Open Science in Education Research—A Worldwide Challenge and Opportunity

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European Commission Definition of Open Science (2016)

Open Science represents a new approach to the scientific process based on **cooperative** work and **new ways of diffusing knowledge** by using digital technologies and **new collaborative tools**. The idea captures a **systemic change** to the way science and research have been carried out for the last fifty years: **shifting from the standard practices of publishing research results in scientific publications towards sharing and using all available knowledge** at an earlier stage in the research process [bold emphasis added].

Source: European Commission, *Open Innovation, Open Science, Open to the World – A Vision for Europe*, 2016 (p. 33).

Open Science Principles, Statements, and Guidance—
A Sample of Key Documents

- *Budapest Open Access Initiative*, 2002
- *Bethesda Statement on Open Access Publishing*, 2003
- *Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities*, 2003
- *OECD Principles and Guidelines for Access to Research Data from Public Funding* (Organisation for Economic Co-Operation and Development), 2007
- *Science as an Open Enterprise* (Royal Society), 2012
- *Mission Statement at the Berlin 11 Open Access Conference* (Max Plank Society), 2013
- *Horizon 2020* (European Commission), Framework and Program for Research and Innovation, 2014
- *Making Open Science a Reality* (OECD), 2015
- *Mallorca Declaration on Open Science* (European Commission, RISE High-Level Expert Panel), 2016
- *European Research Area and Innovation Committee* (ERAC), Opinion on Open Research Data (European Union), 2016
- *The Transition towards an Open Science System* (European Union), 2016
- *Vienna Principles: A Vision for Scholarly Communication in the 21st Century* (Open Access Network Austria), 2016
- *Providing Researchers with the Skills and Competencies They Need to Practice Open Science* (European Commission, Working Group), 2017
- *Open Science Declaration, A National Plan* (Hague Netherlands), 2017
- *UK Strategy for Data Resources for Social and Economic Research*, 2013-2018 (UK Data Forum), 3rd plan; 1st UK National Plan, 2007
- *Australian Research Council Open Access Policy* (versions 2013.1; 2015.1; 2017.1; as of 2017, 27 Australian Institutions; 2 government funding agencies with open access policies)

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Barriers and Challenges to Open Access (OA) in Publishing in Asia

Synthesis from UNESCO, Overview of Open Access in Asia and the Pacific, http://www.unesco.org/new/en/communication-and-information/portals-and-platforms/goap/access-by-region/asia-and-the-pacific/2017.

- Lack of a national mandate or policy on OA
- OA is a relatively new concept among scholarly communities; operates mainly through voluntary contributions, and therefore not sustainable
- Limited funding for OA initiatives
- Content creation in English is a challenge
- Creation of standards for interoperability is a challenge
- Privacy concerns
- Digital libraries do not follow standards or widely used tools and techniques
- Lack of interest or awareness among scientific community in OA
- Deposits of content are relatively low

The Ethos [Norms and Values] of Science (1942)—Robert K. Merton

Universalism—research should be judged based on scientific merit and principles of objectivity, and not by who produced it;

Communism—Merton was not referring to the scientific process in any political or ideological sense, but as an emphasis on the scientific enterprise as a *community* enterprise, and that findings, procedures, and data that contribute to knowledge needed to be accessible to the community and in the public sphere;

Disinterestedness—research should be done to advance knowledge, and not for interested purposes; *and*

Organized skepticism—science is an iterative process, and all scientific findings should be subject to scrutiny.

Source: Adapted/Summarized from Robert K. Merton, *The Normative Structure of Science* (originally published in 1942 as "Science and Technology in a Democratic Order").

