Transition to Open Science: an historical, philosophical and sociological perspective

Frank Miedema

Vice Rector Research, Utrecht University

Chair UU Open Science Program

Open Science: The Very Idea, Springer. OA 2022.

Twitter @MiedemaF; www.scienceintransition.nl

Universiteit Utrecht

Transition to Open Science: why?

Some of the problems of the current science system…….

Transition to Open Science: why?

Just some of the problems of the science system

- Competitive and non-cooperative practices
- Replication crisis
- Expensive commercial publication markets
- Privatization and problems of knowledge ownership / knowledge access
- Relationship with society

Science and its Problems 1

- *Novelty and quantity* are dominant over quality, replication, relevance and impact
- Short-termism and risk aversion because of 4-year funding cycles
- Fields with high societal impact, but low impact in the metrics system suffer (aplied vs basic; SSH vs STEM)
- The national and institutional research agenda is not properly reflecting societal (clinical) needs and disease burden

Science and its Problems 2

- Universities outsource talent management to funders based on flawed metrics instead of having a research strategy going with their mission

- Open Science (responsible) research practices, stakeholder engagement, preregistration, FAIR DATA and Open Access are just ‘nice to have’

Transition to Open Science: how?

Understanding the main origins of problems of the current science system.

A closer look at The ‘Legend’…

The standard/popular image of Science and Research: the 'Legend'*

There is a unique 'scientific method' that quarantees objective truth of general, universal and timeless theories and claims.

These claims allow understanding, prediction and control of our world (nature/men).

The method is logical-empirical and has a firm timeless formal foundation.

*Kicher 1993; Ziman, 2000

The standard/popular image of Science and Research: the 'Legend'*

Facts and values; science and non-science are neatly separated, which makes science objective and neutral

The Legend 'explains' the succes of the 'hard' sciences; the 'soft' social sciences and humanities are methodologically problematic

***Kitcher 1993; Ziman, 2000 Real Science; Miedema, Science 3.0, 2012**

The ‘Legend’, a flawed, but still dominant, image of science determines and distorts the practice of scientific inquiry.

1. **This is reflected in the organization and the politics of academia (‘the credit cycle’)**
2. **This works through the still dominant <u>criteria for excellence</u> used in research evaluations throughout the ‘credit cycle’ by universities, funders & journals**

scienceintransition.nl 2013, 2014

Miedema, 2022

The 'Legend' distorts the practice of scientific inquiry through flawed academic hierarchies

1. Natural and biomedical science >> Social science >> humanities (**'physics envy'**)
2. Theoretical & pure science >> applied science and technology
3. Curiosity-driven research is the best for solving societal problems (the linear model)
4. Science should be autonomous, not interfered by external publics or politics and their problems
5. Scientific knowledge is neutral; scientists are not responsible for the knowledge they (don't) produce

Transition to Open Science: how?

Understanding the main origins of problems of the current science system and what can been done about it:

1. **Rethink the practice of inquiry and of**
2. **Reform Incentives and Rewards**
3. **Based on ‘different’ ideas about Science, Research and Academia.**

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scienceintransition.nl 2013, 2014

The Scientific Field: Professional Interests, Elites, Stratification, Power Struggle, and Economics

