Lecture 1 What is Epistemic Diversity?

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The Alan Turing Institute

Spidergate

- Jonathan Pruitt, MacMaster University, Canada
  - Dozens of collaborators and PhD students
  - 2020: emerging accusations of data irregularities
  - 2021: extensive investigation and retractions of key papers (including co-authored)
  - 2022: resigns from university post; investigation pending
  - All collaborations and resulting knowledge tainted

Pruitt and Laskowski studied social spiders such as *Stegodyphus dumicola*. Credit: Shutterstock

Alzheimer's debacle

- Dominant explanation for A. (and target of drugs) is excessive deposits of amyloid beta protein in the brain
- Since 16 years!
- 2022 Debacle
- "NIH spent about $1.6 billion on projects that mention amyloids in this fiscal year, about half its overall Alzheimer's funding" (Science, 2022)

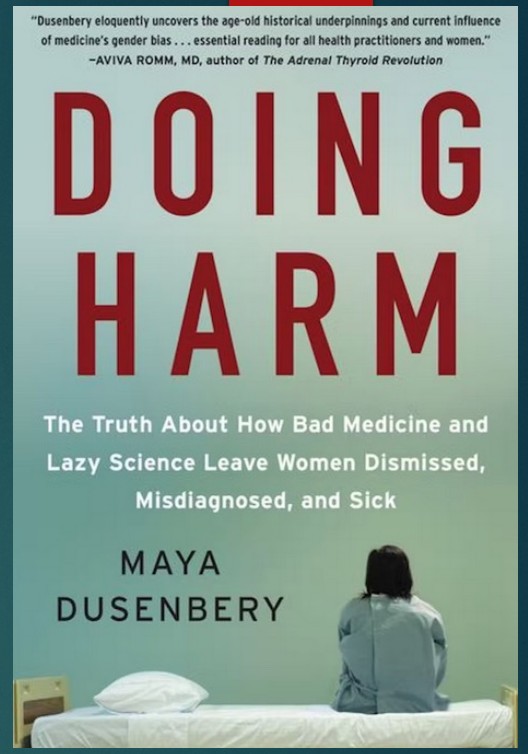
- Over 55 million people worldwide living with dementia in 2020. This number will almost double every 20 years, reaching 78 million in 2030 and 139 million in 2050. (Alzheimer's Society)
- Annual global cost of dementia is now above **US$ 1.3 trillion** and is expected to rise to **US$ 2.8 trillion** by 2030
- Extremely heavy toll on family/community and social/medical services