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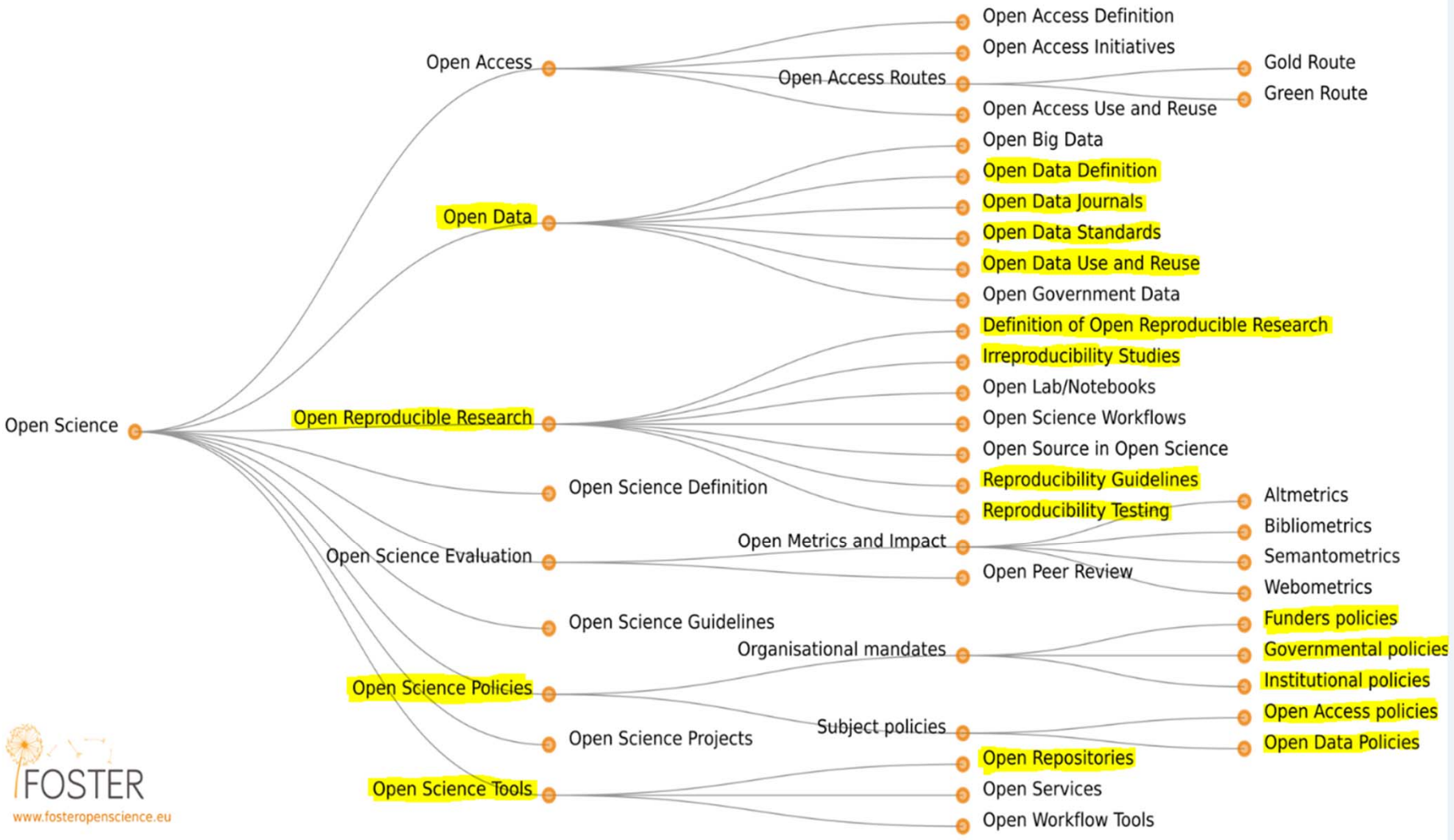
