SOPs4RI

D7.3: Cost-Benefit Analysis

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This report builds on the work that has taken place in work package 6 in SOPs4RI:

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Abbreviations

Below we present a list of abbreviations that will be used in this report:

ALLEA – European Federation of Academies of Sciences and Humanities

CBA – Cost Benefit Analysis

DPO – Data Protection Officer

EC – European Commission

FFP – falsification, fabrication, and plagiarism

FTE – Full time equivalent

IRIS – International Research Integrity Survey

LSE – London School of Economics and Political Science

RI – Research Integrity

RFO – Research funding organisation

RIPP – Research Integrity Promotion Plans

RPO – Research performing organisation

SOP – Standard operating procedure

SOPs4RI – Standard Operating Procedures for Research Integrity

Executive Summary

The Standard Operating Procedures for Research Integrity (SOPs4RI) Pilot testing sites, Research Performing Organisations (RPOs) and Research Funding Organisations (RFOs) and active researchers who participated in the International Research Integrity Survey (IRIS), concur on the beneficial consequences of Research Integrity (RI). The key benefits are seen to be in research quality, trust in science, the research environment, professional service efficiency and opening more RPOs to compete internationally for research funds.

The European Commission (EC)'s recent policies on RI in research grant procedures are supported by both RPOs and RFOs and are seen to give legitimacy and support for local initiatives. A concern for RFOs is the gap between RPO policies and actual practices for RI. However, active monitoring would have significant resource implications.

One in three active researchers would value additional support/training on RI issues including research collaboration, publication and communication, supervision and mentoring, working environment and data management. In RPOs offering workshops that address these and other aspects of integrity in research, the demand from the researcher community is particularly high.

Current resourcing of RI specialists is considered by both RPOs and RFOs to be insufficient. While acknowledging competition for resources, an increase in one or two full time equivalent (FTE) positions per institution is considered necessary to meet external and internal demand.

1. Introduction

1.1   The SOPs4RI Project

The Standard Operating Procedures for Research Integrity (SOPs4RI) is a four-year (2019-2022), multi-partner transdisciplinary project funded by the EC (H2020-SwafS-03-2018, Grant Agreement no. 824481). The project has 13 partners in 10 European countries and is coordinated by Aarhus University (AU). The project's homepage can be found at: https://www.sops4ri.eu/. SOPs4RI has also been preregistered on the Open Science Framework: https://osf.io/49fbk/

1.2   SOPs4RI Objectives

The SOPs4RI project aims to support high quality research and the building of strong RI cultures based on the principles and norms of the European Code of Conduct for Research Integrity. Drawing on a comprehensive research and development program including experts in co-creation workshops, the project has developed a toolbox to support and guide RPOs and RFOs in the adoption of RI. The project focuses on providing Standard Operating Procedures (SOPs) and guidelines to enable RPOs and RFOs to develop and implement Research Integrity Promotion Plans (RIPPs). SOPs4RI has taken a mixed-method, co-creative approach to the identification, development and empirical validation of SOPs and guidelines. The end-users of the tools provided by SOPs4RI are decision makers within RPOs and RFOs, boards and directors of funding agencies, university academic councils, research leaders and researchers.

1.3   Premise

In the development of the SOPs4RI proposal in 2018 it was assumed that most RPOs and RFOs would have established institutional structures and practices for RI, albeit of varying scope and quality. In the pursuit of mapping the benefits and resource requirements of RI, it was assumed that discussions with experienced researchers and administrators would

elicit a wealth of relevant information on 'what works' and the necessary resources – one off and recurrent – to support the development and application of RI. This turned out to be overly optimistic. In reality, in the majority of the Pilot Institutions, RI policies were in their infancy. The absence of experience in policy making and in the delivery of RI militated against the traditional quantitative methodology for the identification and analysis of costs and benefits.

In recognition of this practical reality, the study moved to a more qualitative assessment of the emerging institutional arrangements and the opportunities and constraints to the introduction of RI policies and procedures in RPOs and RFOs. The finding on the expected benefits and related resource implications are described and illustrated with quotations from contemporaneous notes taken during conversations and interviews. In addition, the views of active researchers on training for RI are reported.

1.4   Methodology

1.4.1 Familiarisation through 'Content tour' meetings

The London School of Economics and Political Science (LSE) team took advantage of the opportunity to conduct a reconnaissance of RI in the Pilot Institutions by joining the series of 'Content tour' meetings organised by colleagues from European Association of Research Managers and Administrators (EARMA) in the SOPs4RI project. Three content tours, with a duration of 1.5 hours, were held in February and March 2022. At these meetings members of the SOPs4RI project gave presentations on the rationale and details of selected toolbox topics followed by question-and-answer sessions. While the objective of the content tours was the clarification of issues around the toolbox topics in the informal setting the Pilot Institutions' representatives shared their experiences and concerns. For the LSE team it was a valuable opportunity to understand research-related structures and functions in RPOs and RFOs in a range of countries including Austria, Belgium, Croatia, Denmark, Norway, Singapore and Spain.