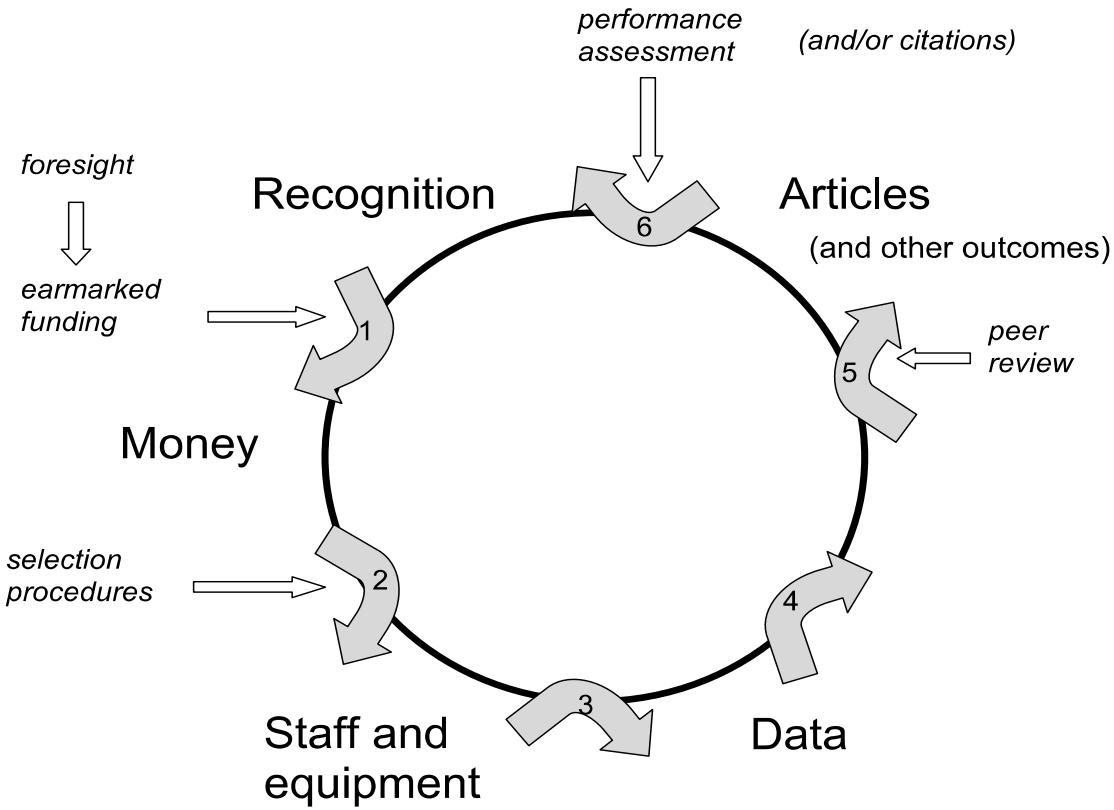


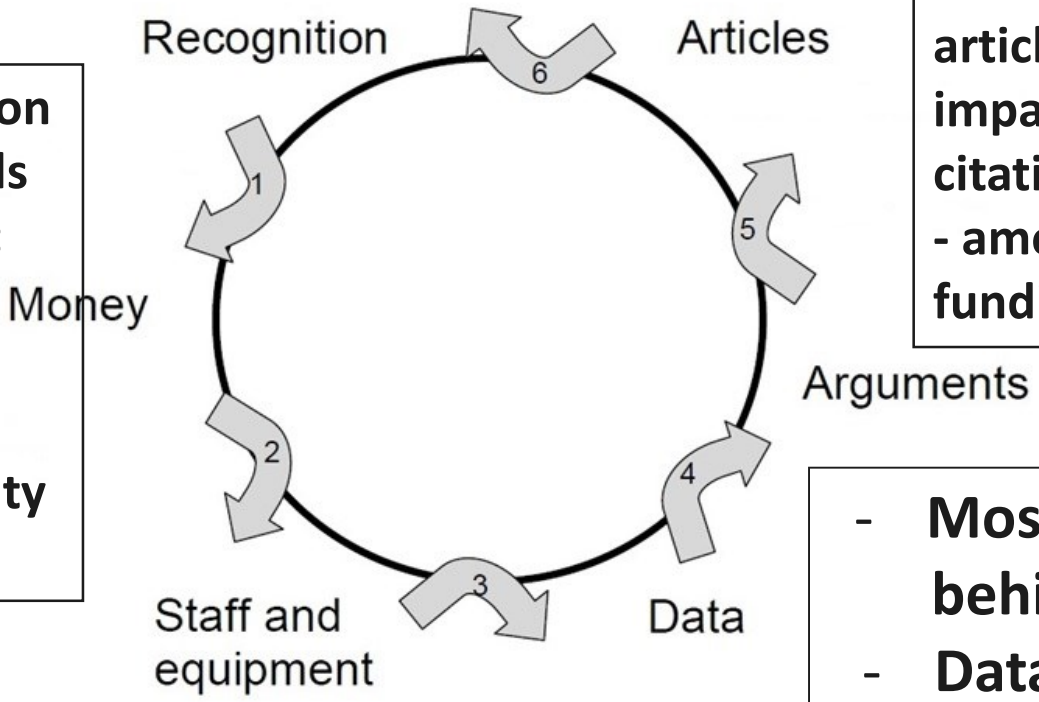
Figure 3. The credibility cycle, adapted from Latour and Woolgar (1986). Points at which organizational devices connect to the cycle are shown

Problems of the Current Reward System in Science

Society is largely absent from the *credibility cycle*

Hypercompetition for limited funds works against:

Team-Science, Multidisciplinarity & Diversity



Quality in Quantitative terms:
- number of articles, journal impact factor, citations, H-index
- amount of funding obtained

- **Most papers still behind paywalls**
- **Data not shared**

Demise of the ‘Legend’ (1970- ….) :

From the late 1960s philosophers, sociologists and historians of science gradually but definitly

showed the Legend to be untenable.

Demise of the 'Legend' (1970- ….) :

No ('given') Foundation

No Dichotomies: Values and Observations are entangled

No Formal Analytical Methods to reach claims

'Truth' is not absolute, but becomes apparent in action

Quine 1957; Kuhn 1962;Toulmin 1972; Shapin 1982, 1995; Habermas 1968, 1971; Latour 1987; Ziman 1978; Hacking 1983; Bernstein 1982; Putnam 1981; Kitcher 2001, 2012;

Towards a realistic (neopragmatist) view of science

Science and the natural sciences have no, never had, a unique formal method to produce 'truth', that is a persistent myth

Hypotheses are tested in experiments, discussed, improved and accepted by the community of inquiry, until a better alternative comes along

Claims are constrained by (natural and social) reality when tested in experiments and discussions with peers

Peirce, Dewey, James, Popper 1937, Quine, Toulmin 1958, Kuhn, Feyerabend, Putnam 1981; Hacking 1983.