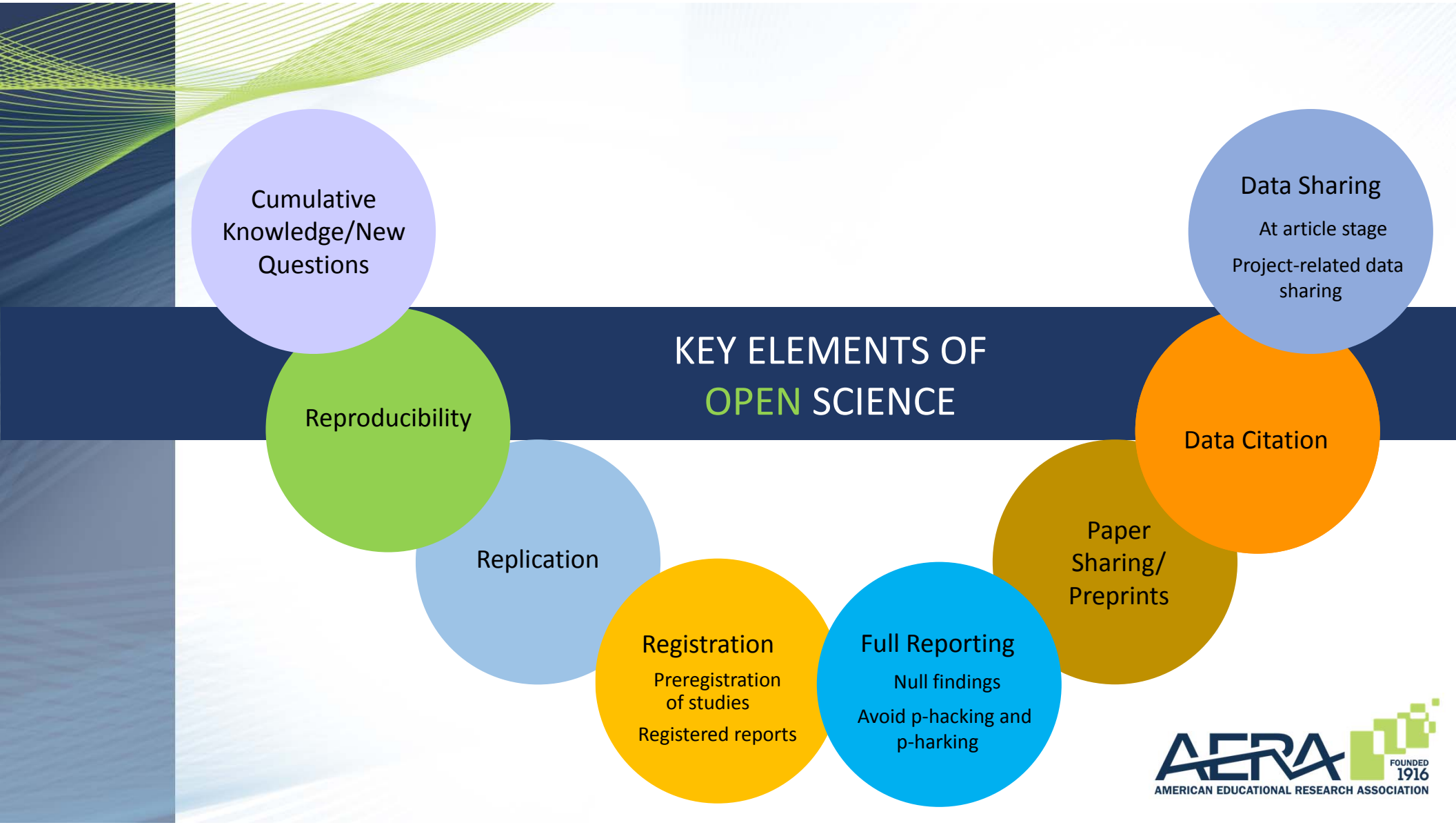
Open Science Taxonomy