1.4.2 A Survey of the Pilot Institutions

In February 2022, a short questionnaire was circulated to the group of Pilot Institutions to elicit details of their progress in implementing RI policies and practices, the resources currently committed to RI and the level of resources that they considered desirable to implement the SOPs toolbox topics.

Questions to pilot institutions

- *In your organisation what is the level of resources currently committed to supporting research integrity? Please estimate in full-time equivalents*
- *Has the level of resources committed to research integrity changed over the last three years? If Yes, has it increased or decreased, and by how many FTEs?*
- *How well-developed do you consider research integrity policies and procedures at your organisation to be on a scale of 0 to 10?*
- *How much additional resource (again in FTE) do you think would be required to get your institution to 10 on the scale in the previous question? First, in terms of the person months for the one-off development costs and second, the recurrent costs of maintaining top quality RI provision.*

1.4.3 Follow up Interviews with the Pilot Institutions

In April 2022, the LSE team conducted 7 interviews with the representatives of the Pilot Institutions to follow up issues arising from their responses to the online questionnaire and to explore the opportunities and constraints facing the development of RI in their institutions.

The topic guide for each interview was tailored to the particular Pilot Institution, designed to fill any gaps and/or uncertainties in the development and implementation of their RI plans, policies and practices.

1.4.4 The International Survey on Research Integrity (IRIS)

The aims, objectives and methods of the IRIS survey are described in detail in D6.2. IRIS is based on a systematic, stratified probability sample of the authors of research articles published between 2016 and 2020 included in Clarivate's Web of Science citation database. The full sample from 29 countries is over 60,000 respondents. Of relevance to the identification of benefits and resource implications of RI, we report on the survey responses to two blocks of questions that capture (i) the researchers' views on the benefits of RI and (ii) the support that researchers would welcome to receive from their institutions, the provision of which would carry resource implications.

2. Technical and Scientific Progress

2.1 Research Integrity in Research Performing Organisations

In the majority of RPOs, RI is, at best, an emerging issue. Indeed, in some institutions, it is met with resistance.

> *"If I've been doing research this way for 20 years, why should I change anything?"*

To challenge scepticism or apathy the following advice was offered:

> *"When people don't take research integrity seriously – an update on retractions acts as shock therapy"*

RI has not been woven into the administrative procedures or features as part of the research culture:

> *"Universities are conservation institutions without an appetite for change"*

Few of the Pilot Institutions have an established 'RI function', a person whose responsibilities include RI and/or ensuring that the European Federation of Academies of Sciences and Humanities (ALLEA) principles are met at the institutional level and/or in research grant applications and administration.

Evidence of an emerging commitment to RI is often driven by individual academics and research grant officers who have taken up the issue as a personal commitment, over and above their current role, and without reward. In some cases, they are supported by senior management as long as it is not at the expense of their current obligations. Such support may well stop short of the allocation of funds for a position in RI. At a time of financial stringency, for many RPOs the possible funding of RI competes with many other calls for limited resources.

> *"Research integrity competes with other priorities – currently it does not fit well with institutional structures"*

In a minority of RPOs, an RI position has been established, normally a single FTE. They have the support of senior management and their functions include organising and delivering modules and workshops on RI, training the 'trainers' in the different faculties, and advising on research grant applications. Training in RI is directed at academic and research staff,

PhD students and, in some RPOs, to under-graduate and post-graduate students. In the Content Tour meetings it was reported that their workshops are in high demand and that a modest demand for an additional one FTE post devoted to RI would help to bring the institution closer to a level of best practice.

The potential benefits to RPOs attributed to RI are not only general and specific but also multi-level, spanning the institution, the research group, the individual researcher, and scientific research. The trust of colleagues and the wider public and trustworthiness of scientific research is widely recognised.

> *"What is the dividend from investments in research integrity? – research quality, professional service efficiency and impact"*

By the same token, avoiding the reputational risks involved in cases of falsification, fabrication, plagiarism (FFP) and questionable research practices is a recognised benefit. For some RPOs, RI would open the doors to European research funding and increase the international competitiveness of institutions that, to date, have relied solely on national funding sources. At the local level, RI is seen to contribute to a great commitment to mentoring, greater diversity in research teams and a less stressful environment for younger researchers.