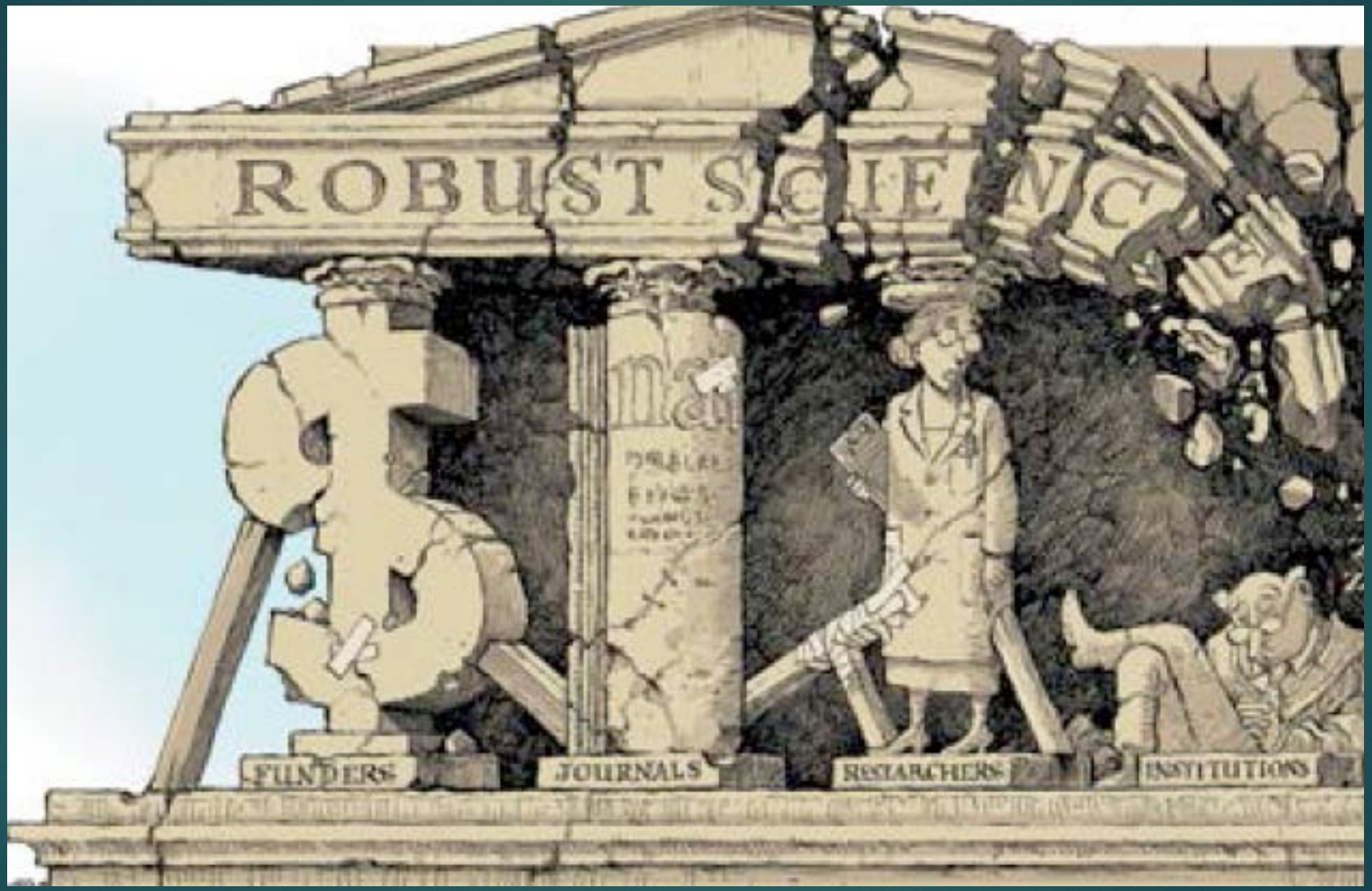
Gender in biomedicine

- Strictly binary gender assignation for experimental research and clinical trials

- Exclusion of research on women altogether
  - 1977: FDA recommends exclusion of women of childbearing age from clinical trials following thalidomide tragedy; cites hormonal fluctuations as problematic to control
  - 1993: NIH mandates inclusion of women and minorities in clinical research
  - 2014 Boston report: "The science that informs medicine – including the prevention, diagnosis, and treatment of disease – routinely fails to consider the crucial impact of sex and gender. This happens in the earliest stages of research, when females are excluded from animal and human studies or the sex of the animals isn't stated in the published results. Once clinical trials begin, researchers frequently do not enroll adequate numbers of women or, when they do, fail to analyze or report data separately by sex."

- Also: tiny percentage of funding devoted to illnesses mostly affecting women (e.g. reproductive health,)




ROBUST SCIENCE
FUNDERS
JOURNALS
RESEARCHERS
INSTITUTIONS

Nature 2015

The dominance of "closed" science..