Towards a realistic (neopragmatist) view of science

Inquiry is a social process producing reliable knowledge

Value of a claim (‘truth”) is shown and proven by its use in experiments and/or actions in the context of the problem the research started with

Research is guided by cognitive, but also by ethical, social, cultural values

Actions Towards a realistic view of science: Engaging with Society*

Societal relevance, participatory science, democratization, responsibility, not neutrality…
‘The Sixties’ 1960-1975

Science for economic growth and competitiveness. 1980- 2010

Co-creation, agenda setting and data production with stakeholders in society
Mode-2 Research. 1997-2005

Responsible Research and Innovation (EU RRI) 2000-2017; Mission Oriented Research, SDG’s EU 2017-…..

Science in Transition/Science 2.0 EU 2014-2015

EU Open Science: Public Engagement, Open Data, Open Access
2016 -

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* Miedema, F. 2022, Chapter 3 and 5

Transition to Open Science: how?

Understanding the main origins of problems of the current science system and what can been done about it:

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2. **Incentives and Rewards**
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The Promise of Open Science

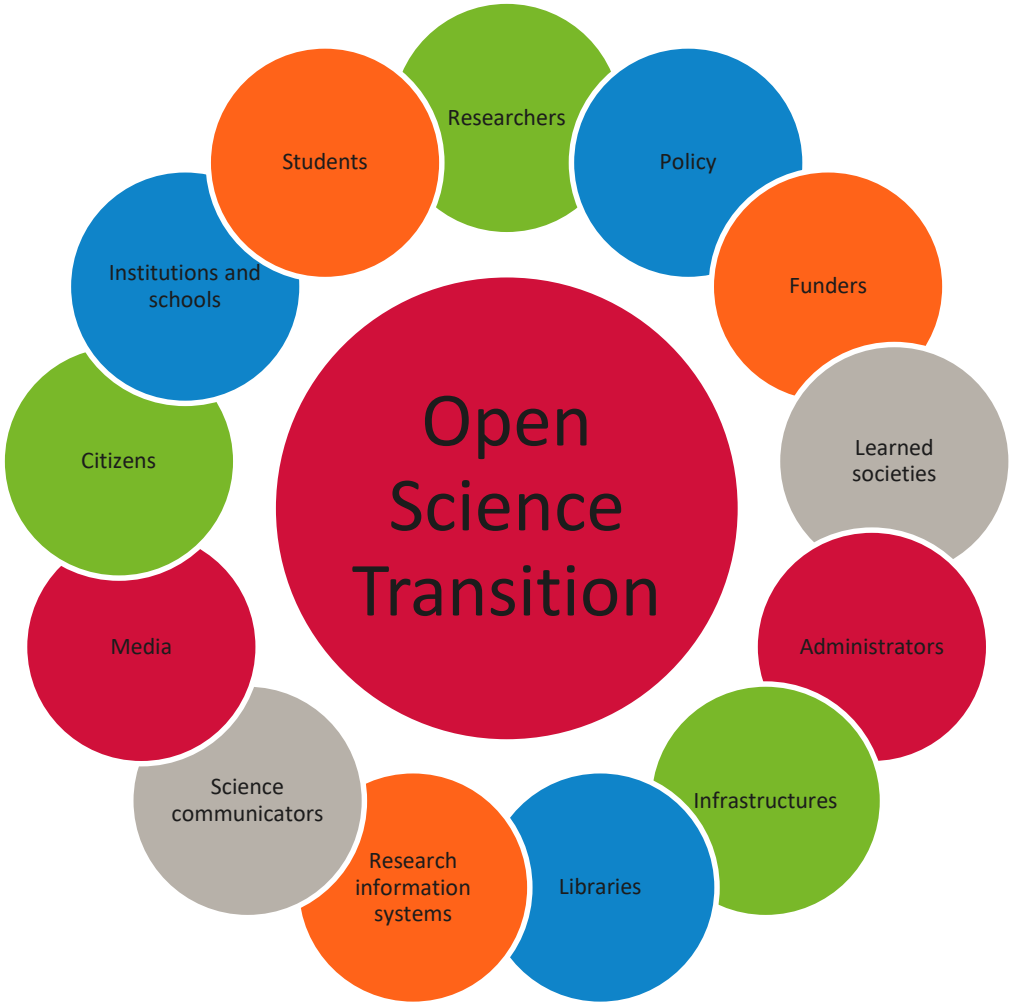
Open Science will:

At the organizational level improve academic culture and the daily practice of research

Foster responsible research conduct and research integrity at several levels

Will improve the interaction with society and increase the impact of science

DOING SCIENCE INVOLVES MANY STAKEHOLDERS



Katja Mayer, Vienna

Open Science: the promise (1)

The overall aim of Open Science is to increase the quality, progress and scientific & societal impact of research and scholarship.

To achieve these goals in the practice of Open Science

- Engage -when appropriate- with relevant and representative stakeholders from society to:
- Define problems to be investigated; discuss ongoing research
- Actively promote that the results of any kind provide guidance for implementation and action(s) in the specific contexts.

Open Science: the promise (2)

The overall aim of Open Science is to increase the quality, progress and scientific and societal impact of research and scholarship.