FOSTER
www.fosteropenscience.eu

KEY ELEMENTS OF OPEN SCIENCE



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Key Question: What issues are most important to you in thinking about data sharing? Early Career Scholar Perspectives (2017)*

Culture of Data Sharing—What is Valuable about Sharing?

- Issues of purpose (e.g., role of replication); responsible sharing and using
- Incentives and disincentives
- Limitations due to theoretical perspectives and contexts of data
- Issues in linking data and use of administrative records

Research Ethics

- Confidentiality, privacy, and data protection/security
- Participant consent (issues of equity, vulnerable subjects)
- Role of institutional review board

Infrastructure Issues to Support Data Sharing

- Role of repositories/archives
- Data structures, formats & platforms
- Practical guidance and training; strong documentation of data

Standards and Guidelines for Data Sharing and Replication

- Methods and protocols to improve transparency, reproducibility
- Intellectual property rights and copyright ownership if data shared

* Question posed to participants prior to the AERA-NSF Workshop on Data Sharing and Research Transparency at the Article Publishing Stage; Washington, D.C., July 25-27, 2017.

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Key Question: What issues are most important to you in thinking about data sharing? Senior Scholar Perspectives (2017)*

Creating Culture of Data Sharing

- Incentives for authors and expectations from funding agencies
- Use across all methodologies (video v. qualitative v. mixed method)
- Protect researchers from exploitation; promote credit

Scientific Integrity

- Research quality when data are reanalyzed
- Rigorous studies with original data – fear that data sharing might reduce if researchers collecting or sharing data do not see advantages

Research Ethics

- Institution review boards—approval and consent from participants for data sharing
- De-identification/anonymizing data
- Confidentiality and privacy

Editor/Author Roles

- Potential burden on editors
- Cost issues (in time and human resources)
- Author experience/expertise with data-sharing

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Attraction But Ambivalence—U.S. National Academy Of Sciences Report (1985)

Select Justifications

- Open scientific inquiry
- Verification, refutation, refinement
- of results
- Replication
- Exploration of new questions
- Creation of new data sets through linkages
- Refinement of analytic techniques & designs

Select Obstacles

- Data with special problems/inadequacies
- Loss of control of data
- Fear and costs of criticism
- Recognition and proprietary concerns
- Issues of privacy and confidentiality
- Costs and burdens

Sharing Research Data 1985

(7 of 16 Recommendations—Most Timely and Salient Today)

Recommendation 1. Sharing data should be a regular practice.

Recommendation 2. Investigators should share their data by the time of publication of initial major results of analyses of the data except in compelling circumstances.

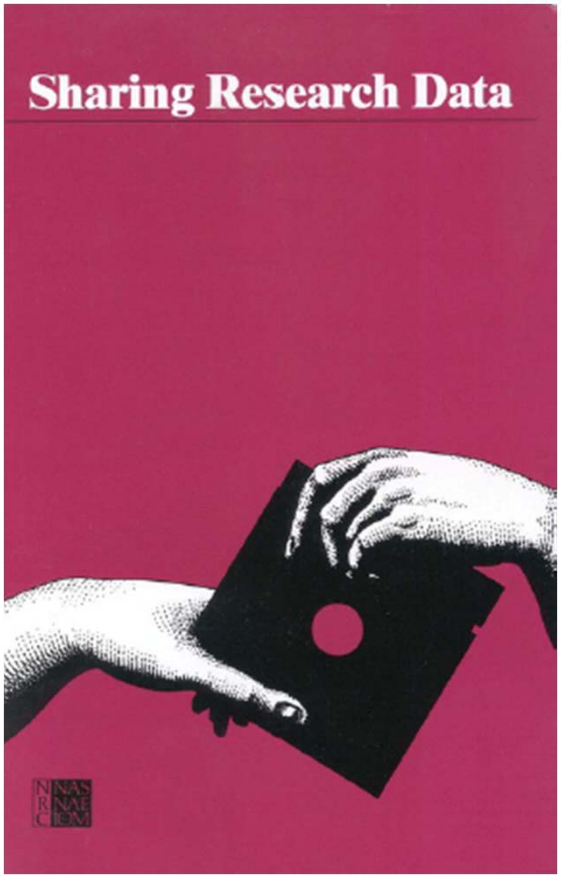
Recommendation 8. Funding organizations should encourage data sharing by careful consideration and review of plans to do so in applications for research funds.