- Self-referential & hypercompetitive academic publishing
  - volume and prestige > quality and reproducibility
- .. when there actually *is* some publishing
  - what is industrial and military funding supporting?
  - data, models, methods lags behind
- Lack of incentives and rewards for:
  - responsible dissemination *and* scrutiny of research components
  - collaboration and community building (diverse expertise beyond visibility and wealth, transdisciplinarity)
  - resisting discrimination, prejudice and racism
  - focusing on social challenges beyond "endorsed" by governments/industry
  - sustainable development / responsible use of (digital) tech

.. and Eurocentric, monolithic modes of scientific reasoning

- Widespread dominance of specific mode of assessment and criteria for what constitutes scientific excellence – publication in specific venues, use of specific technologies..
- Focus on commodified outputs as 'products' of scientific research subject to specific credit and IP regimes
- Acknowledgment of colonial legacies..
  - Understandings of nature, taxonomies, local and planetary health
- .. does not translate into understanding of their implications and continuing effects (or what should be done about those)
  - What hegemonies need to be confronted, how are those embedded in research priorities and goals (e.g. technocracy)
  - What could epistemological restitution and emancipation involve

.. and Eurocentric, monolithic modes of scientific reasoning

- Cosmopolitan ideal is tied to a transnational epistemic economy that *bypasses* political and socio-economic conflict
  - Systemic exploitation of basic research efforts (e.g. COVAX programme, seed industry)
  - Polarisation and dismemberment of collaborative networks (e.g. Russian scholarship)

- Practical / political / linguistic / cultural constraints on ideas travelling into euro-centric debates (e.g. our own syllabus for this summer school!)

What are researchers and institutions to do?

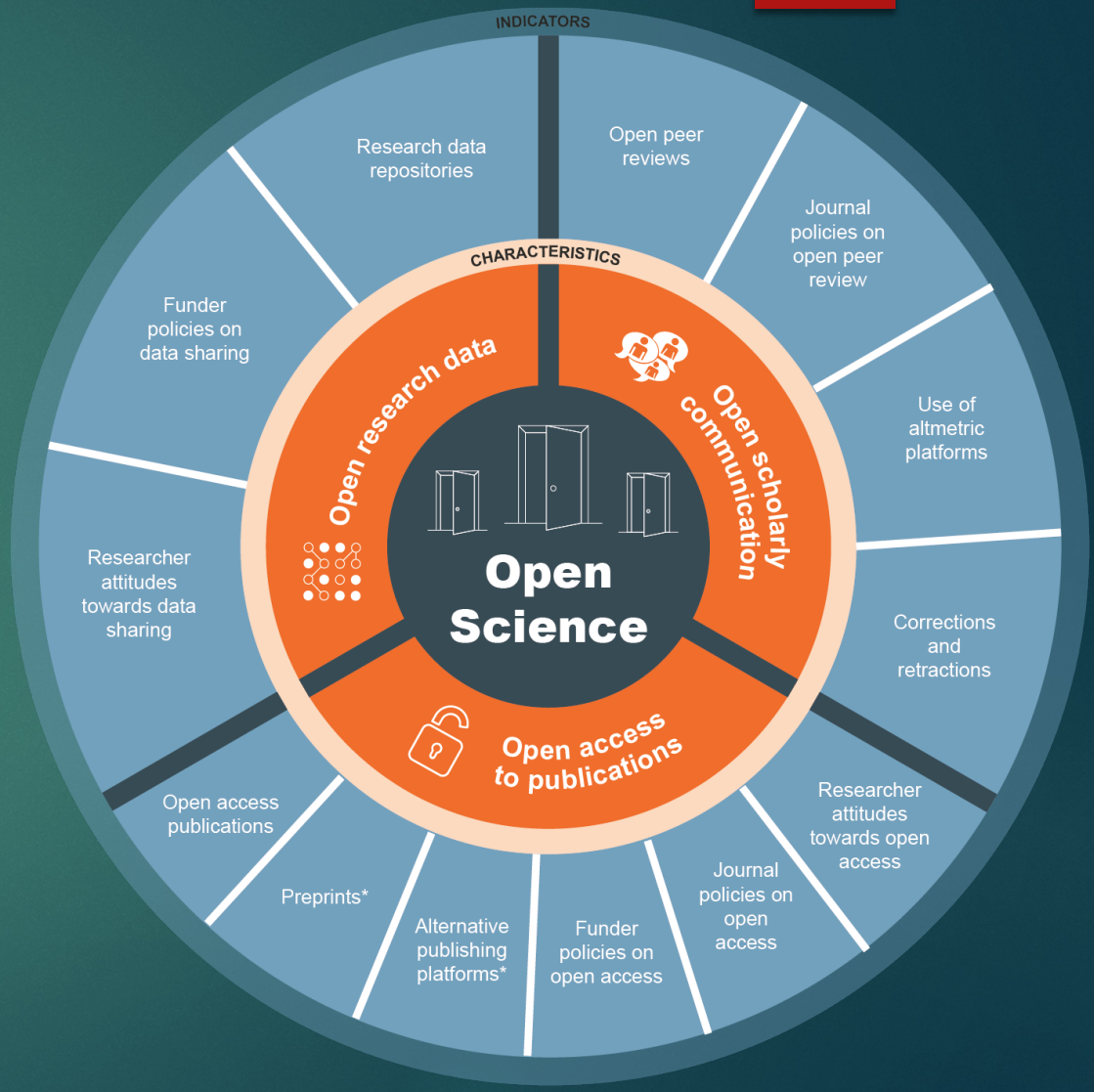
Existential challenge with multiple dimensions:

- **Social**: governance and exchange across research landscape growing in size, diversity and technological scaffolding
- **Political**: critical thinking and cosmopolitan aspirations vis-a-vis authoritarian, nationalist regimes
- **Conceptual:** implications of extractivist, colonial frameworks
- **Economic**: sustainability within an aggressive market economy & increasingly expensive infrastructures
- **Moral**: proliferation of principles and role models; weaponization of scientific authority; no engagement in social implications of technical decisions
- **Methodological**: ever-expanding skillset with ever-diluted accountabilities (management, funding, politics, tech, multi/trans/inter-disciplinarity, media..)

Open Science: A solution?

"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.. [..] .. sharing and using all available knowledge at an **earlier stage** in the research process"

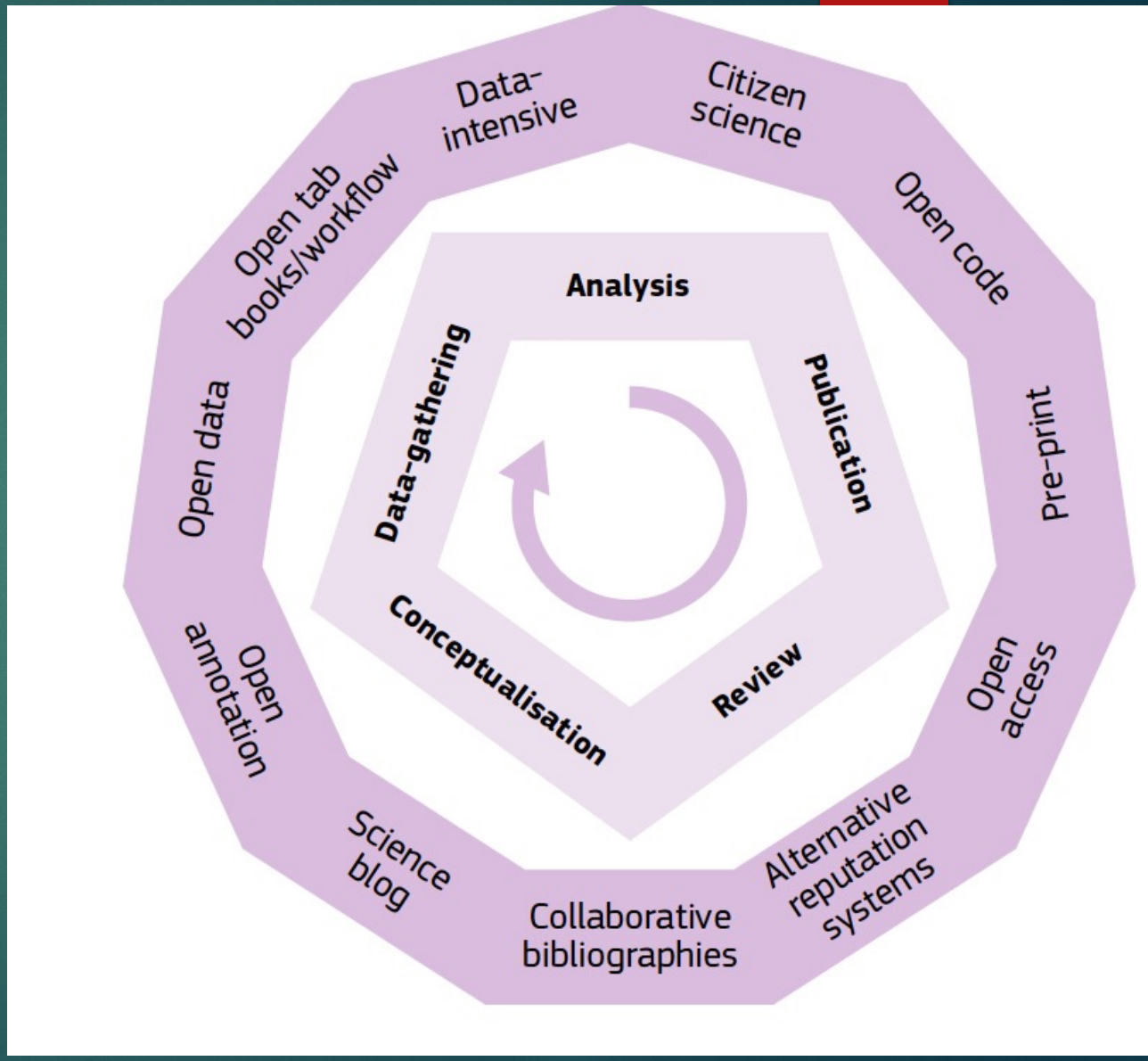
Carlos Moedas, *Open Innovation, Open Science, Open to the World (2015)*



Open Science today

- Technologically mediated collaboration
- View of the research workflow and related governance
- Set of values: transparency, reproducibility, inclusion

Key emphasis: free flow of information



Simplistic vision of Open Science as

- about **unlimited access**: making any research element available at any time for everyone
- about the **digital transformation**: it is a novel phenomenon and completely dependent on ICTs
- always **good**: it automatically improves the content of science as well as researchers' working conditions
- **global**: it can reach everybody with an interest in research, no matter where they are based
- facilitating **equity** in research production and consumption: it makes previously inaccessible resources available to those who may wish to use them

Why care about Epistemic Diversity

- "gone are the days when it could appear uncontroversial to assume that Western sciences are or have ever been autonomous from society, value-free and maximally objective, or that their standard for rationality is universally valid" (Harding 2011, x)

- Recognition of plurality is key to understanding science.. But what are the "ingredients" of epistemic diversity, and are those compatible with an Open Science regime?

The challenge of epistemic diversity

- *the condition or fact of being different or varied in ways that affect the development and/or understanding of knowledge*

Open Science from theory to practice

- A friend of epistemic diversity..
  - Opening new epistemic spaces, challenging traditional communication channels and disciplinary/power structures, encouraging participation "from below"
- .. or a foe?
  - reinforcing conservatism, bias, exclusion, discrimination and inequity
- The proof is in the pudding… in this case, **practical implementation** and what it shows about OS framing of epistemic diversity

1. The access wars: COVID research

Enter the pandemic

- Acceleration of discovery
- Revindication of value of big OS platforms & initiatives
- Unassailable demonstration of the value of OS?