To achieve these goals in the practice of Open Science

- Share research results, if possible, in several stages of the work and publishing these papers Open Access
- And if possible Data and Code (Software) Open Access
- Change Incentive and Rewards accordingly

European Open Science Agenda 2016

- Rewards and Incentives
- Research Indicators and Next-Generation Metric
- OA and the Future of Scholarly Communication
- European Open Science Cloud
- FAIR Data
- Research Integrity
- Skills and Education
- Citizen Science/Public Engagement

Taken from EU OSPP recommendations
https://ec.europa.eu/research/openscience/pdf/integrated_advice_ospp_recommendations.pdf

European Open Science Agenda 2016

- **Citizen Science/Public Engagement/IMPACT**

- Open Access
- FAIR Data
- European Open Science Cloud

- Research Integrity
- Skills and Education

- Rewards and Incentives
- Research Indicators/ Meaningful Metrics

https://www.openscience.eu/open-science-policy-platform-final-report/
https://ec.europa.eu/research-and-innovation/en/statistics/policy-support-facility/mle-open-science-altmetrics-and-rewards

Open Science Evaluation: Incentives and Rewards

Pluriformity of quality indicators:

- **No JIF, no H-index, no numbers of publications (DORA)**
- **Engage Non-academic Stakeholders**
- **Diversity and inclusiveness**
- **Peer review, narratives (supported by data)**
- **Open Science practices and efforts rewarded**

Open Science: the promise (3)
Incentives and Rewards

Pluriformity of quality indicators and excellence:

- **SSH vs Science, Technology, Engineering and Mathematics**

- **Pure and Basic vs Applied science**

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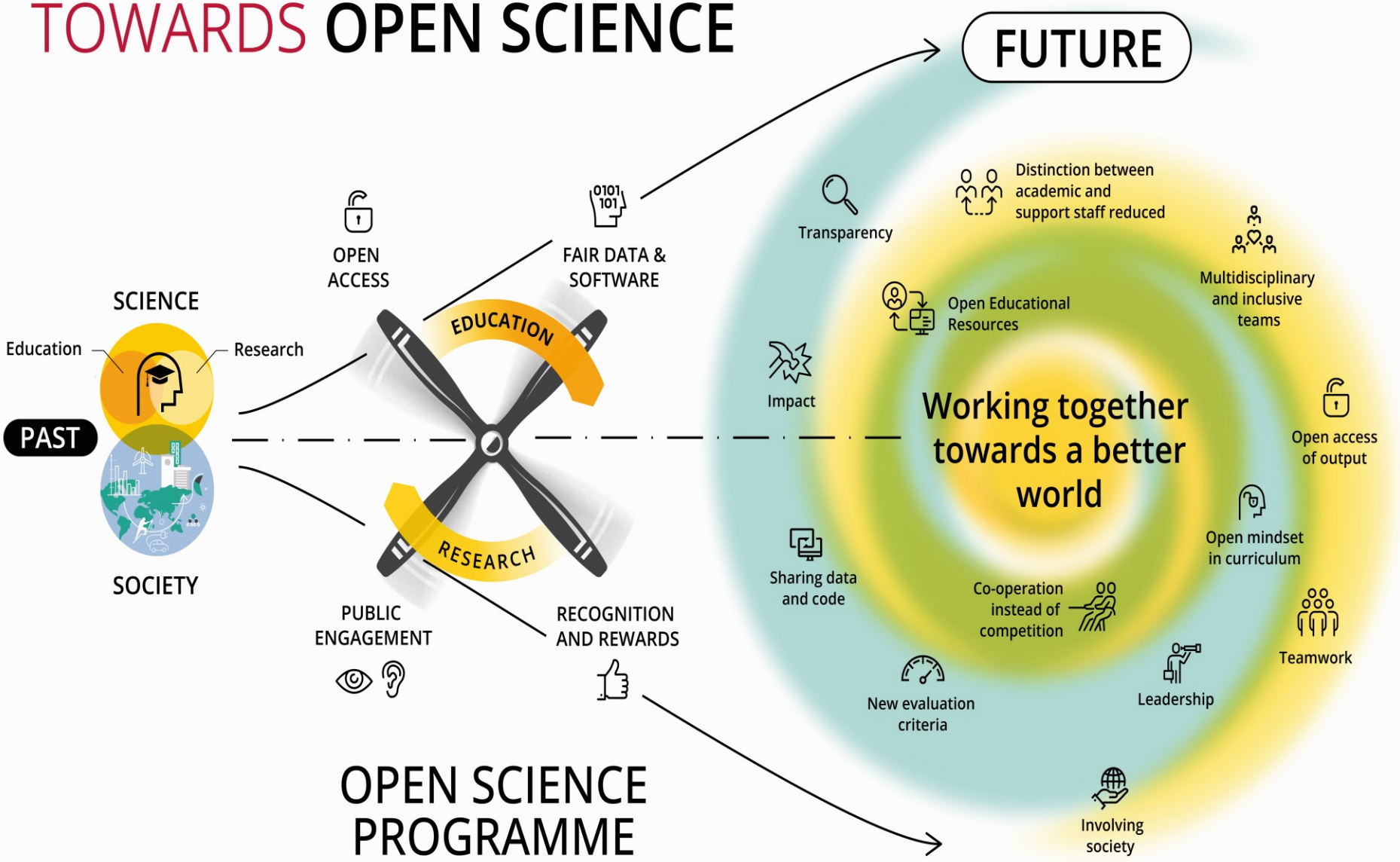
www.uu.nl/openscience

