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Helmholtz Open Science Briefing

Helmholtz Open Science Forum "Research Evaluation, Reputation Systems, and Openness"

Report

Imprint

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Content

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Abstract

On May 9, 2023, the Helmholtz Open Science Office organized the Forum "Research Evaluation, Reputation Systems, and Openness". On this occasion, experts from Helmholtz and the scientific community presented current developments in the field of research evaluation and reflected on the connection between reputation systems and openness. The event focused on three main topics: 1) Development of Helmholtz quality indicators for data and software products, 2) 10 years Declaration on Research Assessment (DORA) and 3) Coalition for Advancing Research Assessment (CoARA). A central subject in the discussion and presentations was the issue of the use and definitions of indicators which foster Open Science. The discussion centered on what appropriate incentives look like in order to make research evaluation fair and appreciative. Furthermore, the relevance of these questions from the perspective of early-career scientists was highlighted.

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Introduction

The Helmholtz Open Science Forum on the topic of "Research Evaluation, Reputation Systems, and Openness" on May 9, 2023 was organized by the Helmholtz Open Science Office in cooperation with the Task Group Helmholtz Quality Indicators for Data and Software Products.

Together with the speakers (Table 1) and 105 participants, approaches and perspectives for the development of "Research Evaluation, Reputation Systems, and Openness" were discussed.

The Helmholtz Open Science Forum offers an opportunity for exchange, networking, and information. This virtual event also served to maintain and create awareness of the topic of research evaluation within the Helmholtz Association.

This report documents the event; the slides of the speakers can be found in the appendix of this report (from p. 9 onwards).

Table 1: Program of the Helmholtz Open Science Forum "Research Evaluation, Reputation Systems, and Openness", May 9, 2023

Programm	Speaker
Introduction and Welcome	Roland Bertelmann, Helmholtz Open Science Office
Focus: Helmholtz Quality Indicators for Data and Software Products	
Challenges for PoF V	Sören Wiesenfeldt, Department Research, Helmholtz Association
Task Group Helmholtz Quality Indicators – Current status subgroup Research Software	Doris Dransch, GFZ German Research Centre for Geosciences and Guido Juckeland, Helmholtz-Zentrum Dresden-Rossendorf
Task Group Helmholtz Quality Indicators – Current status subgroup Research Data	Britta Höpfner, Helmholtz Zentrum Berlin and Martin Köhler, Deutsches Elektronen-Synchrotron DESY
Focus: 10 Years Declaration on Research Assessment (DORA)	
Introduction: Declaration on Research Assessment (DORA)	Lea Maria Ferguson, Helmholtz Open Science Office
Status and perspectives at Forschungszentrum Jülich	Sven Rank, Forschungszentrum Jülich
Status and perspectives at GFZ German Research Centre for Geosciences	Wolfgang zu Castell, GFZ German Research Centre for Geosciences

Status and perspectives at Karlsruhe Institute of Technology	Arne Upmeier, Karlsruhe Institute of Technology
Status and perspectives at Max Delbrück Center	Jess Rohmann, Max Delbrück Center
Focus: Coalition for Advancing Research Assessment (CoARA)	
Coalition for Advancing Research Assessment (CoARA): current status	Roland Bertelmann, Helmholtz Open Science Office
The DFG's perspective on CoARA	Matthias Kiesselbach, DFG-Geschäftsstelle

Documentation of the Forum

Introduction and Welcome

Roland Bertelmann from the Helmholtz Open Science Office (OS Office) introduced the work of the OS Office as a service provider that supports the community in shaping the cultural change towards open science.

In September 2022, the Helmholtz Open Science Policy[1] was adopted. This policy provides guidelines for the open publication of scientific articles, research data and research software. It is an important landmark in anchoring open science in the activities of the community as well as taking steps towards monitoring and reforming research assessment in Helmholtz.

Helmholtz has already integrated research data and software in monitoring results from the Program oriented Funding (PoF).[2] The Task Group Helmholtz Quality Indicators for Research Data and Software Products[3] is mandated by the Assembly of Members and is associated with the Working Group Open Science[4] of the Helmholtz Association. The members of the Task Group from all Helmholtz Centers develop approaches to extend the PoF monitoring into Helmholtz Quality Indicators for Data and Software Products. Broader perspectives on indicators and related assessment are globally discussed in the context of the Declaration on Research Assessment (DORA).[5] As of mid-2023, DORA is already the subject of discussion in four Centers. An interesting development building on DORA is the Coalition for Advancing Research Assessment (CoARA).[6]

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[1] https://os.helmholtz.de/en/open-science-in-helmholtz/open-science-policy/

[2] https://www.helmholtz.de/en/about-us/structure-and-governance/program-oriented-funding/

[3] https://os.helmholtz.de/en/open-science-in-helmholtz/working-group-open-science/task-group-quality-indicators/

[4] https://os.helmholtz.de/en/open-science-in-helmholtz/working-group-open-science/

[5] https://sfdora.org

[6] https://coara.eu/

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Challenges for PoF V

Sören Wiesenfeldt from the Helmholtz Open Science Office presented the challenges for PoF V, which is a key instrument for steering in Helmholtz. Scientific output and transfer[7] should be visible and therefore, indicators in PoF shape the demands placed on scientists and can work as incentives.

Task Group Helmholtz Quality Indicators - Current status subgroup Research Software

Doris Dransch from the GFZ German Research Centre for Geosciences and Guido Juckeland from the Helmholtz-Zentrum Dresden-Rossendorf presented an overview about the approach and work in progress on the Helmholtz Quality Indicator for Research Software. The proposed quality indicator is a multidimensional indicator to improve software quality in terms of reliability, sustainability, and openness.

Task Group Helmholtz Quality Indicators - Current status subgroup Research Data

Britta Höpfner, from the Helmholtz Zentrum Berlin and Martin Köhler from the Deutsches Elektronen-Synchrotron DESY presented an overview about the approach and work in progress on the Helmholtz Quality Indicator for Research Data. The proposed quality indicator is a multidimensional indicator that is not a benchmark value, but rather an incentive for improving the quality of research products.

Introduction: Declaration on Research Assessment (DORA)

Lea Maria Ferguson from the Helmholtz Open Science Office introduced DORA: DORA was published in May 2013 and recognizes the need to improve the way scientists and the output of scientific research are evaluated. DORA has become a worldwide initiative covering all scholarly disciplines and key stakeholders including funders, publishers, professional societies, institutions, and researchers. The presentation focused on how DORA is set out and functions, and how it can be an inspiration for Helmholtz concerning the core themes of research evaluation, reputation systems, and openness.

A modified slide set based on this talk will be published as a presentation blueprint via the event's website;[8] this slide set is open for use by the Helmholtz Centers and other interested parties, seeking to embark on the journey towards implementing DORA and/or CoARA.

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[7] https://www.helmholtz.de/en/transfer/
[8] https://os.helmholtz.de/en/events/fora/research-evaluation-reputation-systems-and-openness/

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Status and perspectives at Forschungszentrum Jülich

Sven Rank from the Forschungszentrum Jülich (FZJ) presented the perspectives on research assessment in the context of DORA and CoARA at Jülich. DORA came up as a topic of discussion at Forschungszentrum Jülich as the new directorate already had experience with DORA from CNRS[9] in France. As a result, in the fall of 2022, corporate development and the central library were asked to evaluate a DORA implementation in Jülich. Thus, FZJ will take first steps towards a cultural change process in research assessment. Several challenges for this process were identified and are being addressed. Eventually, the establishment of fairer and more open scientific practices will greatly benefit from DORA and CoARA inspired research assessment.

Since the publication of its declaration in July 2022, CoARA has significantly gained speed, although its direction and impact are not quite foreseeable yet. FZJ has therefore signed the DORA declaration in May 2023[10], aiming to pick the "low hanging fruits" regarding its implementation. This will mean to better comply with (and to deliver) Helmholtz PoF data and software indicators on the one hand, and to improve staff-related practices on the other hand. Furthermore, Jülich wants to monitor the CoARA developments, as these seem oriented at effective changes in research culture.

Status and perspectives at GFZ German Research Centre for Geosciences

Wolfgang zu Castell from the GFZ German Research Centre for Geosciences presented the status and perspectives at the German Research Centre for Geosciences. Both, data and software, are recognized as the results of scientific work. In addition, there are processes that regulate their publication and ensure that research data and software become visible as valuable results of scientific work. In addition to text-based publications, research data and research software are also used for quantitative evaluation in internal performance assessments.

To replace the well-known quality metrics for evaluating scientific performance based on citations, an indicator is currently being developed that can depict the strategic contribution of scientific work in several dimensions.

Status and perspectives at Karlsruhe Institute of Technology

Arne Upmeier from the Karlsruhe Institute of Technology explained that KIT was one of the early signatories of DORA. He presented the state of discussion at KIT on DORA and CoARA in combination with Open Science. Two related projects were introduced: "DORA4KIT" and "ERRED". While DORA4KIT is already running successfully, "Entwicklung eines Referenzmodells zum Reporting in wissenschaftlichen Einrichtungen anhand von DORA - ERRED" has been approved, but has not yet begun its work.

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[9] https://www.cnrs.fr/fr
[10] https://www.fz-juelich.de/de/aktuelles/news/meldungen/2023/wissenschaftliche-leistungen-besser-bewerten-mit-dora

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Status and perspectives at Max Delbrück Center

Jess L. Rohmann from the Max Delbrück Center presented the current research program at the Max Delbrück Center. The program is focused on Systems Medicine and Cardiovascular Diseases and guided by the motto, "Discovery for Tomorrow's Medicine."[11] When thinking about the future of medicine and the research it requires, one cannot avoid discussing the evaluation (and reform) of research as a central topic. In the talk, recent and ongoing activities at the MDC that relate to research evaluation and seek to foster openness were presented with special focus on the MDC Library and in Research Data Management. In addition, Jess L. Rohmann explained the preparations for the upcoming evaluation of the scientific centers, which will include a comprehensive assessment of MDC research groups and technology platforms, followed by the launch of the strategic process "MDC Strategy 2030". Finally, relevant concerns of junior scientists about the research evaluation reform and some suggestions for addressing these problems were outlined: Recommendations were made for institutions to empower early-stage researchers to get involved in improving research culture and practice.

Coalition for Advancing Research Assessment (CoARA): current status

Roland Bertelmann from the Helmholtz Open Science Office presented the current status of CoARA that was founded in December 2022 and builds, among others, on DORA. In this presentation the highlights of CoARA's development and its vision were illustrated: The evaluation of research, researchers, and research institutions should recognize diverse outcomes, practices, and activities in order to maximize the quality and impact of research. Peer reviews and the responsible use of quantitative indicators are central to this.

Addendum: As of August 2023, the CoARA Steering Board announced that ten Working Groups and the first five National Chapters have been approved to start their activities as part of CoARA; they are open for more CoARA members to join.[12]

The DFG's perspective on CoARA

Matthias Kiesselbach from the Deutsche Forschungsgemeinschaft presented the German Research Foundation (DFG) perspectives on CoARA: The DFG constantly evaluates the environment in which research takes place, and its own funding practices, including the ways project proposals are reviewed and evaluated.

As of May 2022, the DFG has published a Position Paper on Academic Publishing,[13] which discusses the functions of the publishing system as well as a number of challenges and problems facing it. Addressing not only the academic communities, but also funding agencies such as the DFG itself, the position paper proposes a number of actions in order to improve the functioning of the academic publishing system.

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[11] https://www.mdc-berlin.de/research/discovery
[12] https://coara.eu/news/formation-of-first-coara-working-groups-and-national-chapters/
[13] Academic Publishing as a Foundation and Area of Leverage for Research Assessment - Challenges and Fields of Action:https://www.dfg.de/download/pdf/foerderung/grundlagen_dfg_foerderung/publikationswesen/positions papier_publikationswesen_en.pdf

They include establishing and supporting new forms of quality review, new systems of reputational attribution, ensuring that data is owned by the researcher and her or his community, and broadening the spectrum of accepted publication formats. It turns out that these actions require a comprehensive reform of the incentive structure facing researchers - and hence of the culture of research assessment through which these incentives are set.

In order to support the needed cultural change, the DFG has recently implemented some changes in its assessment practices (most recently, it has incorporated narrative elements in its CV forms and changed its guidelines to reviewers) and supported the foundation of CoARA. In a nutshell, CoARA calls for two broad shifts in research assessment: research assessment ought to be less focused on quantitative metrics (or proxies) and more on contents (or ideas). And it should widen its focus from journal articles to the whole range of scientifically valuable contributions over the whole cycle of research.

As a CoARA member, DFG aims to play a constructive role in CoARA's Working Groups, and to help to ensure that the identification of scientific excellence is and remains the goal of all responsible research assessment.

Outlook

The Helmholtz Open Science Forum "Research Evaluation, Reputation Systems, and Openness" presented insights into diverse efforts regarding research assessment strategies. To ensure multi-faceted good scientific practice, research assessment must honor all contributions and activities to research. Reproducibility and research integrity can be advanced, if the diversity of research outputs and outcomes is acknowledged in a way that is appropriate for each research area. This forum marks a first step to discuss and coordinate respective efforts in Helmholtz.

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Appendix

Indicators in PoF-Controlling

Sören Wiesenfeldt

Helmholtz Head Office

Helmholtz Open Science Forum "Research Evaluation, Reputation Systems, and Openness"

9 May 2023

Contact: soeren.wiesenfeldt@helmholtz.de

Spitzenforschung für große Herausforderungen.

