c) Research Integrity (RI) refers to the shared responsibility across the research ecosystem to conduct and support research in ways that uphold responsible research practice and promote trust and confidence in the research process. It is guided by the principles of reliability, honesty, respect, and accountability across all stages of the research process and depends on research environments that promote responsible practice and effectively address misconduct. RI is grounded in research ethics, which provides the moral principles and values that inform what responsible research behaviour ought to be.

   d) Research Ethics (RE) refers to the application of fundamental ethical theories and principles to research, particularly in areas involving human participants, animals, the environment, and other research subjects, thereby establishing the principles, norms, and moral frameworks that guide the responsible conduct of research. It safeguards the rights, dignity, welfare, and justice of all those directly or indirectly affected by research, minimises harm, promotes fairness and autonomy, and upholds societal and moral responsibilities throughout the research process. Research ethics provides the normative foundation for research integrity, which operationalises these ethical commitments into standards and practices for trustworthy and responsible research.

   e) Rehabilitation is a proportionate and context-sensitive process through which a researcher who has committed RM can, when appropriate, demonstrate learning, accountability, and restored capacity for responsible research. It requires both individual effort and institutional support and aims to repair harm and rebuild trust within the research ecosystem. Because rehabilitation is guided by proportionality, it applies only in cases where the nature and severity of the RM make rehabilitation appropriate.

   f) Reintegration refers to the process by which the researcher re-engages with the research community after RM, including training, support, and conditions adapted to the case.

   g) Nudges are subtle, low-cost design changes in the environment that gently steer individuals towards more ethical choices without restricting freedom of decision-making.

2. **Addressing the Socio-economic Impacts of RM**

   a) RPOs, RFOs, and RE/RI bodies must clearly communicate expectations regarding good research practices and provide explicit guidelines outlining proportionate consequences and penalties for RM as deterrents, where possible. These deterrents may include financial penalties imposed by RFOs on RPOs whose researchers commit RM, such as requiring repayment of research funding if a publication resulting from a grant is retracted due to RM, as an accountability measure.

   b) Prevention and mitigation strategies to reduce the socio-economic impacts of RM should be jointly developed by RPOs, RFOs, RE/RI bodies, and policymakers. These strategies should address key areas such as scientific progress, innovation, business and investment, publishing, public trust, careers, the health and well-being of researchers and participants, regulation, policy, and education.

   c) Policymakers should establish regulations and oversight mechanisms covering both public and private research to ensure compliance with RE/RI principles and to balance the protection of commercial confidentiality with transparency, public trust, safety, and human rights.

d) RECs and RFOs should include in applications a section for researchers to explicitly specify, consider, and evaluate risks and other challenges to good research practices within a project's specific context, alongside their impacts, and to provide specific and actionable mitigation strategies to address these.

e) When RM is identified, RPOs and, where relevant, RFOs must take robust and transparent action. Strategic, coordinated, and timely internal and public communication is essential to mitigate the loss of trust resulting from the situation. Effectively restoring trust helps prevent secondary consequences, such as resource pressures, funding decreases, and additional stress on researchers caused by external political intervention, media attention, or public scrutiny.

3. **Addressing RM Impacts on the Health and Well-being of Researchers**

a) RPOs, RFOs, and policymakers must ensure that all researchers, regardless of status, have equal access to employee rights, institutional protections, and support services, and must proactively dismantle discriminatory barriers within research practice. This includes providing fair procedures for RM prevention and mitigation, as well as inclusive training and accountability structures.

b) RPOs must recognise that the pursuit of research excellence cannot come at the expense of researchers' physical and mental health. Ensuring safety, dignity, and mental well-being is essential to upholding RI.

c) RFOs and policymakers must address unequal access to opportunities, recognition, and reporting mechanisms. Integrity policies should ensure fair treatment and equitable participation across all research roles. For example, researchers at similar career stages may have different merits across disciplines due to varying research and publication practices. RPOs and researchers must prevent and respond to gender- and identity-based violence, including harassment and coercion, particularly in hierarchical relationships. Clear, confidential reporting pathways and survivor-centred support are essential. These cases must be addressed as breaches affecting the safety and ethical standing of the research environment.

d) Institutional, national, and regional RE/RI frameworks must consider the cumulative effects of identity-based exclusion and ensure that protections and support systems are accessible and responsive to diverse experiences.

e) RPOs should provide confidential mental health resources and promote a culture that fosters acceptance of help-seeking and prioritizes psychological safety. RPOs must actively promote empathy, openness, and responsibility through leadership, training, and regular assessment of workplace climate. A healthy research culture is essential to the prevention of RM and the protection of all researchers.