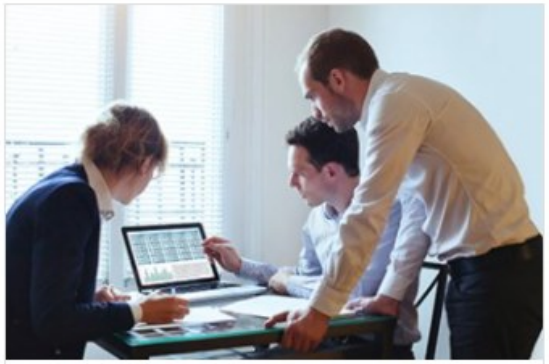
TOWARDS OPEN SCIENCE



OPEN SCIENCE PROGRAMME

Open access

The goal of the open access project is to make substantial progress in order to make open access a natural part of the academic workflow.



FAIR data and software

Making relevant data fully FAIR (Findable, Accessible, Interoperable and Reusable) and also open wherever viable has many advantages.

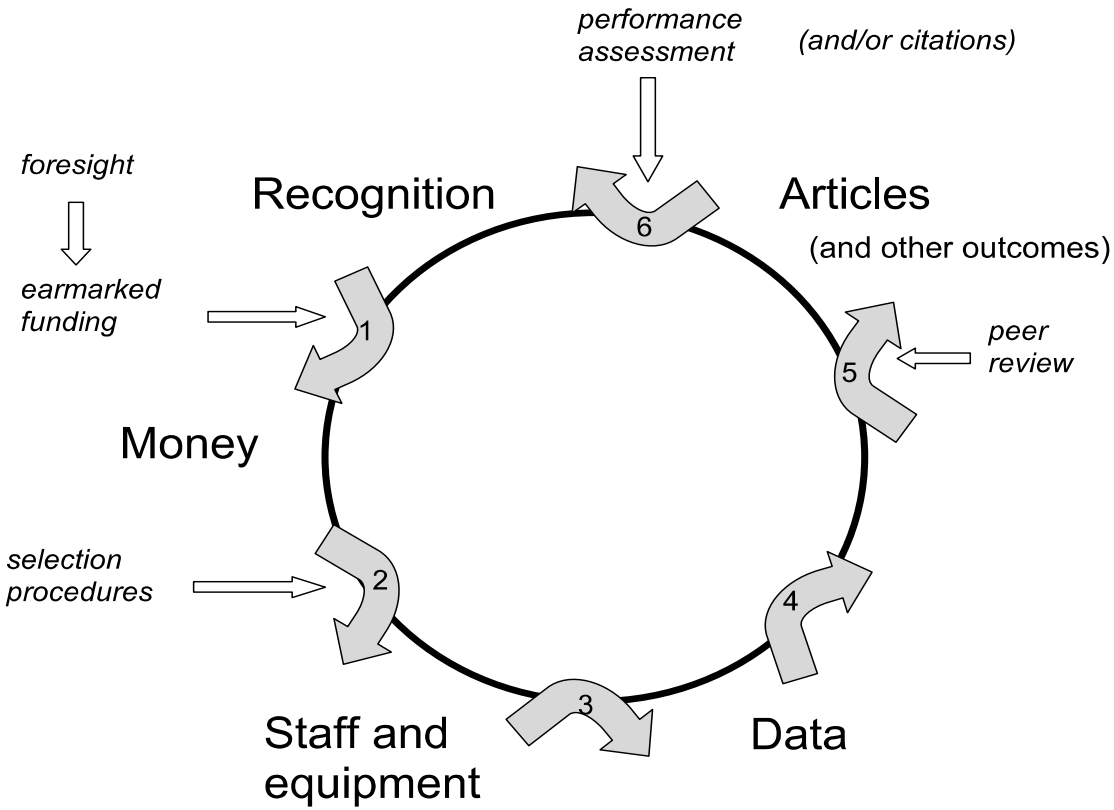
Public engagement

Increasing public engagement helps to make science and scholarship relate more closely to societal issues and any questions that people might have.

Recognition and rewards

The available system of recognition and rewards is seen as the most important in effecting the change towards open science.