Recommendation 11. Journals should give more emphasis to reports of secondary analyses and to replications.

Recommendation 12. Journals should require full credit and appropriate citations to original data collections in reports based on secondary analyses.

Recommendation 13. Journals should strongly encourage authors to make detailed data accessible to other researchers.

Recommendation 14. Opportunities to provide training on data sharing principles and practices should be pursued and expanded.



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Why Share Data and/or Data Related Products?
What Do Data Repositories Provide?

- Curate data—attach metadata
- Enhance discoverability
- Provide for data management
- Ensure data security (protect confidentiality)
- Serve as repository for data-related products/materials
- Assign persistent identifiers (e.g., DOIs)
- Add to legitimacy of results
- Make accessible data in restricted or public use form
- Foster use of data as a citable asset
- Increase impact of work

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The Presence of Data Repositories
U.S. Examples with International Links

- **Inter-university Consortium for Political and Social Research (ICPSR), 1962**—760 member institutions, tens of thousands of studies, hundreds of thousands of users dedicated to data access and sharing, based at a university
- **Center for Open Science (COS), 2013**—nonprofit technology and culture change company dedicated to increasing openness, integrity, and reproducibility of research
- **Databrary, 2013**—permanent secure data archive based at a university to promote sharing and reuse of video/audio developmental data
- **Qualitative Data Repository (QDR), 2014**—a university-based dedicated archive for storing and sharing digital data generated or collected through qualitative or mixed methods research

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Illustrative Activities in Asia—Some Facts from ICPSR

- South Korea, Taiwan, China (PRC), and Japan all have social science data archives with roles and purposes similar to ICPSR
- 298 of 760 ICPSR member institutions are outside of North America
- One quarter of ICPSR's ten thousand studies have some data on China, and 115 studies are specifically data from the PRC
- ICPSR repository includes substantial surveys on China, India, and Nepal, among others
- Fifteen Chinese universities (PRC, including Hong Kong) are ICPSR members

Center for Open Science—Supporting International Preprints and Data Storage Communities

- INA-Rxiv, https://osf.io/preprints/inarxiv, a preprint community with over 4,000 papers from researchers in Indonesia