4. **Establishing Trust: Public Engagement and Institutional Foundations**

a) RPOs, RFOs, and researchers should be aware that public trust in science varies considerably across disciplines. It is important to develop clear, anticipatory strategies for public science communication that build trust by sharing findings, pre-empting inaccurate interpretations, and addressing public concerns proactively in a non-partisan and transparent manner that resonates across ideological divides.

b) Science governance policymakers, RFOs, and RPOs should invest in science communication that explicitly links RE/RI with public benefits, such as better policies, healthcare, or environmental stewardship. This communication should highlight and support researchers who exemplify ethical conduct as public role models, helping to promote engagement and trust in science. Effective science communication brings out the broader public benefits of RE/RI, such as improved policy, health, and environmental outcomes, while showcasing ethical research conduct to foster trust in science.

c) RPOs, policymakers, and RE/RI bodies should ensure that policies and procedures related to RM are clear, concise, actionable, and easily accessible. Best practices and positive examples should be well-publicised and shared across the research community. These policies must be embedded in institutional practices, with particular attention to their integration into researcher training, supervision, and professional development. Regular review and revision of policies and best-practice examples are essential to ensure alignment with evolving standards in RI, research practice, and technological innovation.

d) RE/RI frameworks should engage all stakeholders across the research ecosystem. RE/RI guidance should strike a balance between shared principles, aspirational norms, legal frameworks, and practical, context-sensitive practices grounded in real-world research conditions.

e) RPOs, RFOs, and researchers should engage in practices that treat the maintenance and restoration of public trust as an ongoing responsibility of the research community. This includes engaging with policymakers and civil society actors to co-develop strategies for earning and sustaining trust, particularly in areas susceptible to misinformation or political manipulation. (Cf. For recommendations on restoring public trust in the wake of RM investigations, see 9. Rehabilitation and Reintegration of Researchers.)

5. **Fostering a Supportive and Responsible Research Culture**

a) RPOs should actively foster a research culture that supports open discussion and shared understanding of RE/RI and RM. This includes creating opportunities for researchers at all career stages to engage in dialogue about ethical issues, uncertainties, and the interpretation of RI principles.

b) RE/RI procedures and frameworks should be developed collaboratively with the research community to ensure shared standards across all disciplines. While the definition of RM remains the same, disciplinary diversity should be considered when applying these standards to accommodate epistemic, methodological, and linguistic diversity across fields.

c) RE/RI frameworks should avoid perpetuating hegemonic structures, such as privileging English-language norms, to ensure equitable and contextually valid standards for all research communities.

d) Changing the incentive structures within RPOs can have a profound impact on promoting best practices. These institutions should consider revising their research assessment practices, moving away from solely quantitative metrics such as “publish or perish” and incorporating evaluations that recognise ethical research practices.

e) RPOs should also consider strengthening the organisational/institutional ethical culture and increasing researcher awareness about RE/RI standards. RPOs with honour codes,[1] for example, have been shown to experience fewer incidents of plagiarism. Such codes, coupled with regular discussions on ethics and integrity, can cultivate a robust moral climate conducive to ethical research practices.

f) RPOs, RFOs, and national bodies should ensure that guidelines clearly distinguish between unacceptable research practices and CRPs that may be contextually justified.