It was noted that in multi-faculty institutions it was important to recognise that RI training requirements vary. For example, data management is less important in the humanities that the human/medical sciences.

The advice from a major university was as follows.

> *"Multi-faculty institutions should develop distributed competence. A community of faculty advocates/champions to contribute to lead workshops and train the trainers"*

A further consideration concerned the differing skill sets required to deliver RI training:

> *"Data compliance and research ethics call for different skills and competences"*

Some of our Pilot Institution representatives were not optimistic about obtaining much needed resources and, in some RPOs, those committed to RI had a general sentiment of disillusion:

> *"Without top management support it is an uphill struggle"*

2.2 Research Integrity in Research Funding Organisations

All the Pilot RFOs have existing codes or procedures to support RI. Two reported the introduction of new policies to cater for more competitive calls for research, to go beyond box-ticking milestones and deliverables to follow up research integrity in situ, and to address cases of inaction in response to episodes of FFP in RPOs.

"You cannot rely on RPOs to deliver research integrity"

Three emerging challenges were identified; pressure from the increased volume of research; the gap between the RFOs' stated policies and the delivery, or lack of it, in the research conducted in RPOs, and the contentious issue of authorship arising in part from the increase in collaborative research but also the established hierarchy in research groups.

"Research integrity guidelines can be in place but how are they used in the field and in practice?"

All the RFOs welcomed the development in the EC's policies anticipating the benefits of a change in the research culture; better working environments for junior staff; greater diversity; more respect and trust of society, and the protection of basic research.

"Tools from the EU and SOPs give legitimacy to proposals for research integrity – a sort of 'proof of concept' "

While grant managers in the RFOs act as the custodians of RI, additional resources of 1-2 FTEs specifically devoted to RI and coming from a background of research, were considered desirable and essential if RFOs were to actively monitor RPOs compliance with RI protocols.

2.3 Research Integrity in Research Performing Organisations in the Commercial Sector

If the pilot pharmaceutical company is typical of the sector, RI is a priority issue for senior leadership and is built into the work flows and the organisational culture of the company.

"We can't do without research integrity"

RI is an intrinsic, inherent part of product roll-out, it drives strategic decisions, ensures product safety and therefore product marketability. Moreover, RI ensures efficiency; when

data and procedures are carefully recorded, experiments/compounds can be reproduced effortlessly.

It is essential to make sure data is traceable and transparent for regulators and for us to replicate what we've done"

RI equates to research quality and is an essential component of submissions to the external regulator, the European Medicines Agency. RI is the responsibility of experienced researchers in the key functional specialisms who also lead on the induction of new staff members. There is a continued evolution of RI policies and procedures in areas such as pre-clinical work, record keeping of experiments and the incorporation of RI tools into workflows.

"It's a constant evolution, how are we keeping ourselves future fit? What's coming next?"

2.4 Research Integrity: The Perceptions of Active Researchers

The IRIS survey provides insights into the motivations of active researchers and on the RI topics on which they would value support.

2.4.1 Motivations: on the Perceived Benefits of Research Integrity

In the survey, respondents were asked about which of a range of possible consequences of a commitment to RI they would find most motivating. In other words, what benefits would RI yield.

> *"How motivating would each of the following factors be in encouraging you to adhere to formal research integrity procedures?"*
>
> *Response alternatives:*
>
> *1=not at all motivating 2=somewhat 3=fairly 4=very 5=extremely motivating*

Figure 1 shows that the most attractive incentives are 'truth' and 'trust', the intrinsic scientific benefits of – *more reliable scientific knowledge*, *more trust from colleagues and the general public*. The extrinsic benefits of *promotion* and *salary* prospects are reported to be the least motivating.
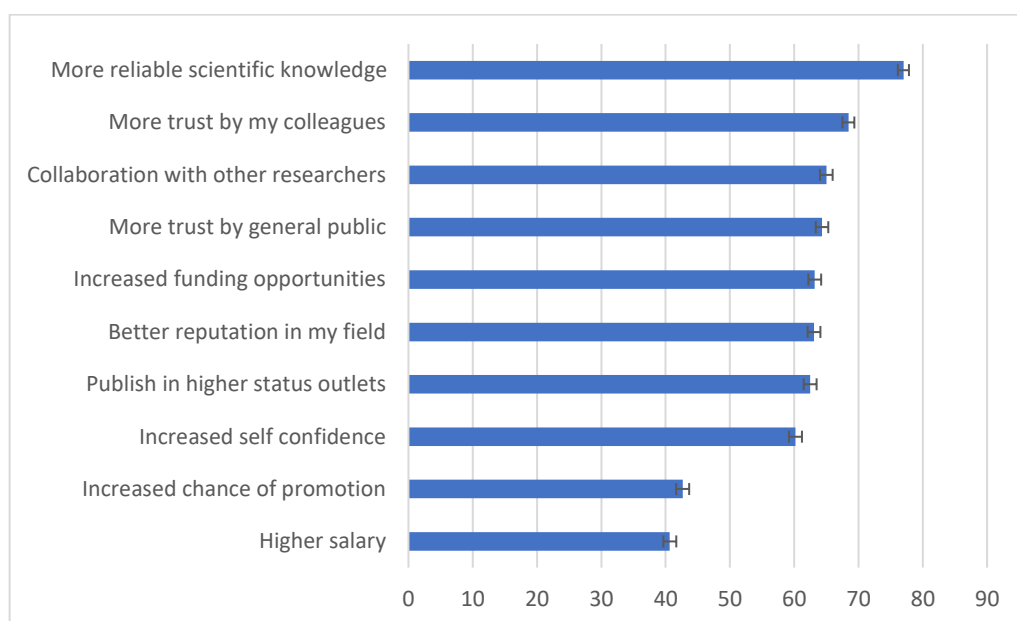