Helmholtz research mission & strategy
Research for grand challenges

- Systems solutions for grand challenges based on:
  - Scientific excellence
  - Interdisciplinarity and critical mass
  - Long-term research programs

- Helmholtz provides a highly attractive environment for talents and brilliant brains

- Profound expertise in large-scale research infrastructure

- Helmholtz as a prime strategic partner at the local, national and international level

- Transfer of knowledge into economy and society

XFEL

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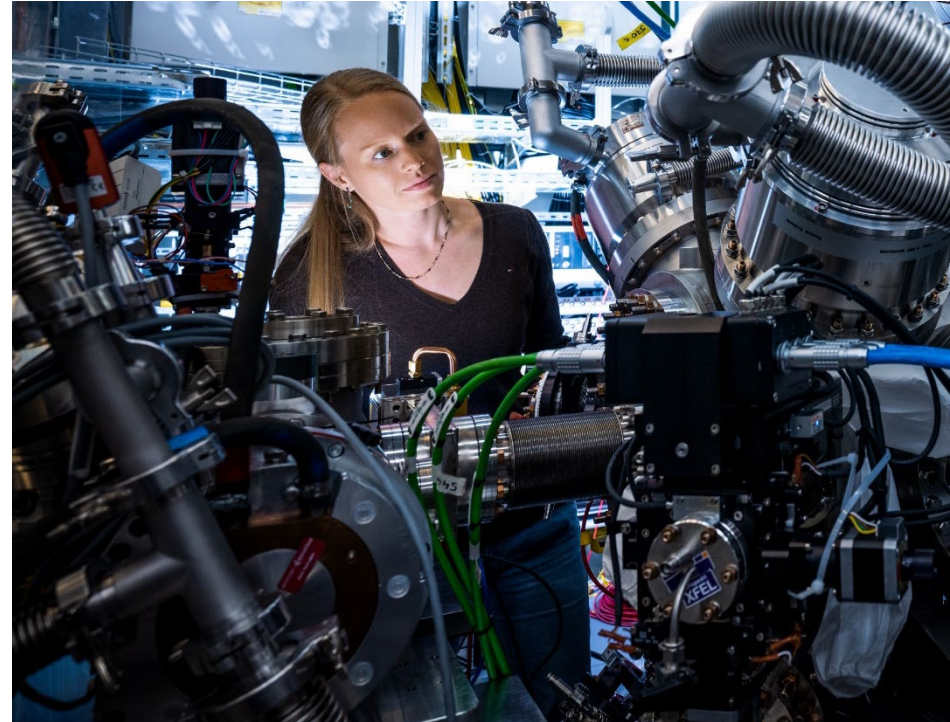
Strategic Research for Grand Challenges
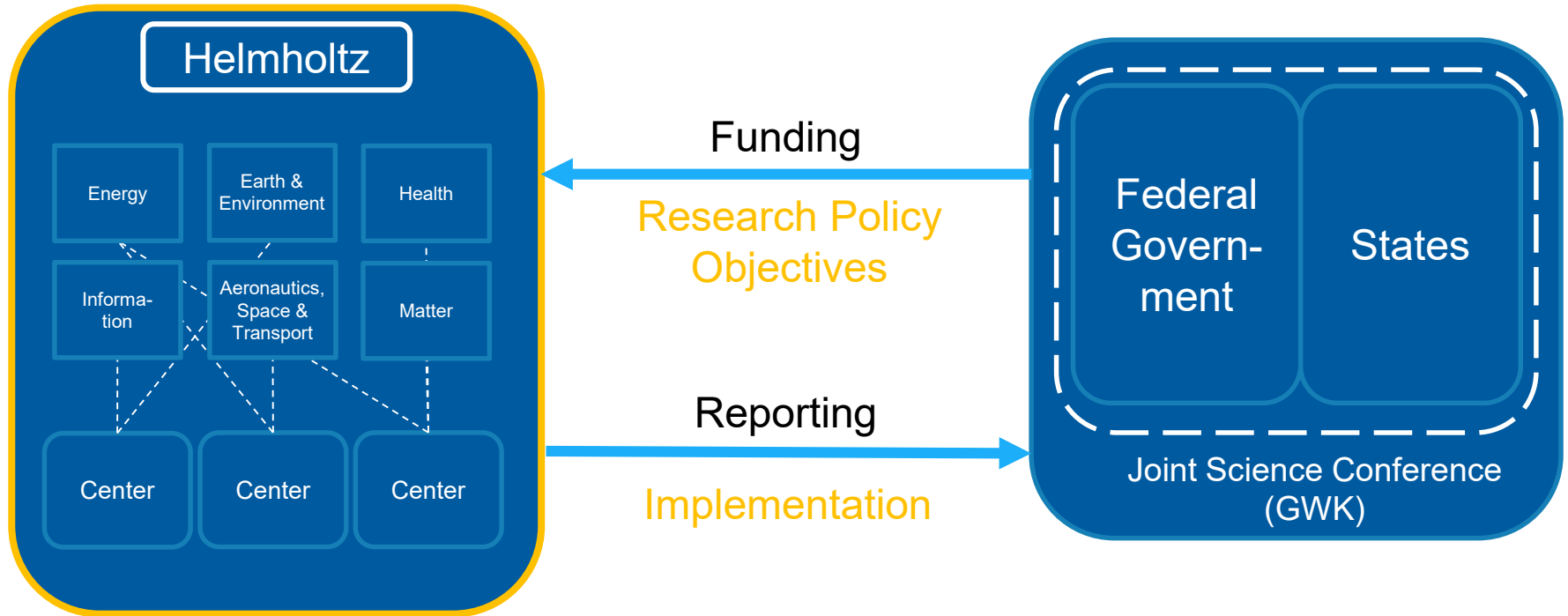# Program-oriented Funding

- R & D in our 18 centers is organized in multi-year programs,

  ► pooling the centers' unique research competences in a complementary approach

  ► to tackle long-term challenges

  ► with a strategic focus

- Provision of large-scale scientific equipment and platforms for international scientific user communities ("user facilities")

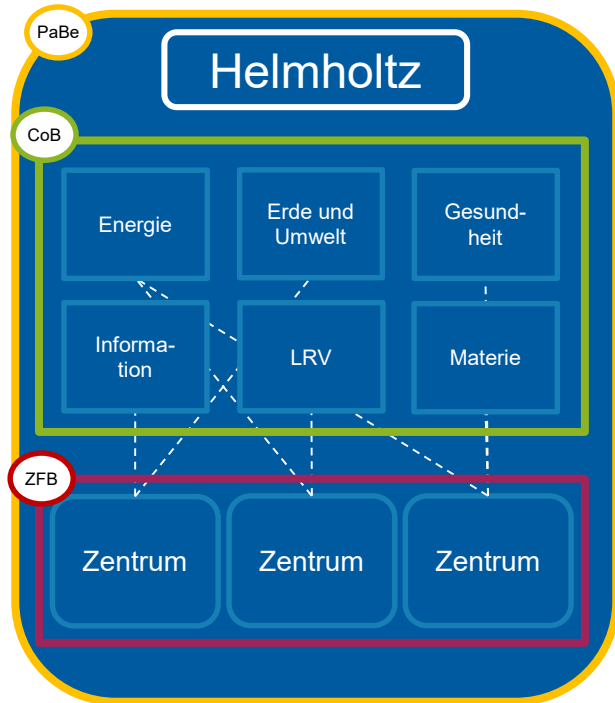| Energy	Earth and Environment	Health	Aeronautics, Space and Transport	Matter	Information

- Helmholtz does not invest its resources in individual institutions, but in (cross-center) research programs!
- Basic costs of the center – buildings & infrastructure, central facilities, operations, central services, administration as well as RESEARCH – are financed through the programs

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Joint Initiative for Research and Innovation
Framework for the Research Agenda of Helmholtz

Helmholtz

Energy

Earth & Environment

Health

Information

Aeronautics, Space & Transport

Matter

Center

Center

Center

Funding

Research Policy Objectives

Reporting

Implementation

Federal Government

States

Joint Science Conference (GWK)

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Reporting System

Three reports on different levels

Helmholtz

PaBe

CoB

ZFB

Energie

Erde und Umwelt

Gesund-heit

Informa-tion

LRV

Materie

Zentrum

Zentrum

Zentrum

Joint Initiative for Research and Innovation

Program-oriented Funding

Helmholtz Centers (legally independent)

- Funding: long-term (2021-2030) with annual increase of budget by 3% ► planning reliability!
- Goals and measures to
  - promote dynamic development
  - strengthen transfer to business and society
  - deepen networking
  - attract and retain the best minds
  - strengthen infrastructures for research
- Research policy objectives

Paktmonitoringbericht

Controllingbericht

Zentrums-fortschrittsberichte

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Program monitoring

- Program spokespersons prepare annual reports in which they present
  - (interim) results,
  - the status of the implementation of Senate recommendations and
  - where applicable, newly addressed topics or changes in strategy

- Reports include quantitative indicators.

- The levels of controlling are
  - the research fields and programs (Helmholtz procedures) and
  - the centers and their shares in the programs

- Program reports (text plus figures), together with the report for the research fields form the basis for the "Controlling Report of the President" to the Helmholtz Senate.

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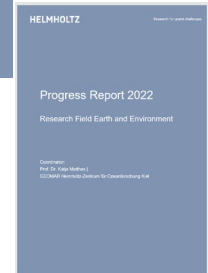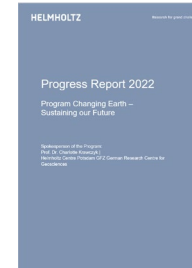
PoF IV Indicators
Overview

- Publications in journals of ISI or SCOPUS lists, Open Access Publications
- Third-party funding
- Finished dissertations, Postdocs, Junior research groups
- Coordinated national and international third-party funded research programs
- Cooperation with industry and non-scientific institutions, spin-offs & start-ups
- Knowledge transfer activities

Request for a "data indicator"
- "Digital products" – data collections, software etc. – have become increasingly important for research
- Should be visible as part of Helmholtz's scientific output and transfer
- Task Group Helmholtz Data Indicators

WoS-, SCOPUS or Open Research Europe indexed publications
… thereof open access publications
other peer-reviewed publications
third-party funding
finished dissertations
Postdocs
Junior research group leaders
selected coordinated national and international third-party funded research programs
Cooperations with the industry and external non-scientific institutions, publicly or privately financed
Spin-offs and competence-based foundations (start-ups)
knowledge transfer activities

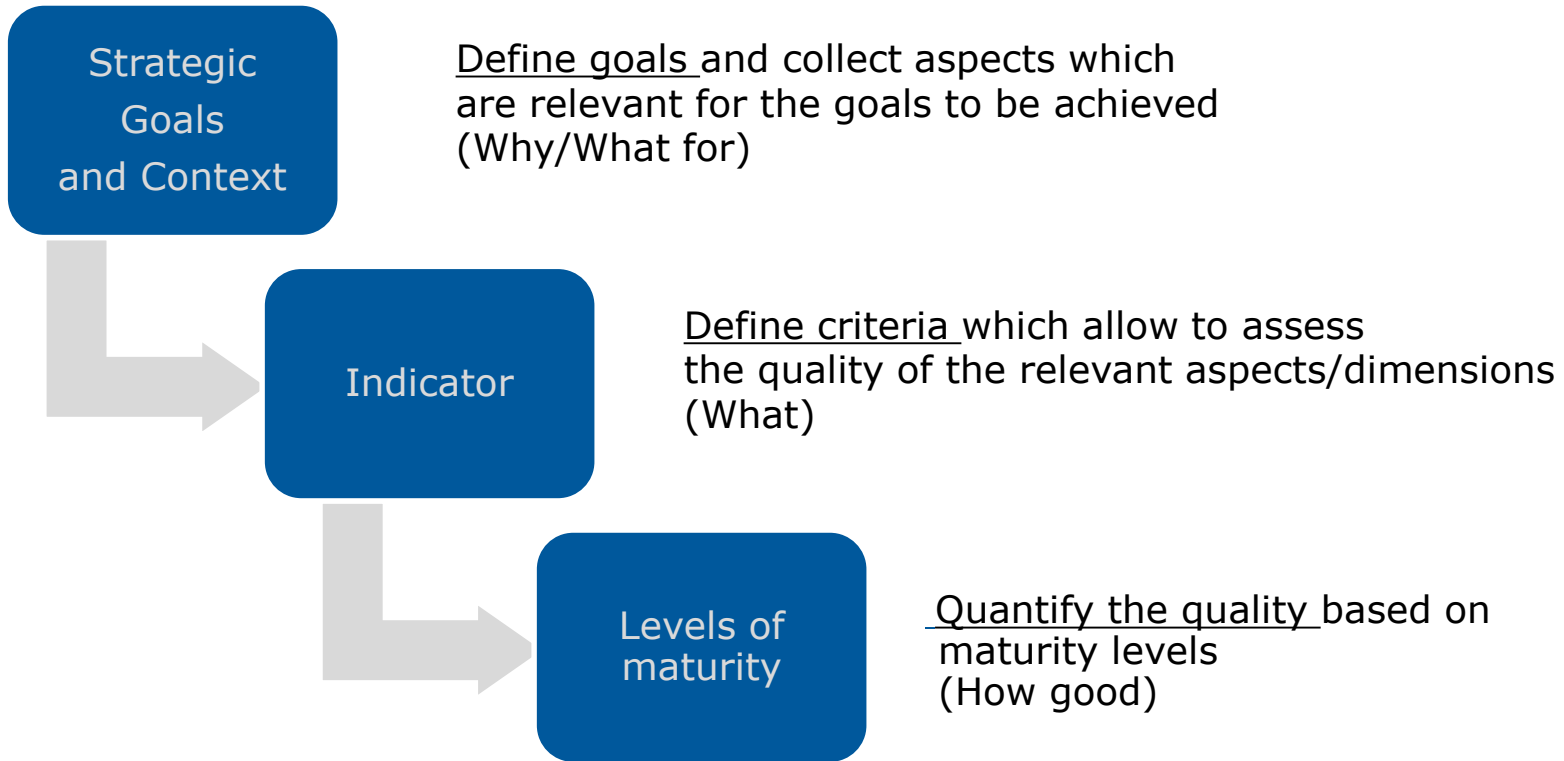| |
|---|
| number of core-funded scientists |
| number of third-party funded scientists |
| scientists in total |