The Scientific Field: Professional Interests, Elites, Stratification, Power Struggle, and Economics



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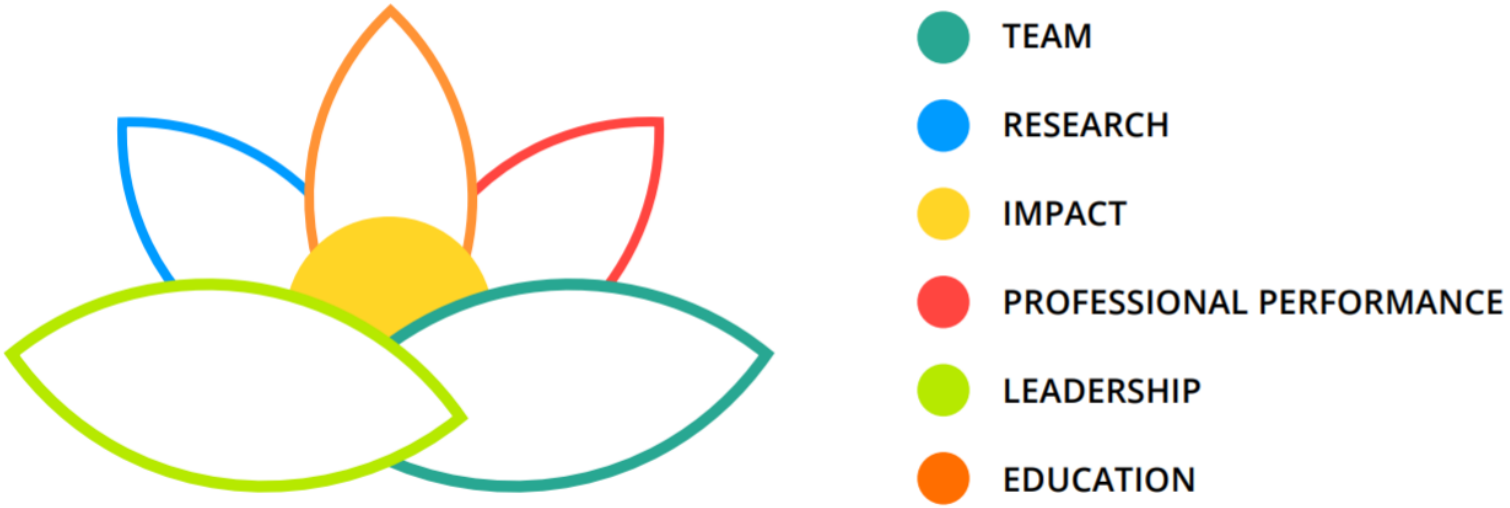
@UMCUTRECHT: Inclusive set of generic indicators for research quality and impact (in use since 2016)

Structure	**Leadership & culture**
	Collaborations with stakeholders
	Continuity and infrastructure
Process	**Setting research priorities**
	Posing the right questions
	Incorporation of next steps
	Design, conduct, analysis
	Regulation and management (OA, FAIR data sharing)
Outcomes	**Research products for peers**
	Research products for societal groups
	Use of research products by peers
	Use of research products by societal groups
	Marks of recognition from peers
	Marks of recognition from societal groups