Figure 1: Motivation for following RI procedures (%)

Full sample who answered all motivation questions(N=49,188)

Figure 2 shows how researchers in the different fields assess the benefits of RI. While there are differences across the fields, the overall picture is consistent. More *reliable scientific knowledge, trust of colleagues and trust by the public* are seen to be the most important benefits.
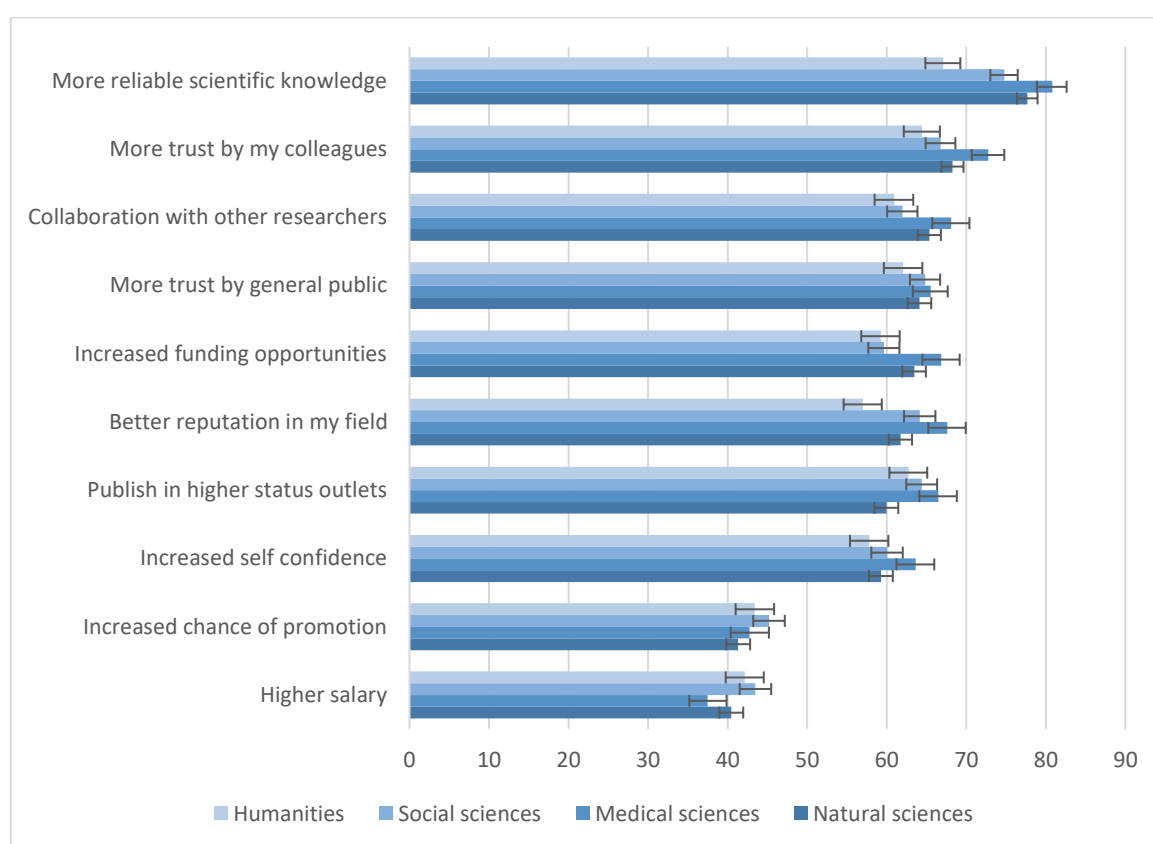