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Data Indicator

- Entry-level indicator: Number of citable published research data and research software publications
  - Must be stored in a repository with metadata and assigned an identifier (DOI)
  - Has been recorded for the first time for 2022 (progress reports)
  - Only used internally

- In the spring of 2024, discussion whether this entry-level indicator or *the quality indicator that may then be available* should be part of the PoF indicator set starting in 2025 (reporting year 2024)
  - Today's topic!
  - Strong support for a quality indicator, could be first example for "outside the *quantitative-or-text* box"

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Towards a quality indicator for research software -Status April 2023-

Subgroup Software Quality Indicator

The Big Picture – Our General Approach

Strategic Goals and Context

Define goals and collect aspects which are relevant for the goals to be achieved (Why/What for)

Indicator

Define criteria which allow to assess the quality of the relevant aspects/dimensions (What)

Levels of maturity

Quantify the quality based on maturity levels (How good)

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Our Goals

- **Enhancement of research assessment**: not only paper but also research software should be counted as scientific product/output

- **Enhancement of scientific product**: the quality of research software should be improved along several quality dimensions

- **Promoting Open Science**: Reusability and reproducibility of research software should be improved

Strategic Goals and Context

Indicator

Levels of maturity

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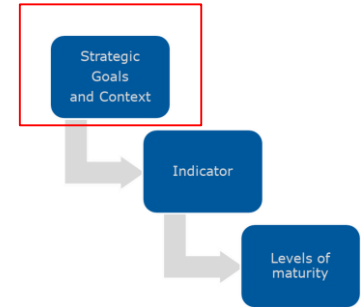
Manifold perspectives on the quality indicator

Different players => different perspectives

- Scientists developing software => credit for scientifc carreer, improving scientific insight
- Software developers supporting science => credit for daily work, improving software
- Collectors/providers of the numbers => relibale numbers, process to collect/provide numbers

Our focus: All are important

Different quality concepts

- Quality of a product
- Quality of the process to create and provide a product

Our focus: The quality of the process

Several quality dimensions => Vague understanding of quality => Definition

Quality: "of a high standard" (Cambridge Dictionary)

Our definition: Scientific software of high standard should be reliable & sustainable.

This is true for research software as well as scientific infrastructure software => no differentiation

Our focus: Quality dimensions determining „reliable" and „sustainable"

Our Work in progress

Arising questions

- What quality dimensions of scientific software do we define?
- What attributes do we define to determine the quality dimensions?
- How to quantify the attributes/dimensions?
- How to derive the values for the attributes?
- How to condense single measures for dimensions/attributes into one number, the quality indicator?
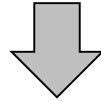
Our Workpackages

1. Define quality dimensions and attributes (What quality criteria?)
2. Define maturity levels for quality dimension/attributes (What maturity levels?)
3. Define procedure to derive the attribute maturity levels (How to derive the maturity levels?)
4. Define procedure to derive one single number, the quality indicator, from maturity levels of quality dimensions/attributes

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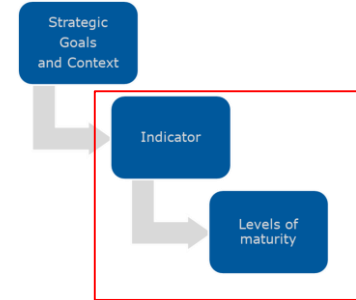
Workpackage 1: Define quality dimensions and attributes

Scientific software of high standard should be reliable & sustainable

=> Quality dimensions to determine „reliable" and „sustainable"

Software Quality
Reliable & Sustainable

Quality Dimensions
reliable & sustainable scientific software has to be
- Findable
- Accessible
- Interoperable   **=> FAIR+ST**
- Reusable
- Scientifically well-grounded
- Technologically well-grounded

Scientifically well-grounded means that scientific software is based on scientific knowledge and practice

T*echnologically well-grounded* means that scientific software is based on software engineering knowledge and practice

Example: Dimension, Attribute

Research Software Indikatore

Dimension	Attribute
Findable	Open Publication repository
	Versioning
	PID/for components
	Rich metadata
Accessible	Access conditions (legal)
	Access options (process)
	technical accessibility

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Workpackage 2: Define maturity levels for quality dimensions/attributes

Methode: Multivariate starplot and process-oriented maturity levels, COBIT Maturity Model
(COBIT is an international recognized framework for IT Governance, it is directed to processes)
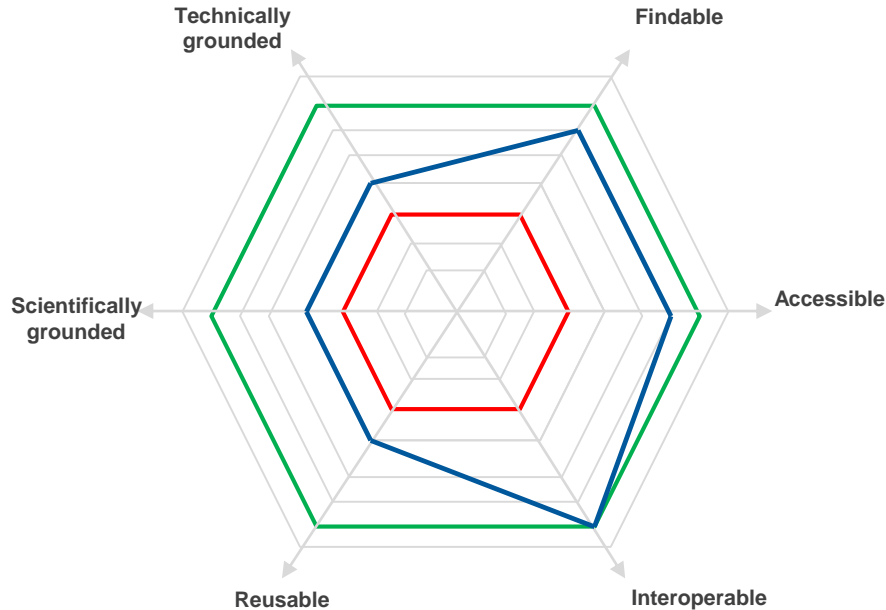
- Quality Dimensions (FAIR+ST)

- Attributes describing each dimension*

- Maturity levels for each attribute**

- Maturity levels for each dimension**
  derived form attribute maturity levels

* Paper FAIR4RS DOI: https://doi.org/10.15497/RDA00068
** COBIT Maturity Model

minimal requirements   *maximum score*   *example which would be counted*

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Example: Dimension, Attribute, Maturity levels

Research Software Indikatoren

Dimension	Attribute	Non-existent	Initial, ad-hoc and unorganised	Repeatable but intuitive, process follows regular patterns	Defined process / is documented and communicated	Managed and measurable / P. Is monitored and measured	Optimised / P. Follows best practices and is automated
		0	1	2	3	4	5
Findable	Open Publication repository	No	Online repository exists	unstructured description (Readme)	structured meta data description (DataCite)	publication repository listed (WHERE?)	Publication repository certified (e.g. re3data)
	Versioning	no SW versioning	initial version	with min/maj rel	Description of versioning scheme available	Roadmap	Versions automatically tagged by CI/CD
	PID/for components	no PID	just handle/URL	identifier with defined metadata scheme	PID	Automatic harvesting possible	PID listed
	Rich metadata	no MD	basic MD	full MD	cont. Updated	autom. Harv.	QA (e.g. review)
Accessible	Access conditions (legal)	unclear	contact	licence	open licence	open lic. & support	Open + community
	Access options (process)	Only one form	source/exec	both+rich doc	incl. Test case	incl. Checks	SW service
	technical accessibility	no info	"how to install"-readme	installation scripts	makefile, manual package (e.g. python modules)	towards package manager, auto-make	complete package (container, app package

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WP3: Define procedure to derive the attribute maturity levels (How to derive the maturity levels?)

Activity 1: Software Evaluation Questionnaire
Questions to get answers for maturity levels

Work in progress no final result

Findable
The following questions address the aspect of being able to find and uniquely identify the software. For each question, provide a check if the question can be answered with yes.

Open Publication Repository
(0) There is no information available on where to find the software. ☐
(1) Is there an online repository which contains the software? ☐
(2) Is there some kind of description available giving further information on the software in this repository (e.g. readme file)? ☐
(3) Is there a structured meta data description (e.g. following DataCite) given for software in this repository? ☐
(4) Is the repository listed in some overarching meta-repository? ☐
(5) Is the repository listed in a meta-repository performing quality checks (e.g. re3data)? ☐

Versioning
(0) No software versioning applied. ☐
(1) Is there some kind of version for the software? ☐
(2) Does the versioning provide information on minor/major releases? ☐
(3) Is a description of the versioning scheme available? ☐
(4) Is there a roadmap giving further information on software releases? ☐
(5) Does the versioning scheme allow for automatic tagging by CI/CD processes? ☐

Persistent Identifier
(0) No PIDs given. ☐
(1) Is there a handle/URL given to identify the software? ☐
(2) Is the identifier provided with a defined metadata scheme? ☐

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WP3: Define procedure to derive the attribute maturity levels (How to derive the maturity levels?)

Work in progress no final result

Activity 2: Tool development

- The final result of our activities should be an algorithm.

- Much of the algorithm will likely depend on meta data provided as manual input. Examples:
    - CITATION.cff
    - LICENCE
    - link to git repository
    - DOI

- Allows software developers to easily determine missing information/processes.

- Makes reporting center-wide results possible without unreasonable effort.

WP4: Define procedure to derive one single number, the quality indicator, from quality dimensions/attributes

To be done!

Summary

We are on the way to a „Quality Indicator for Research Software"

Status of our Workpackages

1. Define quality dimensions and attributes **almost done**

2. Define maturity levels for quality attributes (What maturity levels?) **in progress**

3. Define procedure to derive the attribute maturity levels (How to derive the maturity levels?) **in progress**

4. Define procedure to derive one single number, the quality indicator, from maturity levels of quality dimensions/attributes **to be done**

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Towards a quality indicator for research data -Status April 2023-

Subgroup Research Data Indicator

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Process/Status

- HGF "Entry indicator" → Lessons learned
  - Was/is challenge for all Centers
  - Need more than pure metrics
  - …
  - ➢ Iterative process respecting large variety of datasets within Helmholtz:

	Ownership
	Size/complexity
	Handling
	FAIRnes

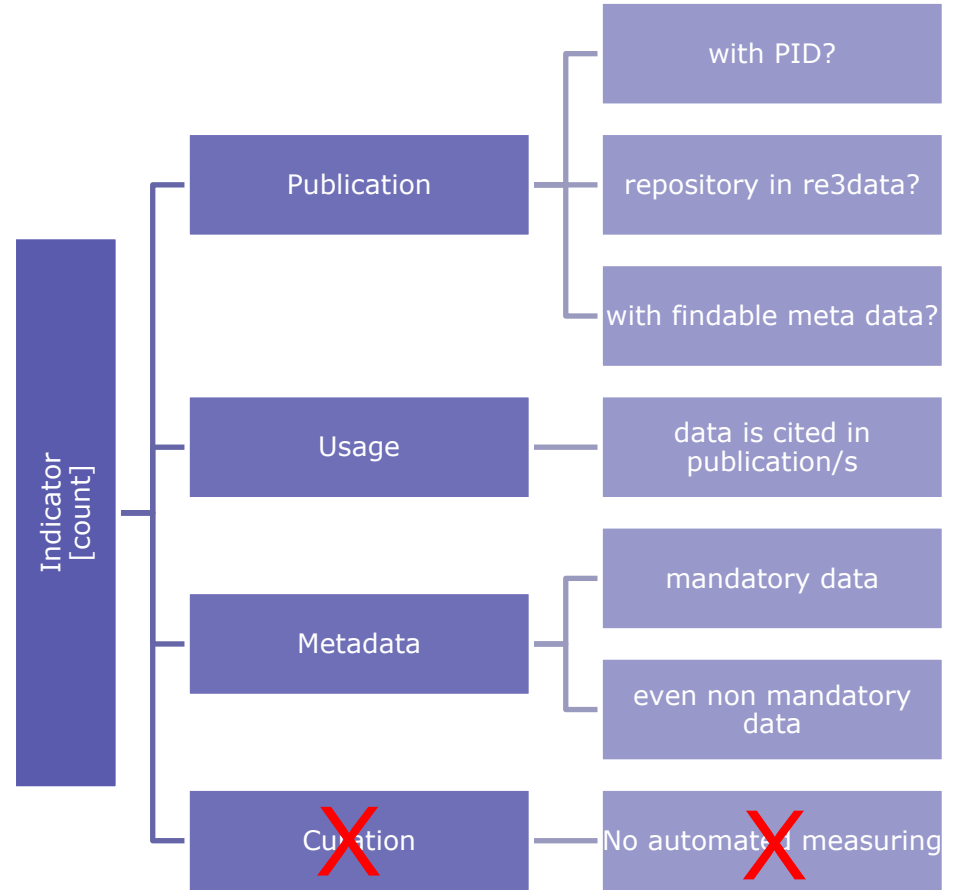How to compare in a fair way?

Objectives of the quality indicator:

- Opening up the concept of scientific output

  center-internal promotion for the development of data publication

- Improvement of the research data-quality (process)

  assessment should be multidimensional and automatically measurable

- Promoting Open Science

  which OS areas should be pushed and how to push them?