6. **Procedures for Fair, Effective, and Timely Handling of RM Allegations**

a) When addressing allegations of RM, RPOs, RFOs, and RE/RI bodies must uphold the principles of fairness, independence, transparency, and confidentiality throughout the investigation process. Investigations should be conducted by impartial and appropriately trained individuals or bodies, and all parties involved must be treated with dignity and respect. The presumption of innocence and procedural fairness during investigations must be guaranteed. Unwarranted stigmatisation during ongoing investigations must be actively prevented. Clear procedural safeguards that ensure the protection of rights and potential access to appeals should be established.

b) RPOs, RE/RI bodies, and publishers should establish clear, pragmatic timelines for RM investigations. Reports of RM need to be addressed promptly to prevent the prolonged use of fraudulent data and to protect the integrity of academic research.

c) Interim measures to mitigate potential harm during prolonged investigations, and communication strategies that balance transparency, objectivity, and fairness while respecting confidentiality obligations, should be implemented.

d) To address RM effectively, RPOs, policymakers, RE/RI bodies, RFOs, and publishers should establish independent oversight mechanisms to prevent internal cover-ups. After adjudication, these mechanisms should ensure that falsified, fabricated, or plagiarised data are promptly removed from circulation and that accountability is upheld. These independent committees should be trained to navigate politically charged environments and to operate independently of institutional or political pressure.

e) Journal publishers' investigation and retraction processes should be expedited, and expressions of concern should be provided if an article is under investigation, with a clear timeline for resolution.

f) RPOs and/or RE/RI bodies responsible for handling RM cases must ensure that those tasked with handling allegations of RM possess ethical awareness, the necessary competence, and appropriate disciplinary understanding. This includes providing initial and ongoing training for RE/RI committee members, ombudspersons, and other relevant personnel.

g) RPOs should establish timely response protocols for assessing allegations without compromising due process and academic rigour. RPOs and RE/RI bodies must approach each allegation of RM with an appreciation of the research context in which it arose. Assessments should consider the disciplinary norms, research methods, and collaborative practices relevant to the case. In distinguishing between RM, CRPs, and honest error, institutions should apply a proportionate response that reflects both the nature of the action and the systemic factors that may have contributed to it.

h) The assessment and evaluation of RM and CRPs by RPOs, RFOs, journal publishers, and RE/RI bodies should account for the methodological, epistemic, and normative characteristics of each discipline. Applying inappropriate standards from one field to another without contextual analysis can lead to misjudgements and unfair evaluations.

7. **Political Sensitivity and Trust-Protective Measures**

a) RPOs, RFOs, and RE/RI bodies should recognise the potential misuse of RM allegations with malicious intent. Procedures should include safeguards against the misuse of investigation processes.

b) RPOs and RFOs should establish transparent protocols balancing support for researchers facing politically charged allegations of RM with the need for public accountability and openness. Clear and consistent communication of these procedures is essential for maintaining trust among stakeholders and the public.

c) RPOs, RFOs, and national bodies should develop guidelines for researchers on navigating politically charged research areas, emphasising the importance of transparency, methodological rigour, and acknowledging potential biases. RPOs, for example, may choose to consult an independent review panel to assess the validity of RM allegations in politically sensitive cases, ensuring fairness and transparency and preventing undue influence.

d) Researchers should proactively address RE/RI concerns in politically charged research topics by outlining mitigation strategies in their risk management plans.

8. **Support and Learning Mechanisms**

a) RPOs should make available appropriate forms of support for individuals involved in RM proceedings, whether as whistleblowers, respondents, or witnesses, as well as for individuals handling the cases. This includes access to psychological counselling, legal guidance, and independent advisory services. Institutions should ensure that whistleblowers are protected from retaliation and that respondents are not subject to undue suspicion or sanctions or punitive action prior to the conclusion of investigations, in accordance with national legislation.

b) RPOs and/or RE/RI bodies should establish secure and trustworthy mechanisms that allow for the reporting of concerns related to RM. These mechanisms must be easily accessible. Confidentiality may be offered where appropriate. Individuals should be informed about how to raise concerns, what to expect from the process, and how their reports will be handled, with an emphasis on fairness, transparency, and non-retaliation.

c) RPOs should treat RM cases as an opportunity for institutional learning. Periodic post-case reviews can identify policy gaps, oversight weaknesses, and factors contributing to RM, thereby strengthening the ethical research culture.

d) RPOs, RFOs, and RE/RI bodies should establish comprehensive, standardised, interoperable, and in-depth qualitative monitoring and analysis of case studies related to RM allegations and sloppy science.

e) Both quantitative and qualitative approaches are needed to improve research on RM and CRPs. Investment in theoretical frameworks and diverse methodological tools will strengthen the evidence base and support more effective, data-driven policy decisions in the RE/RI space.