Figure 2: Motivation for following RI procedures by field (%) N=47,288

Figure 3 presents a breakdown of the benefits of RI by career stage. Here, we find that the potential benefits are ranked in a similar order for each of the four career stages. However, it is notable that a greater percentage (no less than 50% on each incentive) of early career researchers see every potential benefit as motivating, a tendency that is accentuated with respect to the extrinsic benefits of increased prospect of promotion and salary.
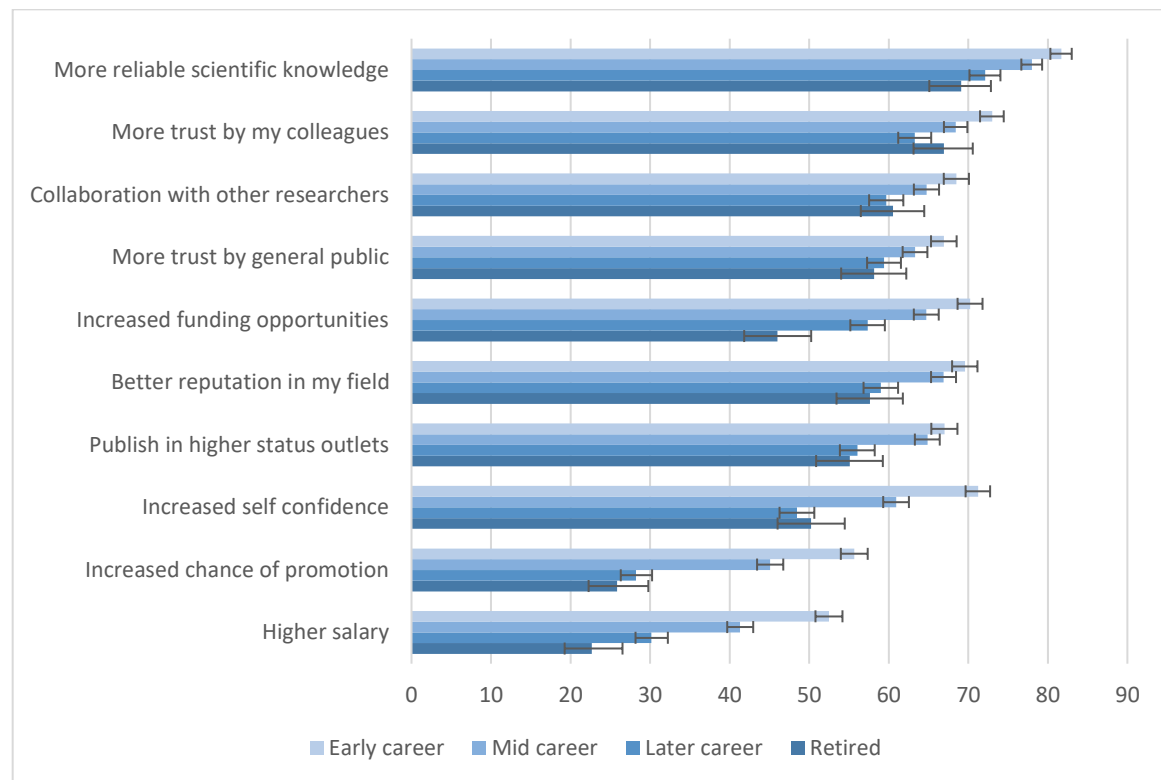

Figure 3: Motivation for following RI procedures by career stage (%) N=49,126

2.4.2 Additional Support for Research Integrity: Resource Implications

In the IRIS survey, respondents were asked whether they would value additional support on a range of topics related to achieving integrity in research. We assume that calls for such additional support are over and above the current provision within an institution. To deliver such additional support would have resource implications or costs for the institution. We therefore take the responses to the valuing of additional support as a rough proxy for the cost of training for research integrity.

To put the question on valuing additional support in the context of the survey, respondents were asked:

> *"Overall, how confident are you that your research is meeting high standards of research integrity?"*
>
> *Response alternatives:*
>
> *1=not at all confident 2=not very confident 3=somewhat confident 4=very confident*

Nine areas of RI were presented as response options:

> *Working environment: Collegial, and without harmful publication pressure, detrimental power imbalances or conflict.*
>
> *Supervision and mentoring: Supervisors encourage responsible research practices and are selected if they meet specified criteria. Guidelines are in place for the supervision and mentoring of researchers at different career stages.*
>
> *RI training: Training in research integrity is provided to all researchers, at all career stages, by qualified trainers.*
>
> *Ethics structures: Dedicated and adequately trained research ethics committees are in place. Ethics reviews are relevant to various research areas and disciplines within the organisation.*
>
> *Integrity breaches: Researchers can consult a qualified person in confidence with any research integrity concerns. Breaches are detected and sanctioned in a fair and standardized way, protecting both whistleblowers and those accused of misconduct.*