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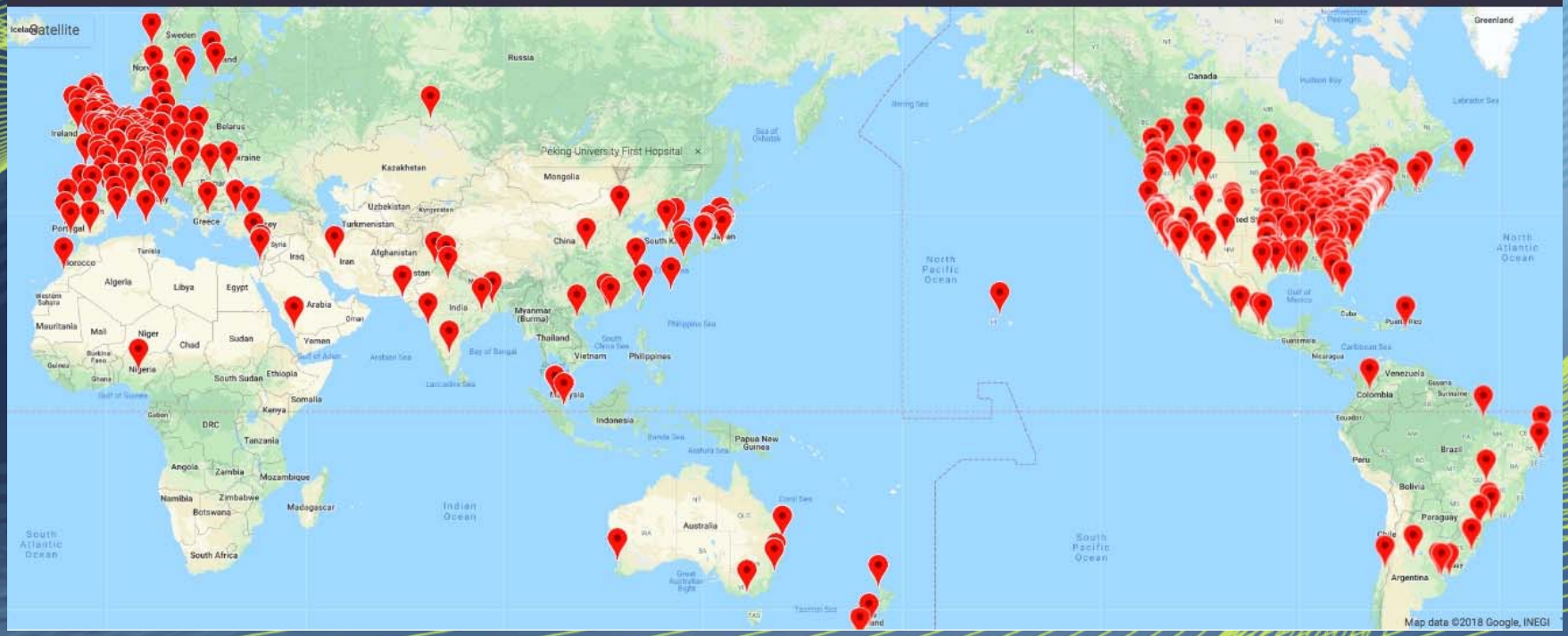
Databrary Investigators Worldwide (2018)

830 investigators **370** affiliates **429** institutions **34,310** hours of recordings



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Qualitative Data Repository (QDR)—Worldwide Orientation to Its Work

- Depositors primarily from U.S. (though scholars from South Africa and Europe have deposited data); data-relevant laws in countries can affect sharing

- One project at QDR from Asia-Asia Pacific:

  Joarder, Taufique. 2017. "Understanding and measuring responsiveness of physicians in rural Bangladesh". Qualitative Data Repository. https://doi.org/10.5064/F6P55KNC. QDR Main Collection. V1

- International data users, but not to extent QDR wishes

- Explicit outreach to APERA community:

  "One significant reason for launching QDR was to make more data available to researchers . . . , so we would be delighted if you would introduce QDR to the audience at your keynote and to other Asia/Asia Pacific scholars whom you meet."

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Open Science Part of the 2010 Singapore Statement on Research Integrity (3 of 14 Responsibilities)

1. Integrity: Researchers should take responsibility for the trustworthiness of their research.

4. Research Records: Researchers should keep clear, accurate records of all research in ways that will allow verification and replication of their work by others.

5. Research Findings: Researchers should share data and findings openly and promptly, as soon as they have had an opportunity to establish priority and ownership claims.

Responsibilities Supporting Singapore Principles—
Honesty, Accountability, Professional Courtesy/Fairness, Good Stewardship

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Can Education Research Embrace Open Science Worldwide?

Is There a Possible 2018 Amended Singapore Statement?

- Promote the highest ethic of responsible conduct
- Build a culture of collaboration
- Serve as stewards of science
- Expand access to doing research—*independent of resources, institutional/geographic location, or funding*
- Change the reward structure regarding science and how it is done
- Foster research transparency and communication with and for diverse stakeholders (practitioners, policymakers)
- Engender greater trust and legitimacy for the scientific enterprise

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I HOPE SO. . .THANK YOU!

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Please Share Your Views

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