9. **Rehabilitation and Reintegration of Researchers after Research Misconduct**

a) Researchers who are cleared of RM allegations should receive support from RPOs to facilitate their return to their professional roles. This may include public statements of exoneration, facilitated re-engagement with research teams, and acknowledgement of the distress caused by the process.

b) RPOs should facilitate opportunities to rebuild academic and social capital, always in accordance with the wishes of the person cleared of RM, such as participation in dialogues on RI and narrative repair through trusted channels.

c) RPOs and RE/RI bodies have a reasonable duty of care towards researchers returning after a confirmed case of RM. Reintegration should be guided by the principles of fairness and proportionality, and by an understanding that individuals are capable of learning and rehabilitation. Reintegration is a process that must be context-sensitive and aimed at upholding the integrity of the research environment while providing individuals with an opportunity to contribute meaningfully to science again. RPOs and/or RE/RI bodies should develop clearly defined requirements for the rehabilitation of researchers found to have committed RM.

d) For researchers who have committed RM but for whom rehabilitation and reintegration are appropriate, RPOs should implement tailored reintegration plans. These may include reassignment to different research responsibilities, completion of ethics training, and participation in supervised research. Restorative justice models may be explored, especially where RM has impacted collaborators or institutions.

e) RE/RI bodies can advise RPOs on developing appropriate reintegration plans that ensure fairness and balance transparency with confidentiality.

f) RPOs should implement formal support systems for reintegrating researchers, such as mentorship by researchers with integrity training; access to retraining or re-certification in good research practices; and regular progress reviews and psychosocial support where needed. These support systems should balance accountability with the opportunity for professional redemption.

g) To minimise stigmatisation, RPOs must cultivate a research culture that allows individuals to be rehabilitated from past misconduct. Internal communication should avoid punitive language and instead focus on promoting inclusive reintegration. Institutional leadership has a key role in signalling that the reintegration process is constructive and driven by RE/RI principles.

h) When entire teams or departments are affected by allegations, RPOs should support collective recovery through activities that aim to restore internal trust and mitigate long-term reputational damage, such as group counselling, reflective workshops, and strategic leadership support.

10. **Whistleblowing and Whistleblower Protection**

a) RPOs should ensure that all researchers and research participants feel safe to express concerns regarding RE/RI or to report suspected RM by establishing clear, accessible, and confidential reporting mechanisms.

b) RPOs should provide channels for researchers to discuss concerns about potential RM with a trusted mentor or ombudsperson without, or before, engaging in a more formal whistleblowing process, ensuring that whistleblowers are protected.

c) RPOs need to act on reports of RM promptly to prevent the prolonged use of fraudulent data and to protect the integrity of academic research.

d) While RPOs may have a vested interest in protecting their reputation, they must nonetheless ensure that cases of RM are handled with transparency and fairness, and that whistleblowers are protected.

e) RPOs should take measures to protect whistleblowers, especially early-career researchers and other researchers in vulnerable situations, from institutional pressures and abuses of power, ensuring they have equal opportunities for research and career advancement without fear of retaliation.

f) Policymakers should define and implement guidelines for whistleblower protection. These guidelines should be clearly defined and consistently applied, offering detailed recommendations for protecting individuals who report RM.

g) RE/RI training should include content on whistleblowing and be evaluated for effectiveness across research settings.

h) RPOs should promote a culture of RE/RI by making discussions and advice widely available, potentially through the establishment of dedicated advisory roles or bodies.