https://www.umcutrecht.nl/en/science-in-transition

Utrecht University - TRIPLE model

TRIPLE: Team Spirit as the default approach to working in academia

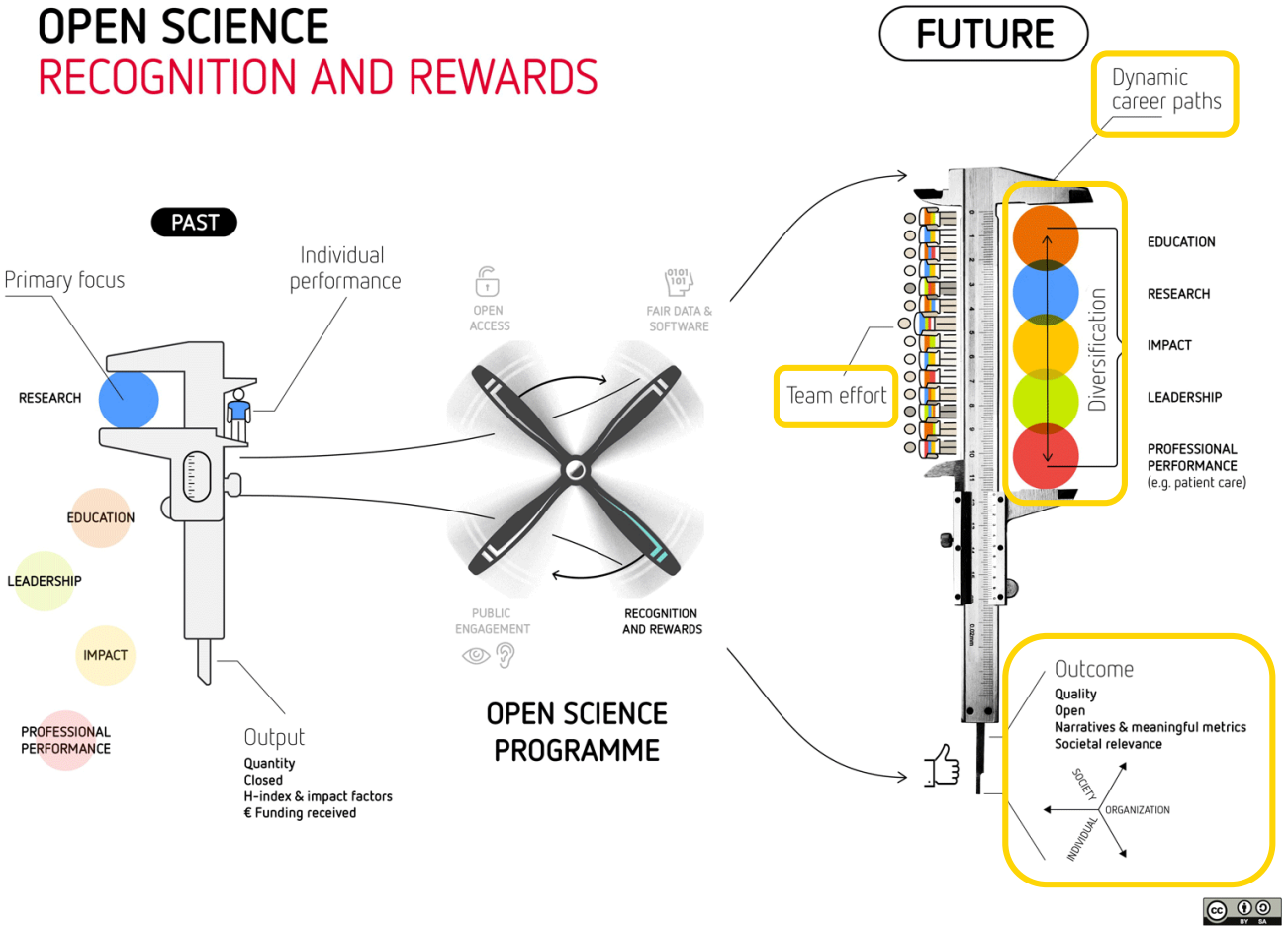


TRIPLE MODEL

Utrecht University

SKETCH AUTUMN 2020

OPEN SCIENCE
RECOGNITION AND REWARDS



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Open Science: the promise (3)
Incentives and Rewards

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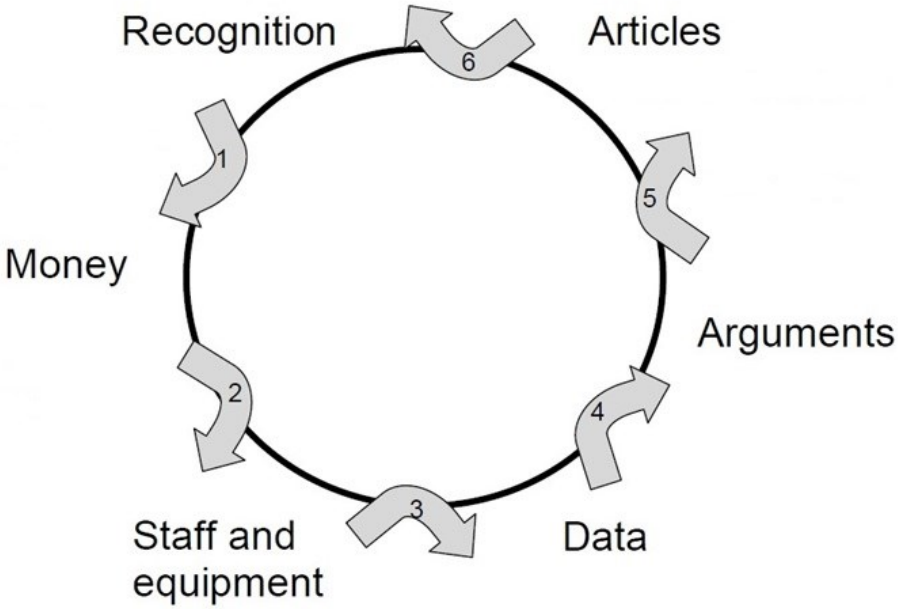
Open Science: To improve quality and integrity at the personal level by systemic change

Engagement of societal stakeholders in problem choice and evaluation



Inclusive indicators

Quality, Rigor, Reliability
Societal Impact
Use in and outside academia
Process Indicators

OPEN PEER REVIEW
POST PUB PEER REVIEW

OA publishing
FAIR data sharing

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National Strategic Evaluation Protocol The Netherlands 2021-2027

Evaluation is in relation to the unit's strategy

<u>Three criteria</u>:
Research Quality, Societal Impact and Viability

<u>Four Aspects</u>:

- **Open Science practices and efforts**
- **PhD policy and Training**
- **Academic Culture (Openess, Safety, Inclusiveness, Research Integrity)**
- **Human Resources Policy (Diversity, Talent Management)**

https://www.vsnu.nl/files/documenten/Domeinen/Onderzoek/SEP_2021-2027.pdf

National Strategic Evaluation Protocol
The Netherlands 2021-2027

The self-evaluation of the research unit:

- **Vision, strategy and aims of the research are outlined and discussed**
- **Results in Narratives (supported by data)***
- **Free choice of their preferred indicators**

*Compatible with DORA
https://www.vsnu.nl/files/documenten/Domeinen/Onderzoek/SEP_2021-2027.pdf