> **Data management:** *Infrastructure is in place for storing and sharing data securely and complies with national and international regulations. Guidance on secure data management is provided.*
>
> **Publication and Communication:** *Open access and clarity in public engagement are encouraged. Researchers are supported with publication matters such as preregistration, reproducibility, handling authorship disputes, responsible peer review practices.*
>
> **Research Collaboration:** *Support is offered for ensuring responsible research collaboration can occur across disciplines, sectors or countries where guidelines and legislation may differ.*
>
> **Declaration of interests:** *There is transparency and guidance in how to declare conflicts of interests in: research conduct; funding; peer review; promotion; and collaboration across sectors.*

Respondents were then asked:

> *"Are there any areas where you would value additional support?"*
>
> *(Please select all that apply)*

The nine areas of RI were offered as response options. If a respondent selected the RI area, it was coded 1. If they didn't select it, it was coded 0.

Figure 4 shows that one in three or more active researchers would welcome training in a range of research-related competences, e.g., *research collaboration, publication and communication and data management*. It is of note that leadership issues, i.e., the *working environment* and *supervision and mentoring,* are also on the training wish list. About 23% cite *integrity training* and 17% *integrity breaches*. That only 15% cite *ethics structures* may well reflect the fact that *research ethics* are a prominent issue and have featured in many grant application procedures for many years.
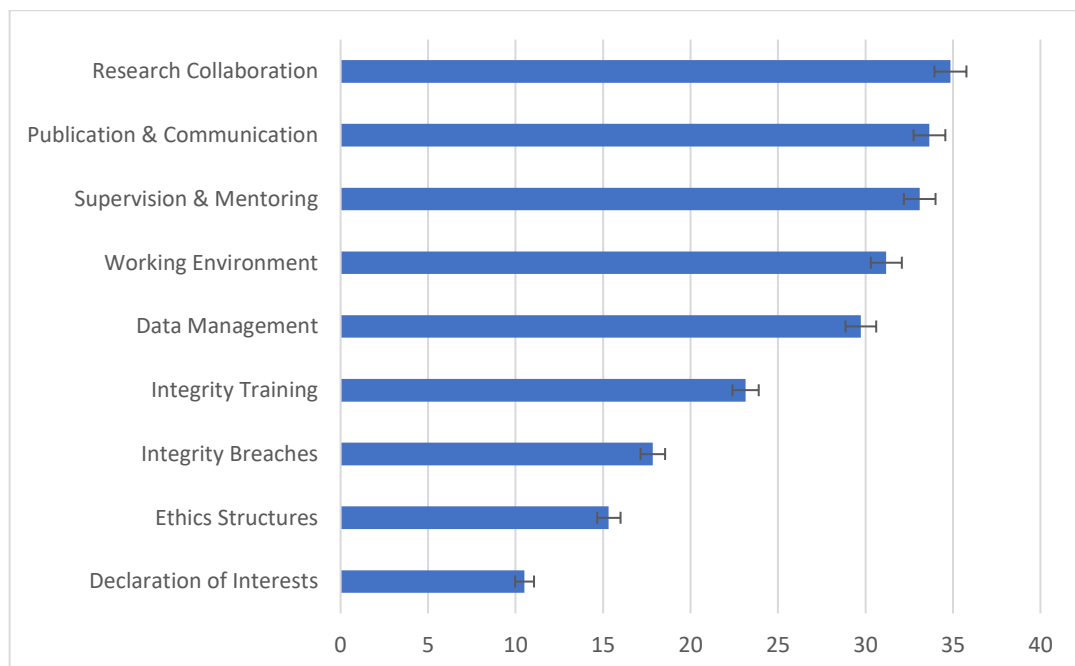

Figure 4: Percentage of researchers would value additional support

Full sample who answered all support questions(N=53,797)