11. **The Role of Nudges in Sensitising Researchers on RM and CRPs**

a) Nudges are subtle, non-restrictive interventions that alter the research environment to encourage ethical choices. RPOs should recognise the strategic use of behavioural nudges as a preventive measure to foster responsible research. When thoughtfully designed, nudges can help researchers navigate complex decisions by prompting reflection and reinforcing integrity in practice.

b) Transparency is a foundational principle for all behavioural interventions. Nudges must be implemented transparently and ethically. RPOs should ensure that researchers are informed about the purpose and nature of behavioural interventions and that their use aligns with institutional values and expectations. Nudges are more effective and ethically acceptable when they are clearly communicated, developed, and implemented in an evidence-based way.

c) Recognising mechanisms such as unwritten rules and trust systems for honourable conduct (i.e., honour codes) and reducing opportunities for RM are crucial in shaping researcher attitudes towards RE/RI and promoting self-control. RPOs should implement structured campaigns that promote these mechanisms, thereby fostering an environment that discourages RM and enhances responsible research practices.

d) Nudging strategies should take into account the emotional and psychological factors that affect ethical behaviour. High levels of stress, low self-efficacy, or feelings of isolation can increase the risk of RM. RPOs should use nudges that reinforce self-regulation, emotional resilience, and internalisation of values. Simple cues that promote self-awareness or invite reflection can counteract disengagement and strengthen motivation for integrity.

e) To combat negative affect, which has been shown to lead to greater acceptance of RM, RPOs should focus on enhancing self-efficacy and self-control amongst researchers. Programmes that contain particular nudges designed to enhance psychological well-being can be pivotal in altering researchers' attitudes towards RM and promoting a culture of integrity.

f) Nudges should be grounded in evidence-based understandings of behavioural factors that influence ethical conduct. RPOs and RFOs are encouraged to introduce nudges that reshape the environment in which research occurs—such as ethical prompts, default transparency settings, or simplified paths to responsible actions. Nudges should be integrated into critical stages of the research process, such as data analysis, authorship decisions, and manuscript submission, in ways that make ethical behaviour easier, more visible, and more intuitive.

g) RPOs and RFOs should embed nudges within a broader climate that promotes ethical behaviour as the norm. This includes symbolic reinforcement, such as recognition for ethical leadership and the visibility of individuals, teams, or communities who exemplify responsible conduct, as well as the designation of RE/RI champions and advisors or ombudspersons who can provide support and mentoring within their institutions. Reinforcing community values through such cues can increase the perceived importance of integrity and reduce tolerance for RM.

h) Even in resource-limited settings, acknowledging and rewarding individuals or groups who consistently demonstrate ethical practices can be an effective nudge. This recognition can motivate others within the community to adhere to ethical practices and contribute positively to the RI culture.

i) RPOs should regularly evaluate the effectiveness and impact of nudging interventions. Feedback from the research community should inform the refinement of these tools to ensure they remain relevant and responsive. Nudges should be part of a broader continuous-learning strategy that fosters a supportive culture grounded in responsibility and accountability.

12. **Importance of RE/RI Training**

a) There is a notable need for continued education and training in RE/RI to foster ethical reasoning and awareness. Training should address knowledge, skills, values, and habits, and should be offered to everyone involved in research. RE/RI education should empower researchers to self-regulate behaviour, particularly in practices susceptible to ethical lapses, such as selective analysis.

b) RPOs should recognise that pedagogy influences learning. RE/RI training programmes benefit from including opportunities for active participation, field-specific content, and case studies with real or realistic scenarios, for instance to effectively shape competencies.

c) RPOs should recognise the importance of supervision and training in RE/RI for students, junior researchers, and in external collaborations to manage competition and publication pressures effectively. In addition, RPOs should create safe spaces in training and supervision for junior researchers to learn from mistakes.

d) RE/RI educators should teach not only rules and procedures but also the real-world impacts of public loss of trust in science—how such distrust harms knowledge creation, democratic decision-making, policy development, and practical problem-solving. They should also explain how instances of RM can be exploited by anti-science groups, populist movements, or authoritarian actors to fuel misinformation and weaken support for science and democratic institutions.

13. **The Role of REI/RI Training for Mentors and Supervisors**

a) RPOs should provide senior researchers and supervisors with targeted, regular, and continuous RE/RI training to enhance their leadership roles in cultivating an ethical research culture.

b) RPOs should support senior researchers and supervisors to foster a culture of ethical conduct within their teams. Training, supervision, and mentoring play a crucial role in shaping research behaviours and culture. Likewise, senior researchers and supervisors should take active responsibility for upholding an ethical culture.