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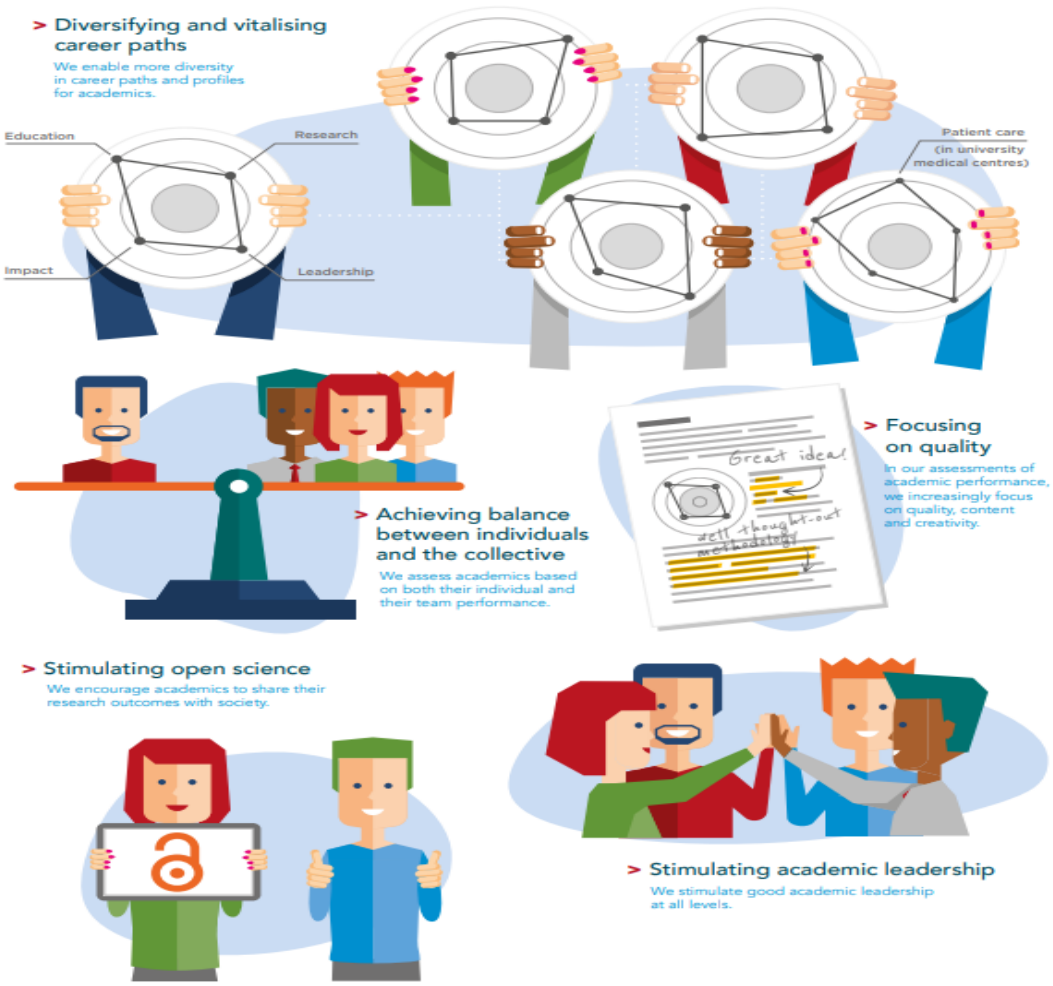
Room for everyone's talent

towards a new balance in the recognition and rewards of academics



https://www.vsnu.nl/recognitionandrewards/wp-content/uploads/2019/11/Position-paper-Room-for-everyone%E2%80%99s-talent.pdf

The many ongoing Initiatives and Actions

- **https://sfdora.org The San Francisco Declaration on Research Assessment**
- **2016 EU adopts Open Science as the standard for Horizon Europe 2021**
- http://ec.europa.eu/research/openscience/index.cfm?pg=open-science-policy-platform Including Open Science Career Advancement Matrix
- **Coalition S and Plan S**
- **UNESCO** https://en.unesco.org/science-sustainable-future/open-science
- **http://www.leidenmanifesto.org**
- http//responsiblemetrics.org
- VSNU, NWO, NFU: www.vsnu.nl/Room for Everyone's Talent;
- https://www.vsnu.nl/files/documenten/Domeinen/Onderzoek/SEP_2021-2027.pdf
- Coalition of the Willing to Reform Research Assessment, EU RD R&Ihttps://www.researchprofessionalnews.com/rr-news-europe-universities-2022-1-eua-and-science-europe-to-draft-reform-of-research-assessment/ > 300 stakeholders, from 40 countries!

Open Science

Values, arguments and reason (phronesis / prudence) in balance with instrumental rationality, formal rules and quantitative methods

External moral and political values influence problem choice and growth of knowledge

Have to deal with power & lobby , conservative and progressive, private and public interests from outside and from within science

Towards a realistic, not a naive view of Open Science

Problems:

‘ideal deliberations’; ‘well-ordered science’; …

How to deal with: power & lobby , politically conservative or progressive; nations with less open or less democratic societies, with private (commercial, IP) interests from outside science

How to deal with ‘the major vote, the tyranny of the ignorant’ (Kitcher, 2011)

What about the boundary between science advice and politics (Jasanoff, 2012, 2017)