While there are differences between the fields, some merely reflect the nature of research in the fields. For example, 'data management' is of less relevance to the humanities while GDPR is a critical issue in the medical sciences. In all the fields, leadership (i.e., *working environment, supervision and mentoring*) is identified by three in ten scientists.
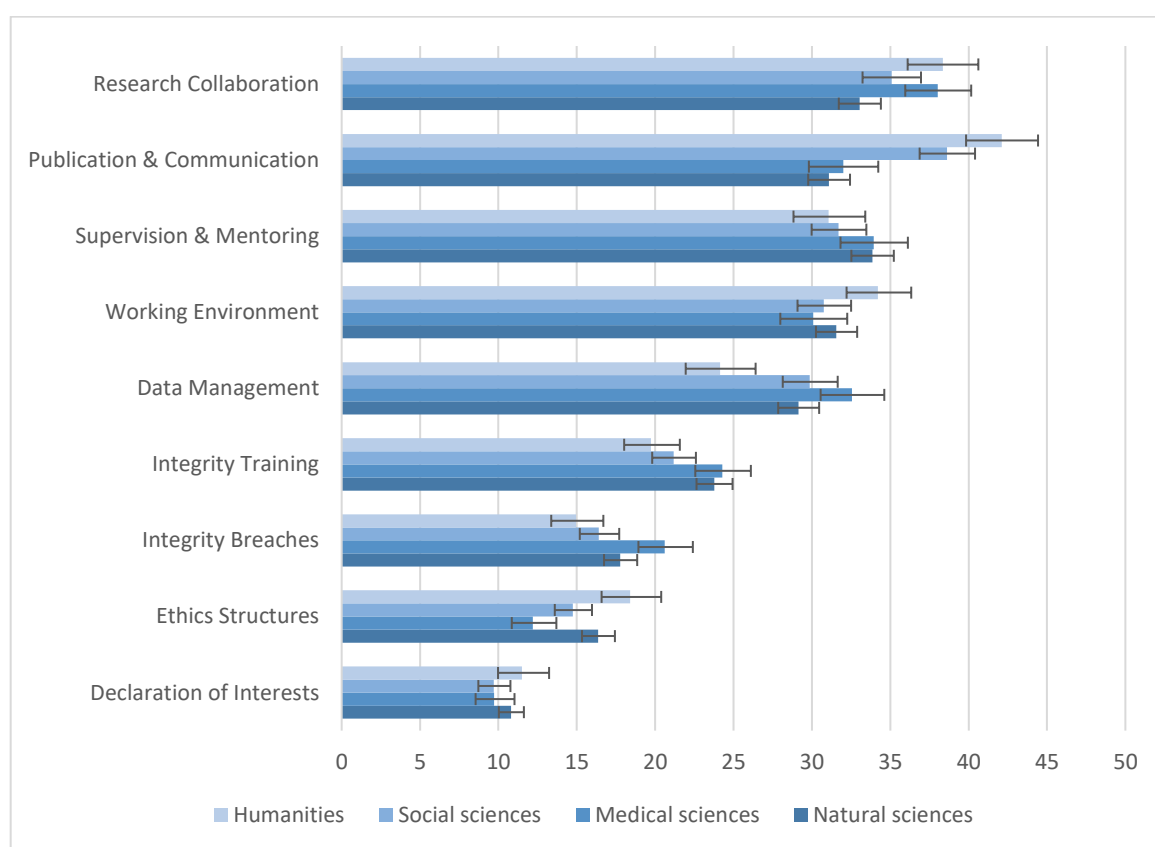

Figure 5: Percentage of researchers would value additional support by field (%) N=51,703