14. **Pedagogy for RE/RI Training**

a) Adaptive teaching tools (e.g., apps for self-reflection or ethical sensitivity measures identified in BEYOND) allow for a personalised learning experience that can cater to the varied needs of students across different disciplines.

b) Incorporating reflective learning practices is vital in developing critical thinking and ethical decision-making skills among researchers, including citizen scientists. These practices encourage learners to continuously evaluate their understanding and apply ethical principles in real-world scenarios, thereby enhancing their overall RE/RI competence.

c) Group discussions and collaborative activities should be core to RE/RI training because they foster ethical deliberation, deepen understanding of complex issues, and build communication and teamwork skills. There are opportunities to follow group dynamics and participation to assess engagement and mutual learning.

d) Incorporating training elements that promote emotional engagement, such as live case studies and role-playing, can deepen learners' connection to ethical issues. Emotional engagement can play an important role in learning, as it helps connect ethical awareness and sensitivity with moral reasoning in the ethical decision-making process, making learning impactful.

e) Training should consistently incorporate ethical dilemmas and real-world applications to bridge the gap between theoretical RE/RI knowledge and its practical application. This approach not only makes the learning process more engaging but also prepares researchers to handle complex ethical situations they may encounter in their professional lives.

f) RPOs must ensure that, if their researchers involve citizen scientists, the researchers are responsible for training the citizen scientists in RE/RI to develop ethical sensitivity and to foster knowledge, competence, and values. To accommodate diverse learning environments and the needs of researchers, and to align with FAIR principles, training materials should be versatile and accessible in various formats, including online platforms. This flexibility allows learners to access valuable resources and support regardless of their geographical location or learning context.

15. **Indicators of Effectiveness of RE/RI Training**

a) RPOs and RE/RI trainers benefit from implementing structured evaluation frameworks and learning taxonomies to assess the depth of learners' understanding. Such frameworks help distinguish between different levels of learning outcomes, ranging from basic recall of information to higher-order thinking skills.

b) Learning analytics and authentic manifestations of learning can be responsibly used as innovative assessment tools providing insights into participants' engagement and ethical decision-making processes during training. These tools can provide valuable data on how trainees interact with learning platforms and content during training.

c) RPOs (at the programme or departmental level) could conduct ongoing evaluations to assess the long-term impact of implemented RE/RI training programmes on researchers' ethical decision-making and behaviour. By tracking participants' practices over time, RPOs can gain insights into how training influences ethical practices in their research activities. This process must be transparent, provide opportunities for ongoing reflection and learning, and ensure that results are not used against learners.

d) RPOs (at the programme or departmental level) should establish feedback mechanisms to continuously develop training content and delivery. Regularly soliciting input from participants and faculty can help identify areas for enhancement and ensure that training remains relevant and effective in addressing emerging ethical challenges.

e) A combination of quantitative and qualitative measures may be used to evaluate training effectiveness comprehensively. Surveys, pre- and post-training assessments, focus group discussions, and monitoring the quality of authentic research outputs can all be used to gather information on researchers' perceptions, knowledge retention, and behavioural and value changes resulting from the training.

f) RE/RI trainers and training developers should collaborate with, or become experts in, ethics education to enhance the development and assessment of RE/RI training programmes, ensuring that these are grounded in best practices and current research in RE/RI training methodologies.

g) RPOs can encourage and promote best practices across the research community by sharing the outcomes of their training evaluations to foster transparency and to contribute to a broader culture of RI.

Conclusion

This paper highlights that research-performing organisations, research-funding organisations, research ethics/research integrity bodies, publishers and policymakers must work together to create a prevention-to-reintegration ecosystem that protects research integrity while also safeguarding researchers' wellbeing and public trust. Effective responses require clear expectations, proportionate and transparent procedures, supportive resources, context-sensitive investigation and sanctioning, independent oversight, and sustained education and culture change across disciplines and regions.

Disclaimer

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Ethics and consent

Ethical approval and consent were not required.

Use of Artificial Intelligence

ChatGPT (OpenAI-GPT-5.5) was used during the preparation of this article to assist in organising inputs contributing to the development of the Guidelines and to support language editing, including refining English phrasing and correcting grammar. The authors reviewed, revised, and take full responsibility for all content included in the final manuscript.

Data availability

No datasets were generated or analysed for this publication. The publication is based on project documents and materials produced within the BEYOND project.

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