Work in progress

Mulitidimensional Approach

- Indicator
- Dimensions
- Attributes

- Measure *process* quality!
- What can be realized?
- What can be measured automatically?

Indicator [count]

- **Publication**
 - with PID?
  - repository in re3data?
  - with findable meta data?
- **Usage**
  - data is cited in publication/s
- **Metadata**
  - mandatory data
  - even non mandatory data
- **Curation** ✗
  - No automated measuring ✗

Work in progress

Attributes → Indicator ?!

- Attributes: Weight + Maturity-LEVEL
    → Value for dimension
- Radar plot

    Multidimensional description
- Threshold (?) → Indicator

In discussion: F-UJI integration ?

TO DO

TO DO

TO DO
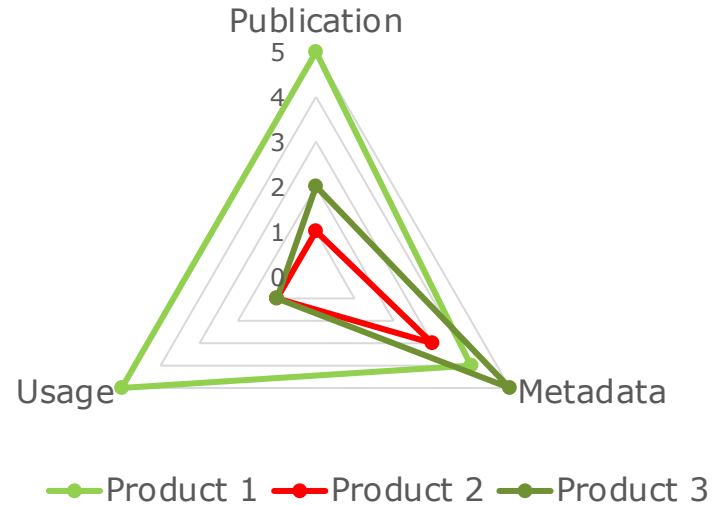
Make sure to avoid wrong incentives ("Teaching to the test")!

HELMHOLTZ

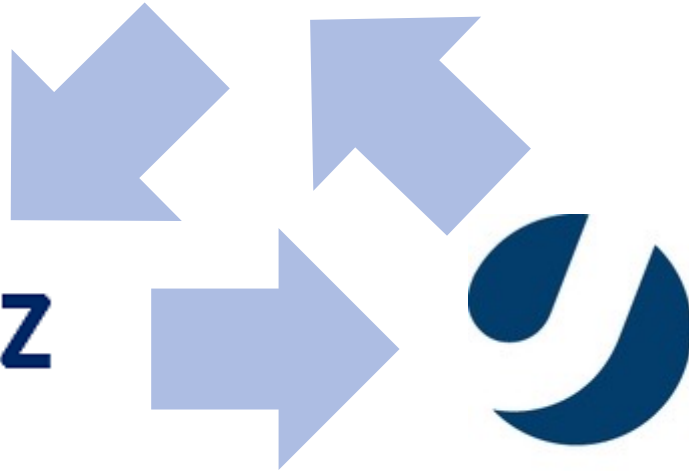# DORA

STATUS AND PERSPECTIVES AT FORSCHUNGSZENTRUM JÜLICH

9 MAY 2023 I SVEN RANK

Mitglied der Helmholtz-Gemeinschaft

DORA

- (so) what?!

Cultural change in scientific practice, not more, not less

DORA vs. CoARA

CoARA (2022) = DORAs (2012) „younger relative"

Principles are largely similar. CoARA is more modern in wording, both more detailed & more comprehensive: text is influenced by change and diversity management.

DORA = a declaration of principles, which institutions (dt. Einrichtungen) and organisations (dt. Organisationen) and/or individuals can sign and adopt at their own discretion.

DORA = global

CoARA = common vision of the signatories to act along certain principles

CoARA = declaration of intent, to create an action plan as soon as possible (2023) to put the common vision into practice

CoARA = European initiative, but open to all

JÜLICH
Forschungszentrum

OPTIONS FOR FORSCHUNGSZENTRUM JÜLICH

A „Do nothing"	B „Lip Service"	C „Low Hanging Fruits"	D „All-in"
= don't sign DORA/CoARA	= sign DORA	= sign DORA	= sign (DORA and) CoARA
	= press release	= press release	= press release
		= small implementation steps, e.g. adapt templates, count data &software etc. in 2023	= draft „action plan" with implementation steps in staff and in research assessment in 2023
		= evaluate at the end of 2023, how CoARA comes along	= 2024ff. put CoARA „action plan" into practice

LOW HANGING FRUITS FOR JÜLICH

(some may not hang that low …)

C „Low Hanging Fruits"
= sign DORA
= press release
= small implementation steps, e.g. adapt templates, count data &software etc. in 2023
= evaluate at the end of 2023, how CoARA comes along

governance (normative)

FZJ guideline that makes the registration of data and software output obligatory

technical

build / adapt system to register data and software output

organisation & staff

create DORA supporting staff processes esp. for young researchers

maybe also adjust performance agreements

(2nd step)

communication

press work, internal and external

maybe also modify job ads (2nd step)

JÜLICH
Forschungszentrum

CHALLENGES ENCOUNTERED AT JÜLICH

➢ even simple quantitative OS indicators cannot be delivered (OA: yes; RD: not reliably; Software: not at all)

➢ staff development department sees DORA/CoARA critical (= changing processes is extra work)

➢ board of directors afraid of parallel/double developments in PoF and in DORA/CoARA (= extra work?)

➢ researchers afraid of having to perform even more tasks parallelly ("jack of all trades, master of none")

➢ …

Shutterstock

HOPE

Shutterstock

JÜLICH
Forschungszentrum

PERSPECTIVES

From my personal point of view

THANK YOU FOR YOUR ATTENTION

JÜLICH
Forschungszentrum

REFERENCES

DORA

https://sfdora.org/read/

CoARA

https://coara.eu/app/uploads/2022/09/2022_07_19_rra_agreement_final.pdf

JÜLICH
Forschungszentrum

Declaration on Research Assessment (DORA) Status and Perspectives at GFZ

Wolfgang zu Castell
(Director Department Geoinformation)

Open Science @ GFZ

PROCESSES

PEOPLE

TECHNOLOGIES

➢ Technologies
- platform for open publication of text-based output
- workflow/platform for publication of research data
- workflow/platform for publication of research software

➢ Processes
- processes for data/software publication
- process for regular technology screening
- multi-dimensional assessment of research performance (QUIBS)[1]

➢ People
- training/eductation in various aspects of open science for various levels of career
- support for researchers in open access publishing, research data management and research software engineering
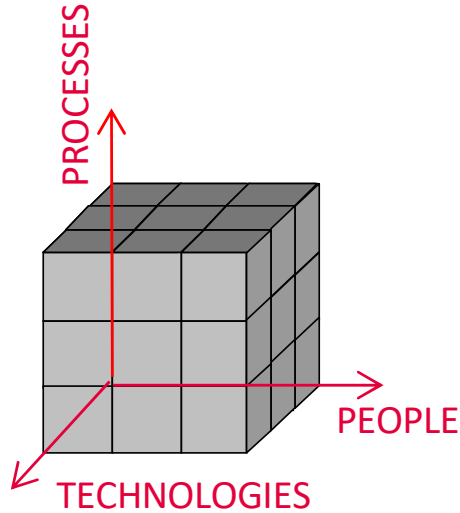
However, h-indices still regularly appear in research assessments!

[1] Quantitativ-qualitatives Internes BewertungsSystem

GFZ
Helmholtz-Zentrum
POTSDAM

HELMHOLTZ

Do not mix-up the map with the terrain …

➢ „*Some of the most powerful incentives in contemporary science actively encourage, reward and propagate poor research methods and abuse of statistical procedures.*"

➢ „*Whenever a quantitative metric is used as a proxy to assess a social behaviour, it becomes open to exploitation and corruption.*"

➢ „*Incentives to increase one's h-index may also encourage researchers to engage in high-risk hypothesizing, particularly on 'hot' research topics, because they can increase their citation count by being corrected.*"

ROYAL SOCIETY OPEN SCIENCE

rsos.royalsocietypublishing.org

The natural selection of bad science
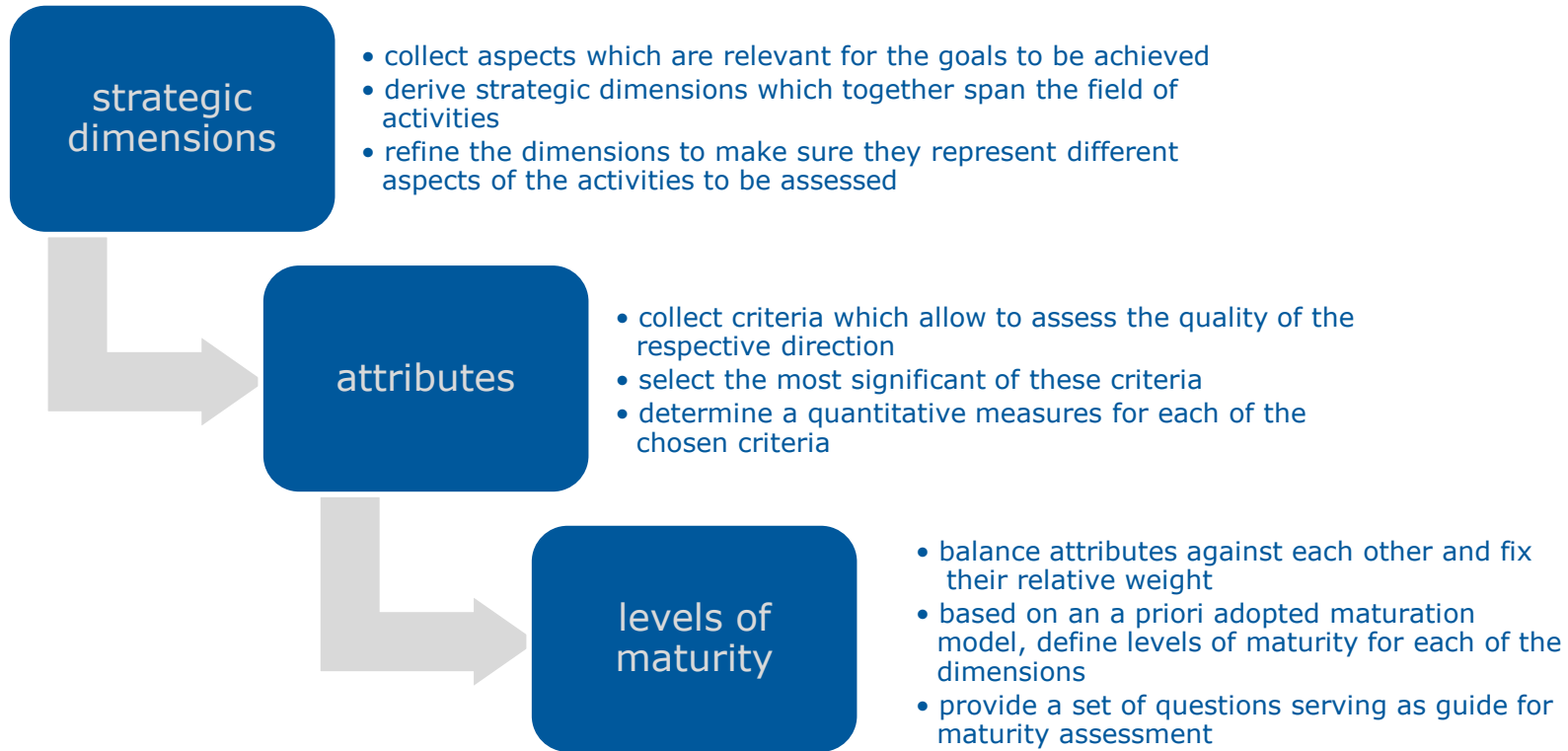
Paul E. Smaldino[1] and Richard McElreath[2]

[1]Cognitive and Information Sciences, University of California, Merced, CA 95343, USA
[2]Department of Human Behavior, Ecology, and Culture, Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany

Research

PES, 0000-0002-7133-5620; RME, 0000-0002-0387-5377

Cite this article: Smaldino PE, McElreath R. 2016 The natural selection of bad science. R. Soc. open sci. **3**: 160384.
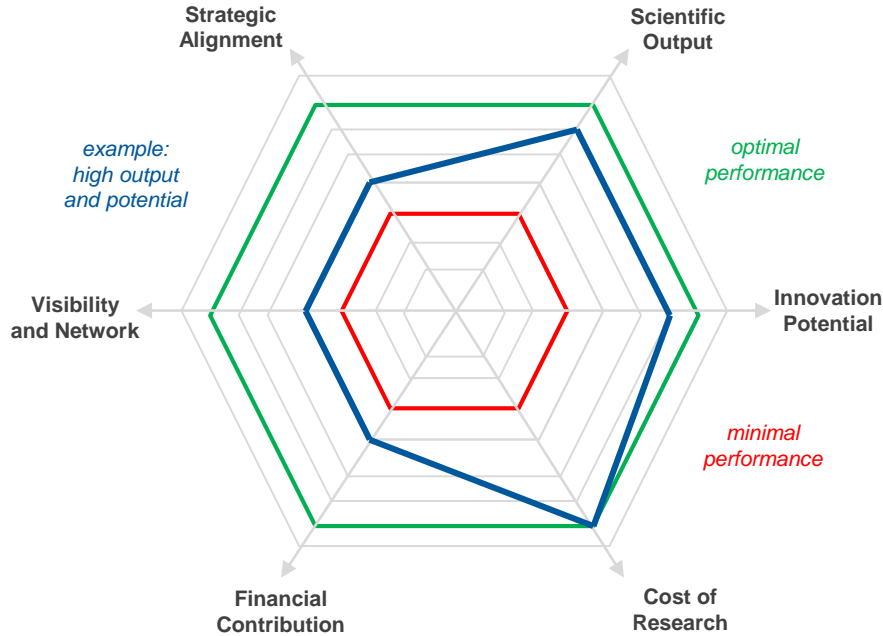http://dx.doi.org/10.1098/rsos.160384