Across the career stages, Figure 6 shows that a greater percentage of early and mid-career researchers would value support on the research skills such as *research collaboration*, and *publication and communication*; on the leadership issues of *supervision and mentoring*, and the *working environment*, and on *integrity training*. It is clear that the next generation of senior researchers recognises the need for training in research management and RI.
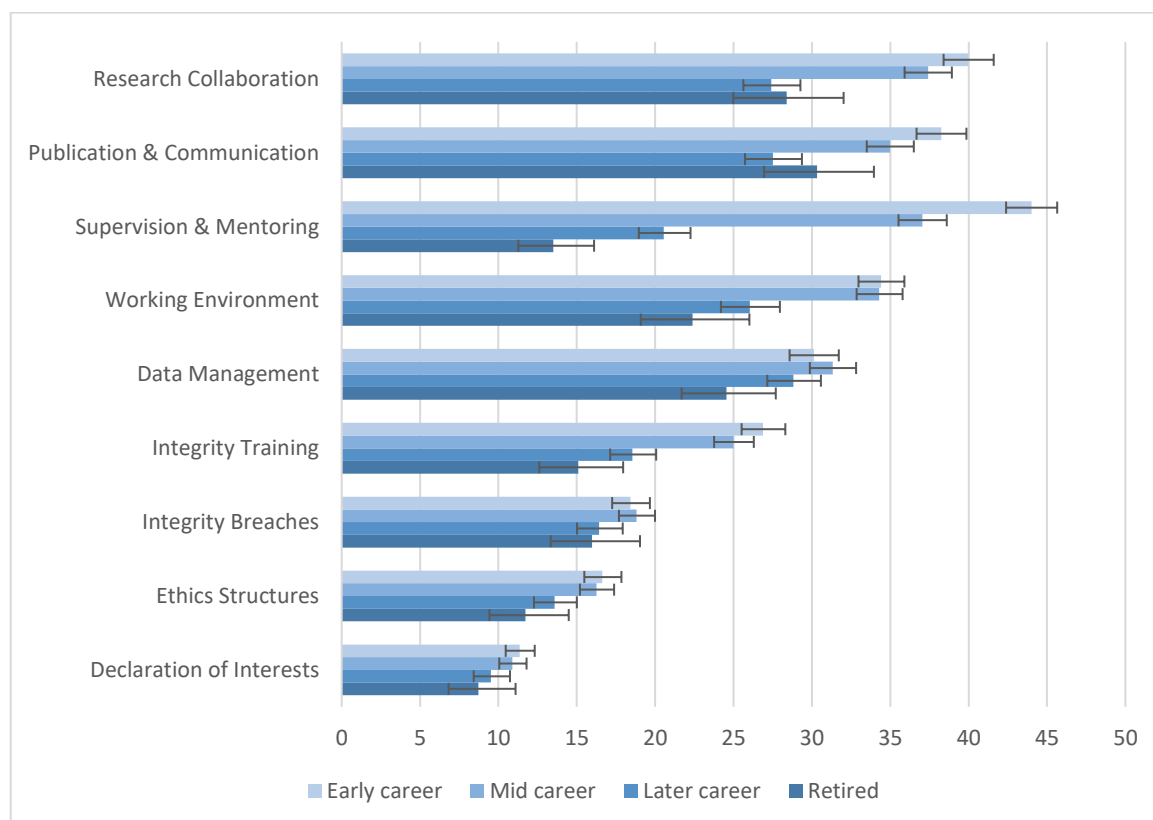

Figure 6: Percentage of researchers who would welcome additional support by career stage

3. Deviations from the Grant Agreement

3.1   Deviations

As set out in the description of work, it was intended to assess the probability and impact of costs and benefits of SOPs, guidelines and recommendations. For each SOP, the probability of specified costs and benefits was to be elicited on a 5 point scale (0 = low probability; 5 = high probability). The impact of the costs and benefits would be assessed using a second 5 point scale (0 = no cost or no benefit; 5 = high costs or high benefit). The overall CB assessment of a SOP would be (Σ p.c. - Σ p.b), where p = probability; c = negative impact and b = positive impact. This approach was predicated on RPOs having experience in research integrity policy development, implementation and evaluation.

In reality this was not a feasible approach as most of the Pilot Institutions were at the beginning of the RI journey. Few had formal RI policies in place and resources to implement SOPs and guidelines in institutions were limited. In recognition of this practical reality, the study moved to a more qualitative assessment of the emerging institutional arrangements – the opportunities and constraints to the introduction of RI policies and procedures.

3.2   Monitoring Institutional responses to RI policies

The leading role of Horizon Europe in demanding RI policies in institutions in receipt of EC funding, supported by the SOPs4RI study, may set in train a change in the culture of RPOs towards a commitment to RI. It is recommended that applications to the Horizon Europe programme are monitored in relation to statements/commitments on RI. As this RI culture emerges, it will be possible to investigate the 'what works' question in depth, assess the 'one off' and recurrent resources that are required.

4. Conclusions

Research integrity policy

Research integrity is an evolving issue. The commitment of the EC via Horizon Europe will encourage the development and adoption of RI policies and practices in RPOs.

Horizon Europe's commitment to RI has spurred the ambition of some RPOs to move beyond national funding sources and to seek to participate in EC projects.

For RI to be embedded in the research system it will require the leadership of senior institutional and research centre management. The survey of active researchers shows that it will be early and mid-career researchers who are most likely to support RI policy initiatives.

Perceived benefits of Research Integrity

RFOs, RPOs and active researchers recognise the importance and benefits to be gained from RI. Among the key benefits are improving the quality of scientific research and increasing the trust of colleagues and the wider public.

Resource implications

Current resource allocation for RI specialists appears to be less than optimal in all sectors apart from commercial companies conducting research. The active research community would value additional support on a number of issues of central to RI. Some one in four researchers would welcome training in RI and one in three training in research collaboration, publications and communications and data management. Researchers also flagged up training needs in relation to the working environment and supervision and mentoring. To meet these demands and to establish an institutional trajectory towards a culture of RI, our Pilot Institutional representatives made out the case for one or two additional full time appointments committed to RI per institution.

Policy evaluation

The monitoring of the RI content in research grant applications to Horizon Europe is recommended as a method for the determination of the speed of RI implementation in RPOs.