Enter the pandemic

- Acceleration of discovery
- Revindication of value of big OS platforms & initiatives
- Unassailable demonstration of the value of OS? **NO**


History and Technology

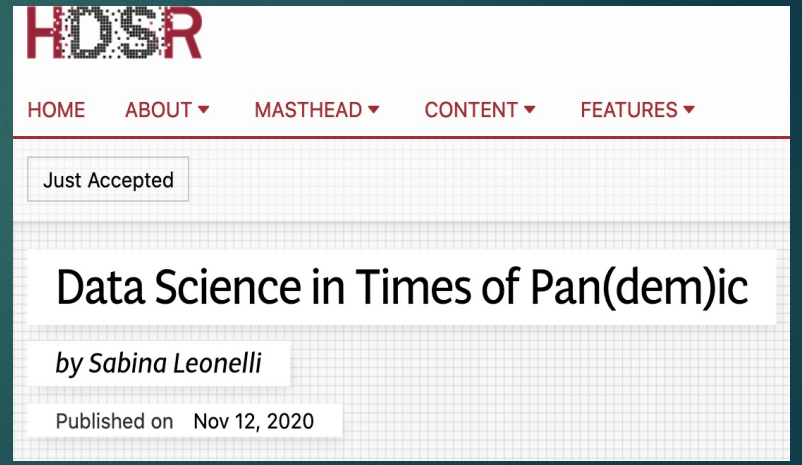
An International

Historiographic Essay

Mobilizing the Transnational History of Knowledge Flows. COVID-19 and the Politics of Research at the Borders

John Krige & Sabina Leonelli

Published online: 10 Mar 2021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Just Accepted

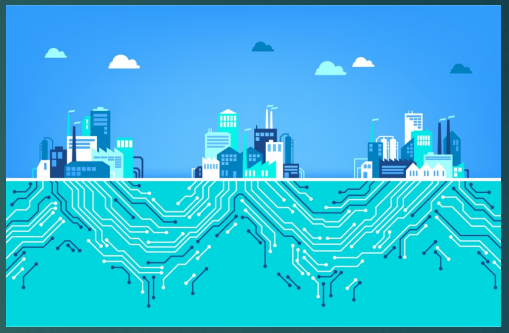
Data Science in Times of Pan(dem)ic

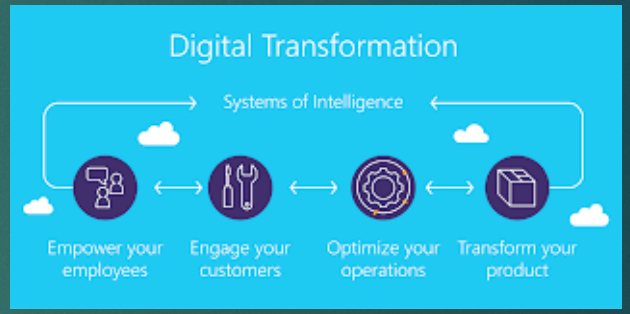
by Sabina Leonelli

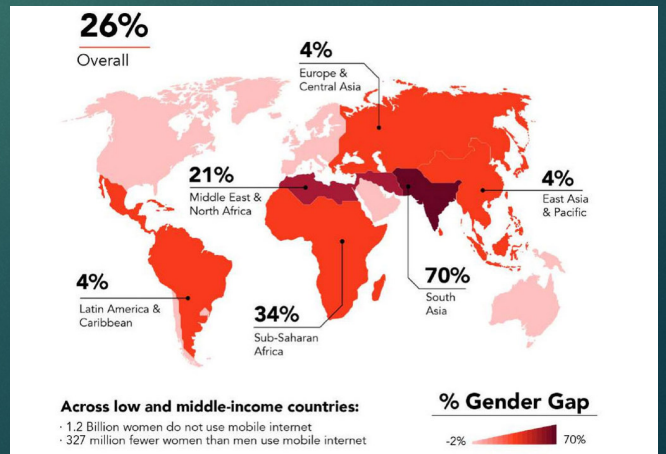
Published on Nov 12, 2020

COVID crisis and the direction of digital transformation

- Acceleration of digital transformation
  - Centralisation of infrastructures and services, launch of 5G
- High awareness of digital opportunities and problems
  - the Great Reset (WEC): "build a new social contract that honours the dignity of every human being"
  - Huge marginalization, often along existing fault lines – differential impact on the vulnerable
  - Digitalization and planetary health