Poor research design and data analysis encourage false-positive findings. Such poor methods persist despite perennial calls for

The general approach

strategic dimensions
- collect aspects which are relevant for the goals to be achieved
- derive strategic dimensions which together span the field of activities
- refine the dimensions to make sure they represent different aspects of the activities to be assessed

attributes
- collect criteria which allow to assess the quality of the respective direction
- select the most significant of these criteria
- determine a quantitative measures for each of the chosen criteria

levels of maturity
- balance attributes against each other and fix their relative weight
- based on an a priori adopted maturation model, define levels of maturity for each of the dimensions
- provide a set of questions serving as guide for maturity assessment
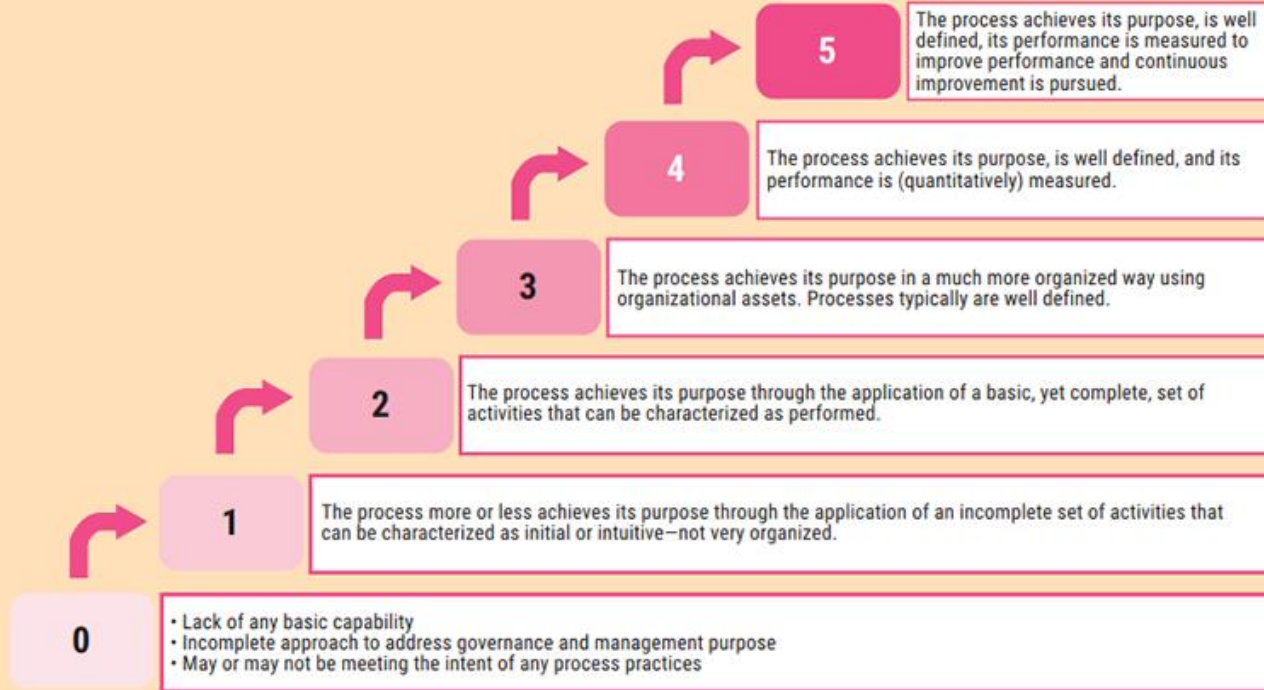
Assessing with respect to multiple perspectives

- for visualization purposes the number of chosen strategic directions should not be too large
- maturation should be measured on equal scale either ingoing or outgoing
- minimal criteria might be defined being depicted by a minimal polygon
- as overall assessment, a number can be assigned to be determined by some kind of (weighted) averaging over all directions

Note that most of the time it is **not helpful** to optimize for **all directions at the same time.**

The perfect team rarely consists of perfect universalists, only.

Quantification can be achieved using a process maturity model

Figure 2—Capability Levels for Processes

5 — The process achieves its purpose, is well defined, its performance is measured to improve performance and continuous improvement is pursued.

4 — The process achieves its purpose, is well defined, and its performance is (quantitatively) measured.

3 — The process achieves its purpose in a much more organized way using organizational assets. Processes typically are well defined.

2 — The process achieves its purpose through the application of a basic, yet complete, set of activities that can be characterized as performed.

1 — The process more or less achieves its purpose through the application of an incomplete set of activities that can be characterized as initial or intuitive—not very organized.

0
- Lack of any basic capability
- Incomplete approach to address governance and management purpose
- May or may not be meeting the intent of any process practices

www.isaca.org/resources/cobit

fokus on process

optimized – measures/processes are in place to optimize the process of collecting the necessary information and resources being used

managed – the process to collect the necessary information is being monitored to assess ist performance

defined – a clear process is defined and implemented allowing to collect the necessary information in a defined manner

repeatable – set of necessary information can be determined in a repeatable manner

ad hoc -- set of necessary information can be determined, however this is done on a case to case basis

initial – no/little information available

fokus on information

Some concluding remarks

➢ We should never measure without purpose.

➢ Measurements should help us to improve our science and to achieve our scientific goals.

➢ Metrics should help us uncover ‚the hidden' and objectify our assessment.

➢ Metrics should cover as many of the relevant aspects of our activity as possible.

➢ Metrics should not be directly connected to rewards to avoid optimizing for the metric rather than the goal behind it.

➢ We must promote values and foster transparancy.

At the end, we must master a cultural change
(rather than a mere re-design of our assessment scheme).

Thank you for your attention!

DORA am KIT

DORA am KIT

KIT hat im Dezember 2019 DORA unterzeichnet

Wichtige Punkte bei DORA:

- Allgemein:
  - Bewertung nicht [nur] nach Journal Impact Faktoren (h-Index). *„Die Notwendigkeit, die Forschung selbst zu bewerten und dies nicht auf Grundlage der Fachzeitschrift, in der sie veröffentliche wird, zu tun"*
  - *Die Untersuchung neuer Kennzahlen für die Signifikanz und Bedeutung*
  - *Berücksichtigen Sie zur Forschungsbewertung … auch andere Forschungsergebnisse (einschließlich Datensätze und Software). Berücksichtigen Sie eine breite Palette von Kennzahlen einschließlich qualitativer Messgrößen* (Empfehlungen 3 und 5)

Forschungsbewertung trifft Open Science

Das Projekt DORA4KIT – Data Literacy

- Finanzierung aus Sondermitteln der Exzellenz-Universität
- Ursprünglich nur einer von drei geplanten Teilprojekten
  - Data Score
  - Data Champion
  - Data Literacy
- Drei Jahre, 2 E13 Stellen
- Beteiligte Einrichtungen am KIT sind das House of Competence (HoC), das Institut für organische Chemie (IOC) (Stefan Bräse / Nicole Jung), das Institut für Funktionelle Grenzflächen (IFG) (Ute Schäpers) und das Zentrum für Mediales Lernen (ZML)

- Nimmt insbesondere DORA-Empfehlungen 3 und 5 in den Blick:
  - Frühzeitige curriculare Einbindung von Forschungsdaten und Forschungsdatenmanagement

Das Projekt DORA4KIT – Data Literacy

Entwicklung von Inhalten zur systematischen <u>Sensibilisierung für FDM</u> und die dazu notwendige Bereitstellung entsprechender Lehrmaterialien und Kurse für Studierende und Lehrende.

Langfristig solle eine FDM-Lernplattform auf Ilias entwickelt werden, um die FDM-Lernangebote am KIT zentral zu verorten.

Digital & integrierbar: Die Online-Lernmodule sollen unkompliziert und direkt in die Lehre integrierbar sein.

Theoretisch & praxisbezogen: FDM soll sowohl theoretisch als auch praktisch vermittelt werden. Dazu werden Lernangebote mit konkreten Anwendungsszenarien verknüpft, sodass die erlernten Kompetenzen direkt in die Praxis transferiert werden können.

Modular & flexibel: Ein Modul-Baukastensystem soll ermöglichen, dass fachübergreifenden Grundlagen als auch fachspezifische Komponenten des FDM zielgruppen- und bedarfsorientierten eingesetzt werden können.

Das Projekt DORA4KIT – Data Literacy

Das erste Lernmodul steht seit Wintersemester 2021/22:

Der Kurs „ELN 1"
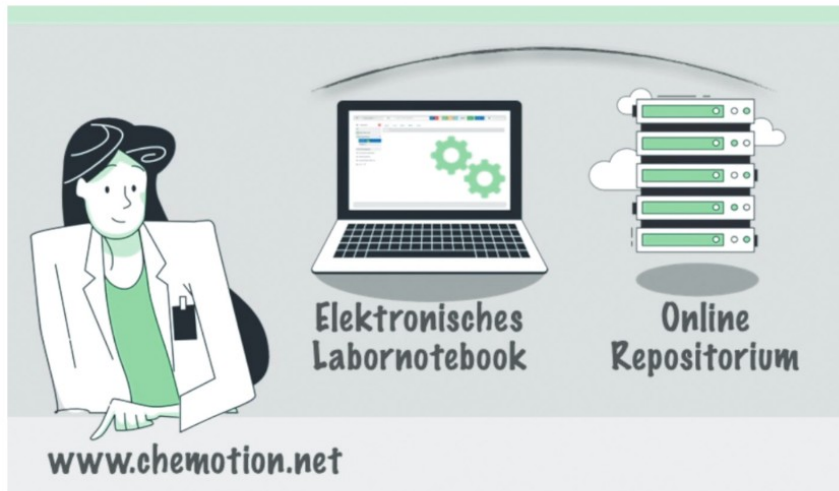
Abb. 3: Nutzung einer Kombination aus elektronischem Labornotebook und Repositorium als Basis zur schnellen Bereitstellung von Forschungsdaten.

Das BMBF-Projekt „Entwicklung eines Referenzmodells zum Reporting in wissenschaftlichen Einrichtungen anhand von DORA – **ERRED**"

- BMBF Fördermaßnahme „Digitaler Wandel in Bildung, Wissenschaft und Forschung"
  - Förderbereich: Etablierung einer gelebten Open-Access-Kultur

- Letzte Woche vorläufig bewilligt

- Vorgesehener Projektstart: 1. September 2023, Laufzeit 2 Jahre

- Personalmittel: 24 Monate E13

Das BMBF-Projekt „Entwicklung eines Referenzmodells zum Reporting in wissenschaftlichen Einrichtungen anhand von DORA – ERRED"

- **Ausgangspunkt:**
- Durchdringung der DORA-Empfehlungen ist immer noch zu gering
- Grund: es fehlen Alternativen zur Leistungsmessung

„Die noch ausstehende Durchdringung der DORA-Empfehlungen in Deutschland verdeutlicht sich auf der praktischen Ebene insbesondere in der fehlenden Umsetzung von Alternativen zur Leistungsbemessung, die zu einer notwendigen Weiterentwicklung einer wissenschaftsgeleiteten und verantwortungsvollen Bewertung von Forschungsleistungen führen würde." [Aus dem Antrag]

Das BMBF-Projekt „Entwicklung eines Referenzmodells zum Reporting in wissenschaftlichen Einrichtungen anhand von DORA – **ERRED**"

■ **Ziel:**

Erarbeitung eines Referenzmodells zum Reporting auf Basis der am KIT bereits vorliegenden oder mit vertretbaren Aufwand zu erhebender Kennzahlen

Nachnutzbarkeit in anderen Einrichtungen

Vorbehaltlich entsprechender Prüfung sollen die zu erhebenden Daten unter offener Lizenz veröffentlicht werden können, um die Nachnutzbarkeit zu verbessern

Das BMBF-Projekt „Entwicklung eines Referenzmodells zum Reporting in wissenschaftlichen Einrichtungen anhand von DORA – **ERRED**"

■ Arbeitspakete:

1. Evaluation des Ist-Zustandes
2. Überprüfung der Übertragbarkeit der DORA-Ziele auf die Reportingverfahren
3. Kommunikation am KIT gemeinsam mit Wissenschaftler:innen und Entscheider:innen
4. Erstellung eines Referenzmodells
5. Praxistests anhand des erarbeiteten Referenzmodells
6. Projektmanagement

Wird das KIT CoARA zeichnen?

- Diskussion läuft

- Vorarbeiten aus dem Kontext von EPICUR

- CoARA ist erheblich breiter

- CoARA und die UN-Nachhaltigkeitsziele

- Bedenken und Kritik

Sustainable Development Goals

**Fragen? =>   Jetzt gleich hier
oder später an arne.upmeier@kit.edu**

DORA
STATUS AND PERSPECTIVES AT THE MAX DELBRÜCK CENTER

Jess Rohmann
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@jlrohmann@mstdn.science
@JLRohmann
ORCID: 0000-0003-2420-5716

HELMHOLTZ

DISCOVERY FOR TOMORROW'S MEDICINE

MAX DELBRŪCK CENTER

HELMHOLTZ
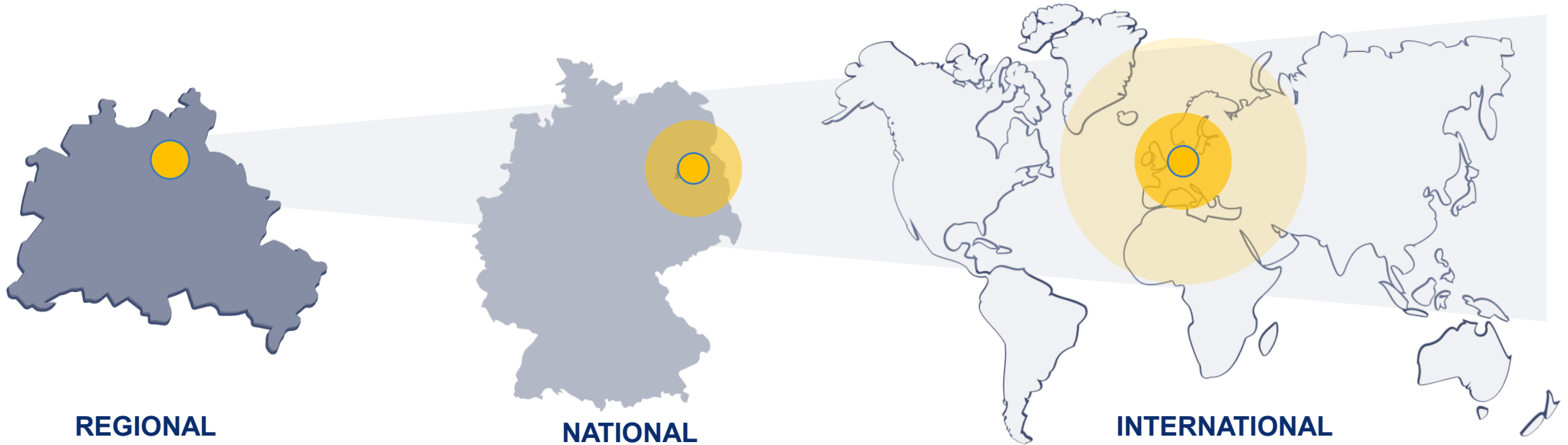
RECENT AND ONGOING ACTIVITIES AT THE MDC

- "Open Responsible Research and Innovation to further Outstanding KNowledge" - **ORION project** (2017-21)
  - ➢ Integration of open science not only into curricula but also professional development for scientists
  - ➢ Large outreach component: Berlin Science Week, Long Night of Sciences, citizen science projects

- **EU-LIFE:** "Research Assessment" & "Indicators and Publications" Task Forces

IN PROGRESS... SUPPORTING OUR SCIENTISTS (BETTER)

- **MDC Library**
  - ➤ Systematic collection of metadata into MDC Repository: OA, indicators
  - ➤ Currently: How to best integrate research data and software?
  - ➤ Next: new Head & scope of services: internal committee, townhall

- **MDC RDM Team** (since 2020)
  - ➤ RDM Roadmap for MDC
  - ➤ Optimizing internal integration with library, IT; onboarding and service provision for scientists
  - ➤ Repository of open-source software developed by MDC scientists

DigTools
Database of Digital Tools offerd by the MDC-Groups

Thanks to Inga Patarcic and
Wolf Schröder-Barkhausen

LOOKING TO THE FUTURE:
IN-DEPTH CENTER EVALUATION & STRATEGIC PROCESS

- **2023 Evaluation @ Institutional level**
  - ➤ Research groups: May 31-June 2, Tech platforms June 8-9
  - ➤ Big picture of our activities as a Center, evaluation of "us"
    - ▪ What is working? What needs more support?
  - ➤ Reviewer briefings, analysis/results, institutional contributions/engagement

- **MDC Strategy 2030**
  - ➤ Strategic Process

"Hopes and fears"

FUTURE?

NEW TARGET
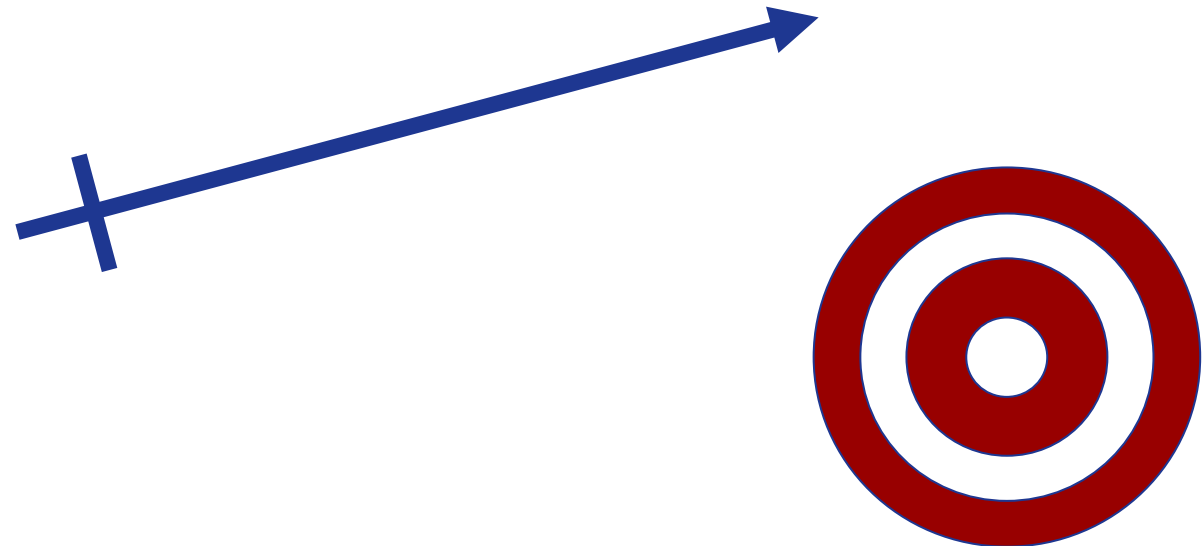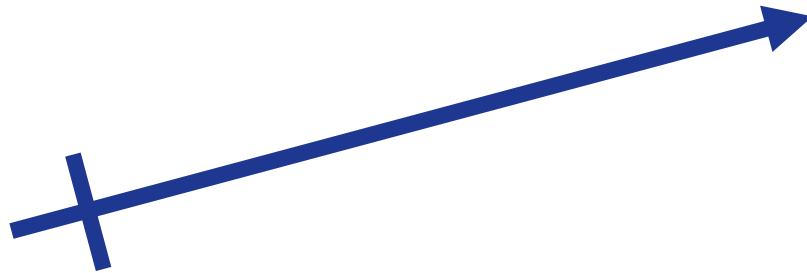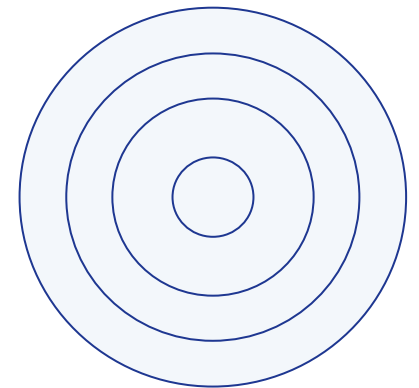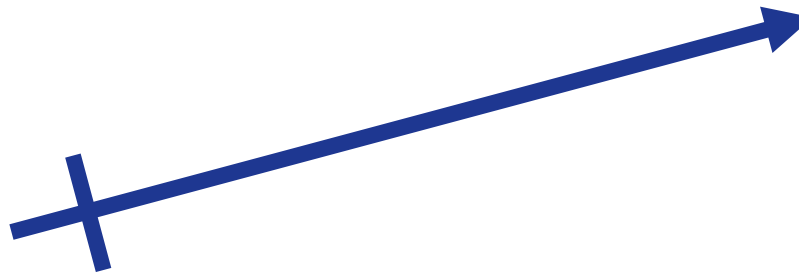
NO TARGET?

FUTURE?

MOVING TARGET
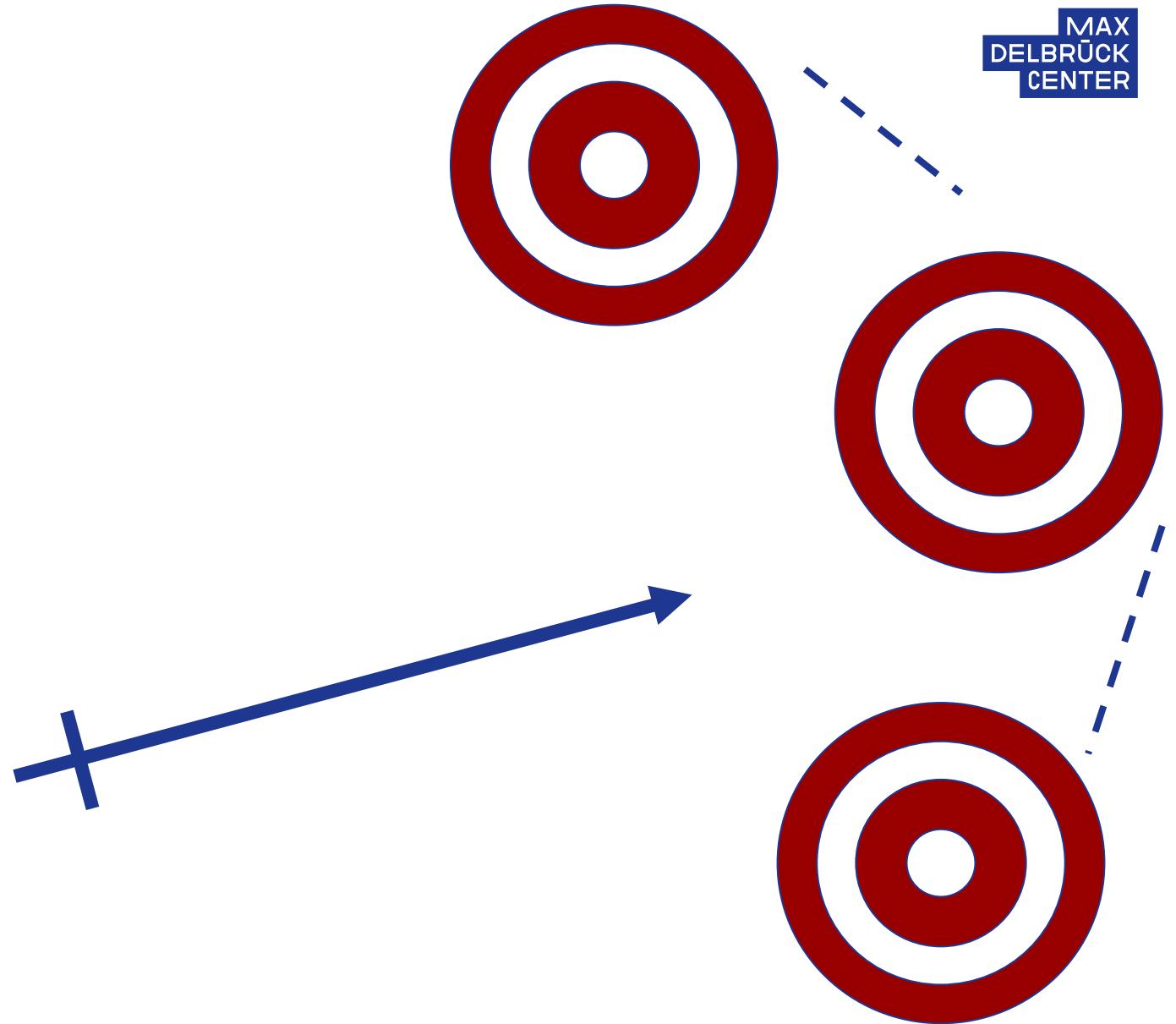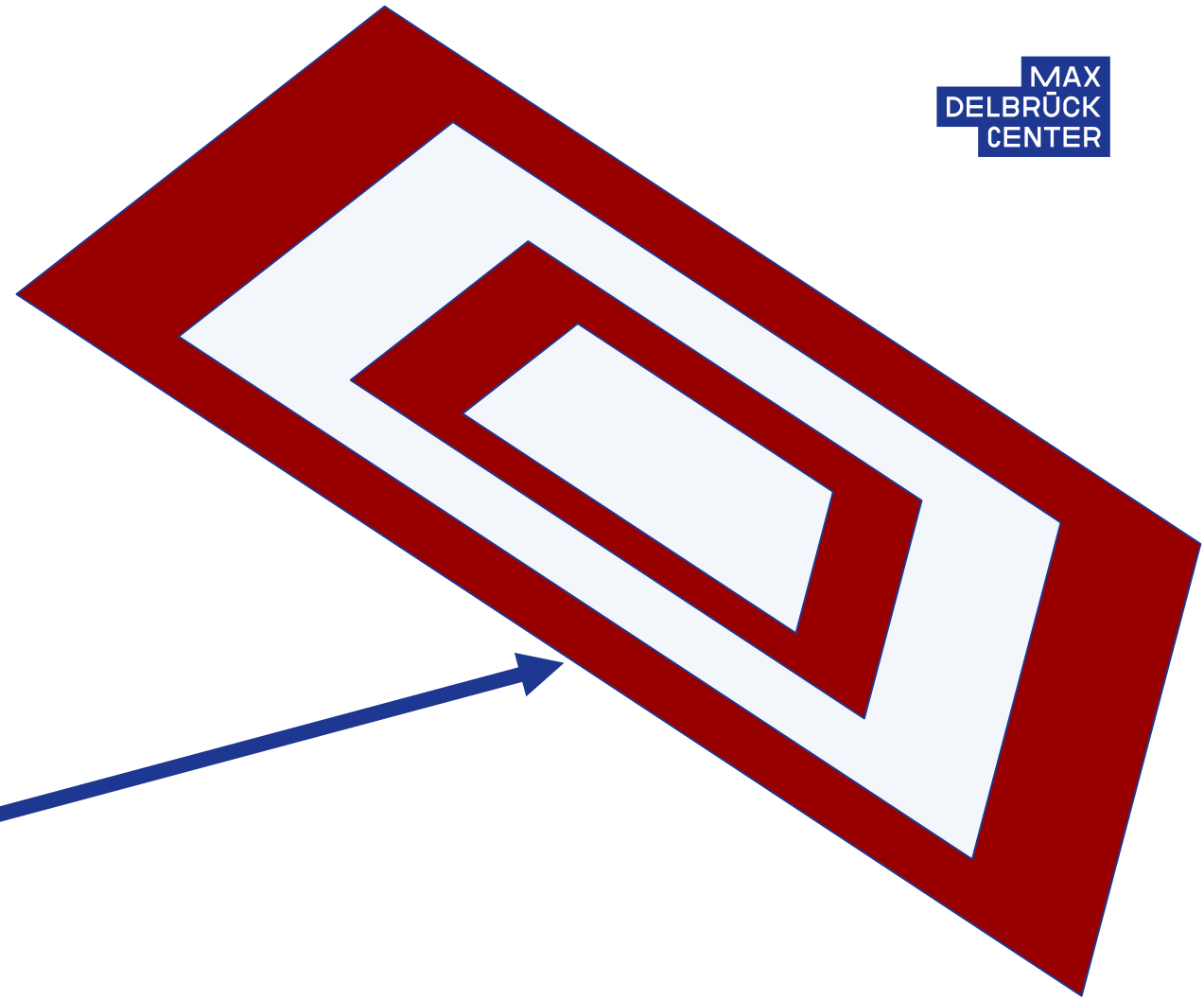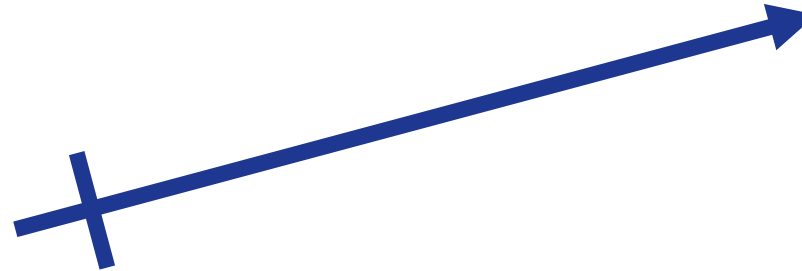
PLOS BIOLOGY

CONSENSUS VIEW

Recommendations for empowering early career researchers to improve research culture and practice

Brianne A. Kent[1], Constance Holman[2], Emmanuella Amoako[3,4], Alberto Antonietti[5], James M. Azam[6], Hanne Ballhausen[2,7], Yaw Bediako[8], Anat M. Belasen[9,10], Clarissa F. D. Carneiro[11], Yen-Chung Chen[12], Ewoud B. Compeer[13], Chelsea A. C. Connor[14], Sophia Crüwell[2], Humberto Debat[15], Emma Dorris[16], Hedyeh Ebrahimi[17], Jeffrey C. Erlich[18,19], Florencia Fernández-Chiappe[20], Felix Fischer[21], Małgorzata Anna Gazda[22¤], Toivo Glatz[23], Peter Grabitz[2], Verena Heise[24], David G. Kent[25], Hung Lo[26,27], Gary McDowell[28], Devang Mehta[29], Wolf-Julian Neumann[30], Kleber Neves[11], Mark Patterson[31], Naomi C. Penfold[32], Sophie K. Piper[33,34], Iratxe Puebla[35], Peter K. Quashie[36,37], Carolina Paz Quezada[38], Julia L. Riley[39], Jessica L. Rohmann[23,40], Shyam Saladi[41], Benjamin Schwessinger[42], Bob Siegerink[43,44], Paulina Stehlik[45,46], Alexandra Tzilivaki[26,27,47], Kate D. L. Umbers[48], Aalok Varma[49], Kaivalya Walavalkar[49], Charlotte M. de Winde[50], Cecilia Zaza[51], Tracey L. Weissgerber[2]*
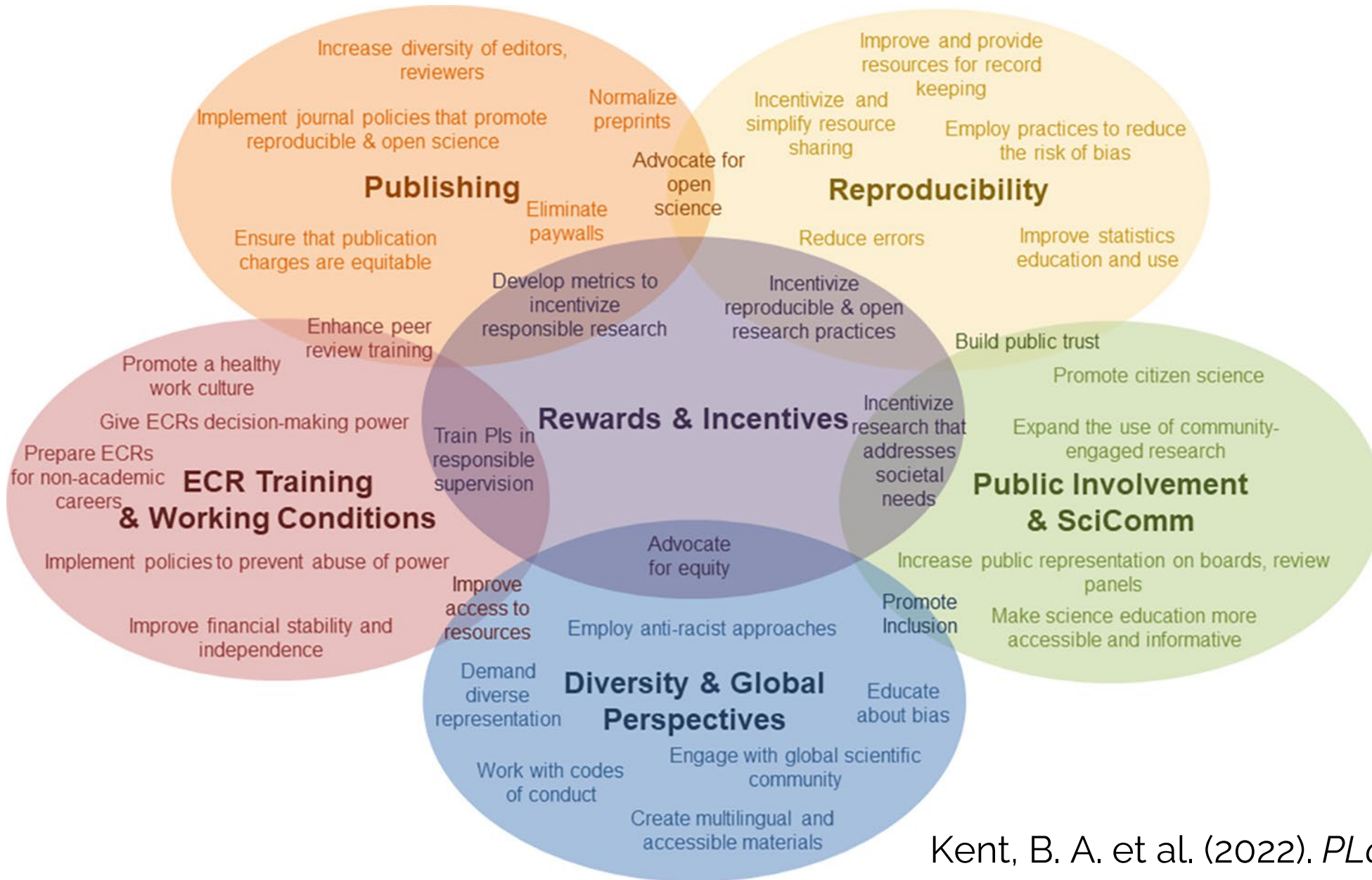
Check for updates

ECRs have good ideas about research reform & implementation…

Talk with them!

Give them protected time and a platform!

Empower them!

Table 1. Actions that organizations and individuals can take to support ECRs in improving science publishing and research culture.

https://doi.org/10.1371/journal.pbio.3001680

Kent, B. A. et al. (2022). *PLoS Biology*.
https://doi.org/10.1371/journal.pbio.3001680

The DFG's perspective on CoARA

Matthias Kiesselbach

Helmholtz OS Forum "Research Evaluation, Reputation Systems, and Openness", 9/5/23

DFG

Academic Publishing
as a Foundation and Area of Leverage for
Research Assessment

Challenges and Fields of Action

Position Paper

DFG

https://www.dfg.de/en/service/press/press_releases/2022/press_release_no_15/index.html

Prestige

- **Delay** between conclusion of researc...
- **Reduced pub**...
  nou...
- **Insu**...

- Incent...
- Incentiv... **quality**

- **High co**... **Rising costs**

...diments ...flow of ...knowledge

THE LANCET

CORRESPONDENCE | VOLUME 383, ISSUE 9923, P1123, MARCH 29, 2014

Problematic incentive structures →
Missing topics, slow turnover, problems of replicability →
The system does not run optimally, is not resilient

Published: March 29, 2014 • DOI: https://doi.org/10.1016/S0140-6736(14)60556-0

DFG

Disadvantages of a (mostly) prestige-driven publication culture
Problems and (a selection of) countermeasures

- **Delay** between conclusion of research and publication

- **Reduced public awareness**, visibility, findability of topics which are (currently) not „marketable"

- **Insufficient recognition** for scientific output of the non-prestigious kinds

Impediments to the flow of (new) knowledge

- Incentives for **cutting corners in research process** and hasty publication

- Incentives for **violations of good scientific practice**
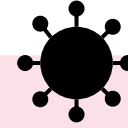
Loss of scientific quality

- **High cost** of publication (money for prestige)

Rising costs

DFG's view on CoARA, Matthias Kiesselbach | DFG
Helmholtz OS Forum, 9 May 2023

DFG

Disadvantages of a (mostly) prestige-driven publication culture
Problems and (a selection of) countermeasures

- Establish and support fast, open publication formats (e.g. preprints)

- Equal access for all topics in reaching the academic public

- Scientific community as owner of data, publications and publication venues

- Recognition for all forms of scientific output

Improve flow of scientific knowledge

Increase quality

Lower costs

DFG

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Improve flow of scientific knowledge

- Incentivize quality control in the entire cycle of research

- Incentivize good scientific practice (e.g. via recognition for Open Science adherence)

→**Open Science position paper:** https://zenodo.org/record/7193838#.Y3zS6qSZNaT

→**DFG code:** https://wissenschaftliche-integritaet.de/en

Increase quality

Lower costs

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Improve flow of scientific knowledge

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Increase quality

- Establish and support science-driven, affordable publication venues

Lower costs

→ Action Plan for Diamond Open Access: https://www.dfg.de/foerderung/info_wissenschaft/2022/info_wissenschaft_22_26/index.html
https://zenodo.org/record/6282403#.Y3zTr6SZNaQ

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Problems and (a selection of) countermeasures

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- Incentivize good scientific practice (e.g. via recognition for Open Science adherence)

Increase quality

- Establish and support science-driven, affordable publication venues

Lower costs

Requires a reform of research assessment!
- Ideas not metrics
- Appreciation of variety of outputs

DFG's view on CoARA, Matthias Kiesselbach | DFG

DFG

https://www.dfg.de/en/research_funding/announcements_proposals/2022/info_wissenschaft_22_61/

Changes in the proposals and review procedures → https://www.dfg.de/foerderung/index.html

- Frugal in terms of data, GDPR compatible

- Room for individual and narrative information

- New category for various forms of publication types

uniform CV

DFG

DFG's measures to support a shift in the culture of research assessment
Since September 2022

Changes in the proposals and review procedures → https://www.dfg.de/foerderung/index.html

- Frugal in terms of data, GDPR compatible

- Room for individual and narrative information

- New category for various forms of publication types

uniform CV

- Discuss *contents* of project specific preliminary and previous works
  - List of previous publications only in the References (at the end of the text)

- Inclusion of full spectrum of publication formats
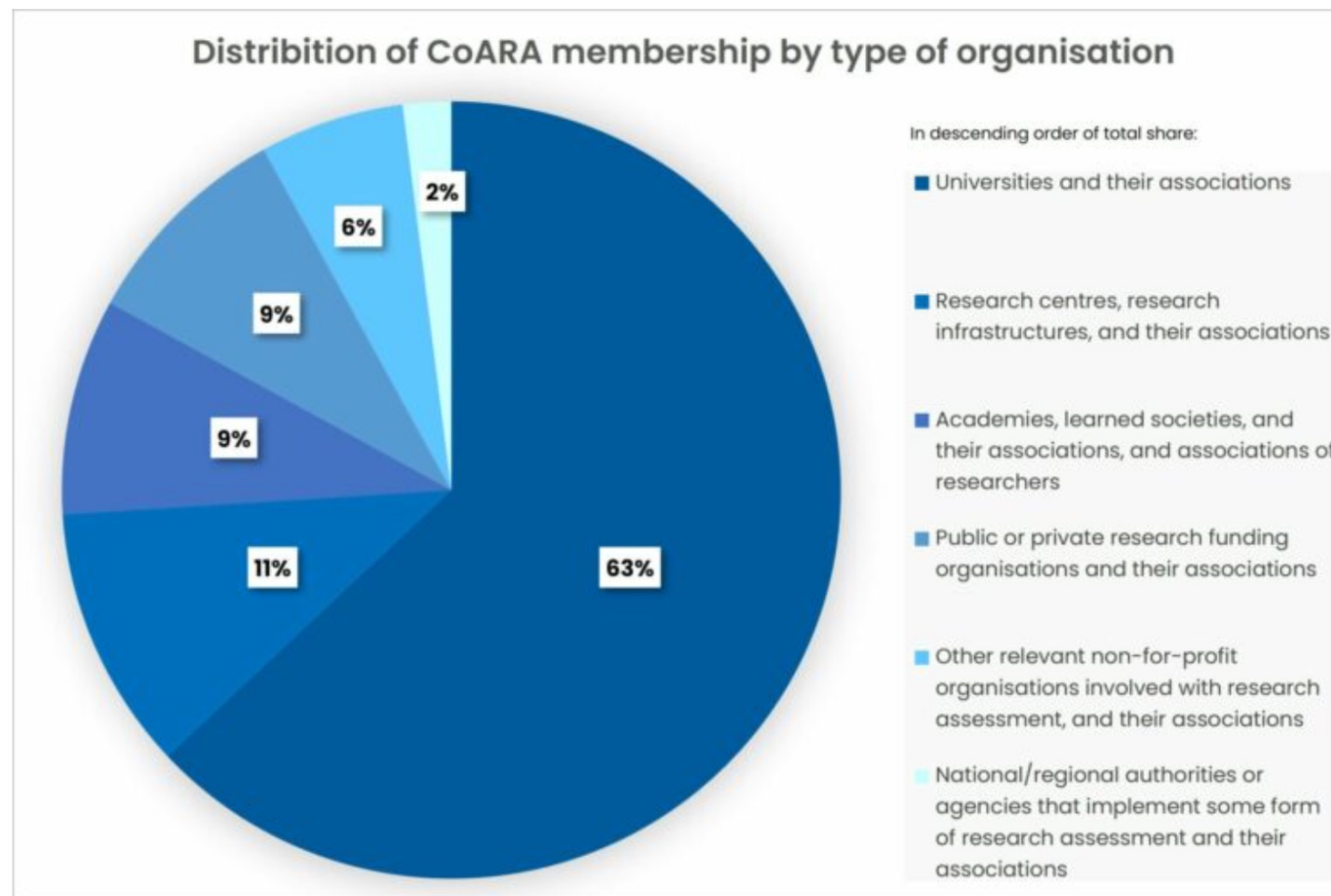
- No metrics!

new Guidelines

DFG

CoARA
Coalition for Advancing Research Assessment

CoARA

- **> 500 signatory organisations**

- **Member organisations:**

  - **Universities**

  - **Research performing organisations**

  - **Research funding organisations**

  - **Academies of science**

  - **others**

Distribition of CoARA membership by type of organisation

In descending order of total share:

- Universities and their associations
- Research centres, research infrastructures, and their associations
- Academies, learned societies, and their associations, and associations of researchers
- Public or private research funding organisations and their associations
- Other relevant non-for-profit organisations involved with research assessment, and their associations
- National/regional authorities or agencies that implement some form of research assessment and their associations

63% / 11% / 9% / 9% / 6% / 2%

see https://coara.eu/news/progress-on-coara-membership-and-forthcoming-activities/ **(from 24 February 2023)**

DFG

CoARA Core Commitments
Fully compatible with DFG practice

▶ **CoARA Core Commitments**

1. Recognise the <u>diversity of contributions to, and careers in, research</u> in accordance with the needs and nature of the research

2. Base research assessment primarily on <u>qualitative evaluation</u> for which peer review is central, supported by responsible use of quantitative indicators

3. <u>Abandon inappropriate uses in research assessment of journal- and publication-based metrics</u>, in particular inappropriate uses of Journal Impact Factor (JIF) and h-index

4. <u>Avoid the use of rankings of research organisations</u> in research assessment

DFG

Signatories of the Agreements on Reforming Research Assessment
European organisations, subjective selection

DFG's view on CoARA, M
Helmholtz OS Forum, 9 M

► Membership in the bottom-up initiative

→ Chance to influence discussions

→ Mutual Learning

► Join forces with like-minded agencies – public, transparent monitoring

→ Higher credibility of – and commitment to – our own attempts at reforming practices and culture

→ Dependability and safety for researchers

► Creation of a unified research area with similar principles in the evaluation of research

→ Minimize the „First Mover" Disadvantage (break out of the „Prisoner's Dilemma")

→ Break the path dependency

Berichtslegung 2023

Berichtslegung 2024

Berichtslegung 2025

Berichtslegung 2026

Berichtslegung 2027

2022   2023   2024   2025   2026   2027

--------------Ongoing monitoring – check and develop DFG's review and evaluation procedures ----------------
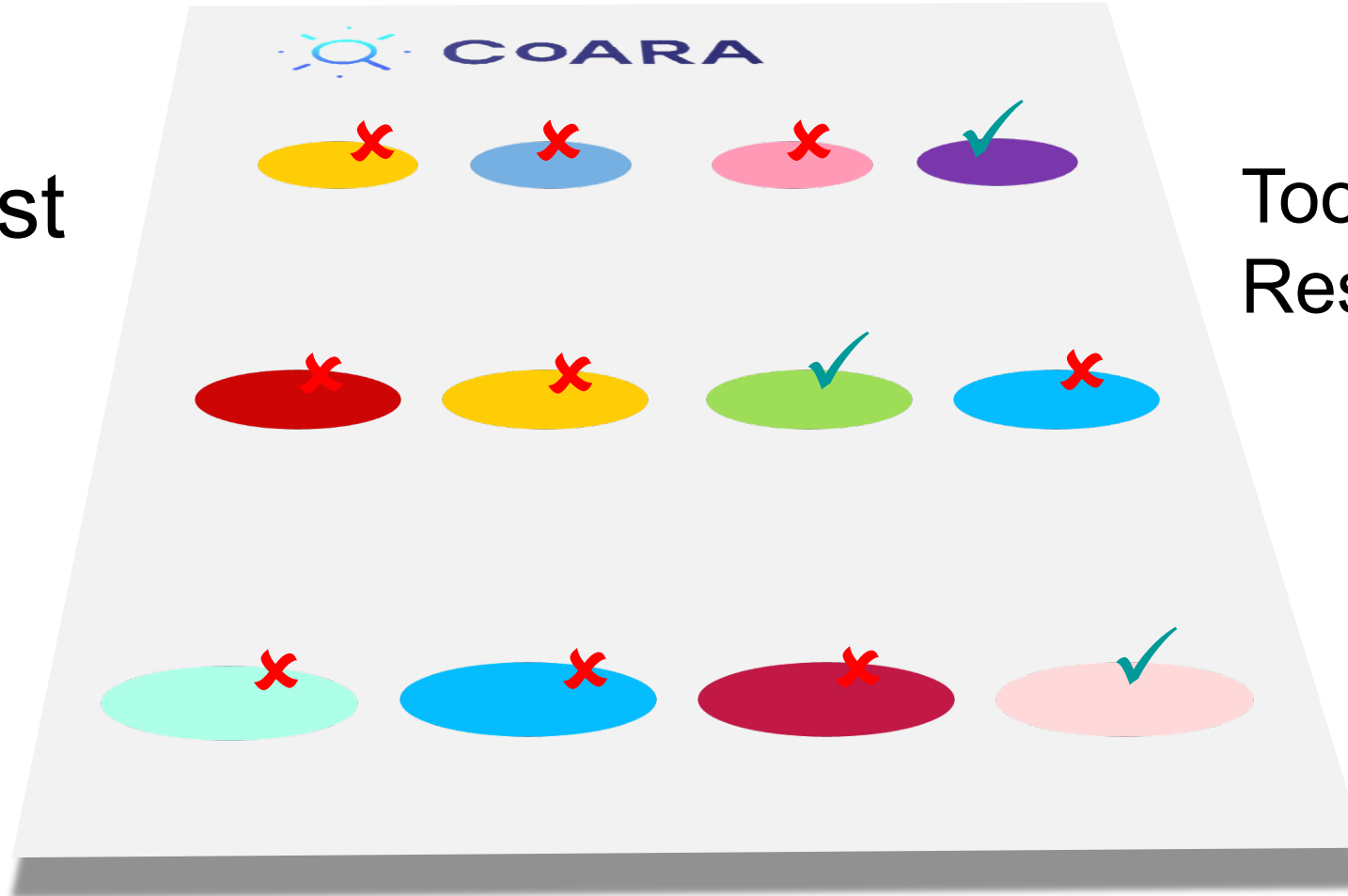
Current activities

Planned activities

Activities in CoARA

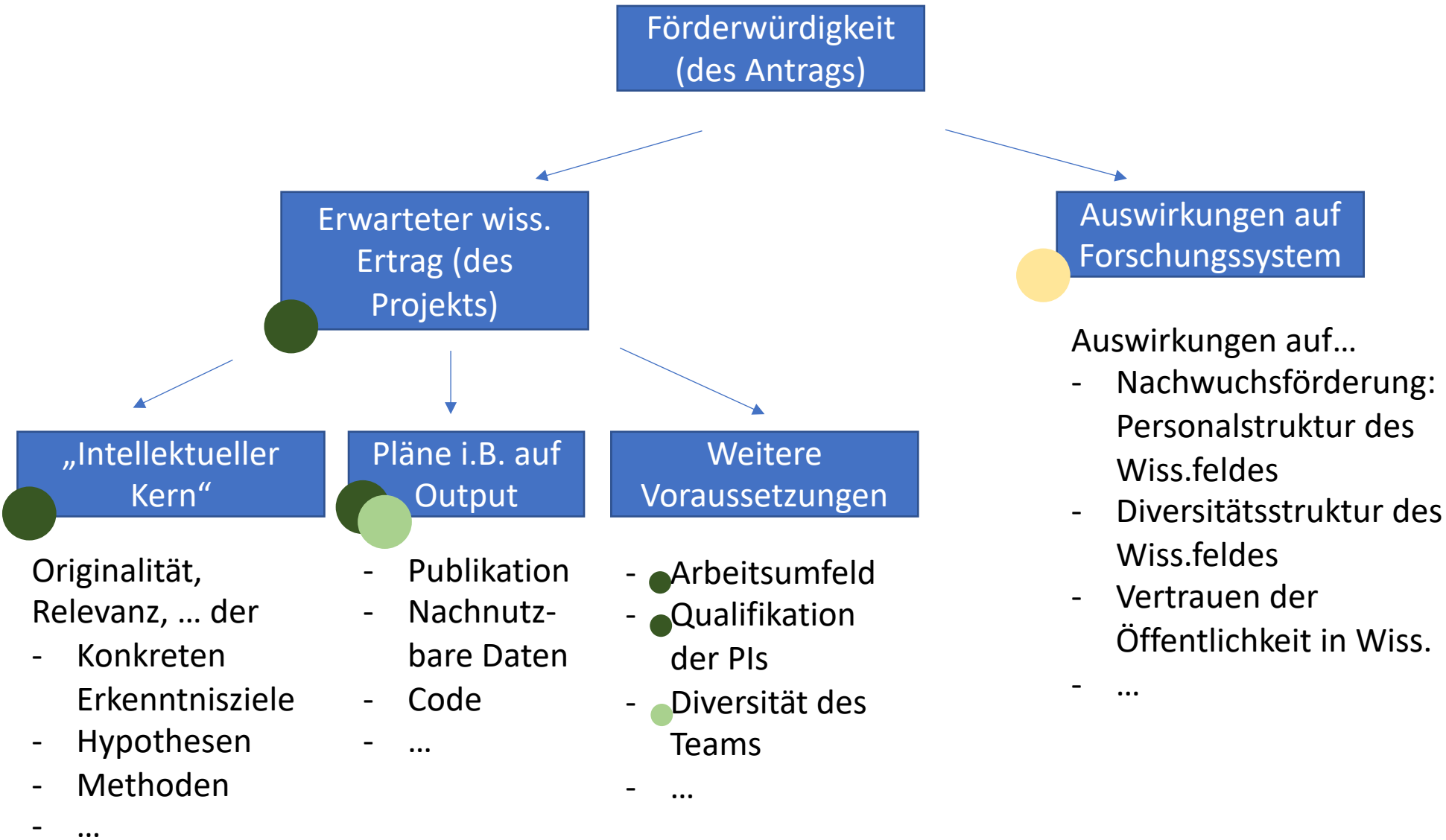Activities to be developed

Check list

Tool box /
Reservoir of ideas

Thank you for your interest!

Further information

► DFG CoARA e-mail inbox: coara@dfg.de

► DFG Publication System e-mail inbox: publikationswesen@dfg.de

► on DFG: https://**www.dfg.de**

► on DFG's funding: https://www.dfg.de/**foerderatlas**

► on DFG funded projects: https://www.dfg.de/**gepris**

► on the German research landscape: https://**gerit**.org

Einschätzung Wissenschaftlicher Qualität - *prospektiv*

Förderwürdigkeit (des Antrags)

Erwarteter wiss. Ertrag (des Projekts)

„Intellektueller Kern"

Originalität, Relevanz, … der
- Konkreten Erkenntnisziele
- Hypothesen
- Methoden
- …

Pläne i.B. auf Output

- Publikation
- Nachnutz-bare Daten
- Code
- …

Weitere Voraussetzungen

- Arbeitsumfeld
- Qualifikation der PIs
- Diversität des Teams
- …

Auswirkungen auf Forschungssystem

Auswirkungen auf…
- Nachwuchsförderung: Personalstruktur des Wiss.feldes
- Diversitätsstruktur des Wiss.feldes
- Vertrauen der Öffentlichkeit in Wiss.
- …

Gewichtungen:
(in Einzelförderung)

- typischerweise hoch
- typischerweise mittel
- typischerweise niedrig

(bei Verbundprojekten (FOR, GRK, SFB, EXC, auch SPP, sind die „Auswirkungen…" höher gewichtet)