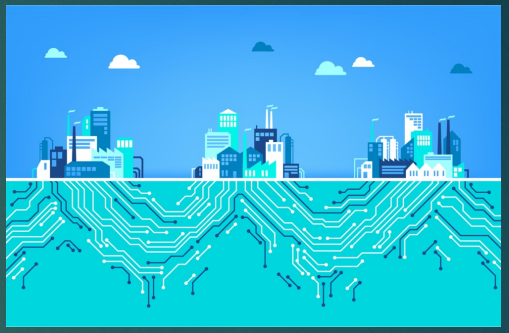


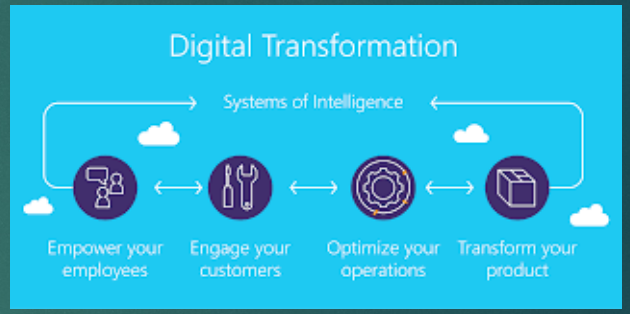


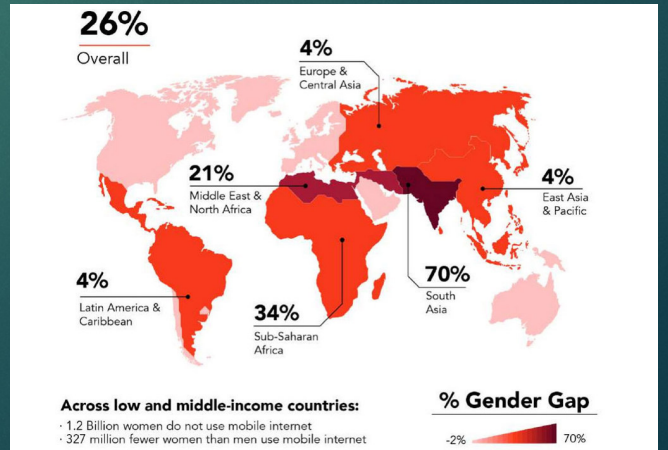


COVID crisis and the direction of digital transformation

- Overemphasis on "the technical" as an alternative to tackling "the social"
  - Rush towards technical solutions
  - **Data science as key resource** e.g. tracing apps on smartphones, data aggregation across countries
  - Capacity increasing in already powerful big tech, decreasing in low-resourced environments that need it most
  - "Great Reset" = surveillance capitalism + lip service to social responsibility?
- Stark reminder of system fragility
  - Serious limits to data access (e.g. medical frontline, social services, tracing technologies)
  - Problematic relations between governments, Big Tech corporations and international agencies







Enter the pandemic

- Huge technical "sharing" issues
- Reliance on expensive technologies (widening the digital divide)
- Lack of clarity over rights and obligations pertaining to "sharing"
- Disregard for diverse knowledge sources and perspectives, tendency to conservatism
- Lack of consultation and collaboration with relevant communities/disciplines
- Large-scale exploitation of data accumulated on and through patients from around the world ("digital feudalism")
- Polemics on data governance and access, esp. transnationally
- Failure of transnational solidarity, e.g. downstream research outputs

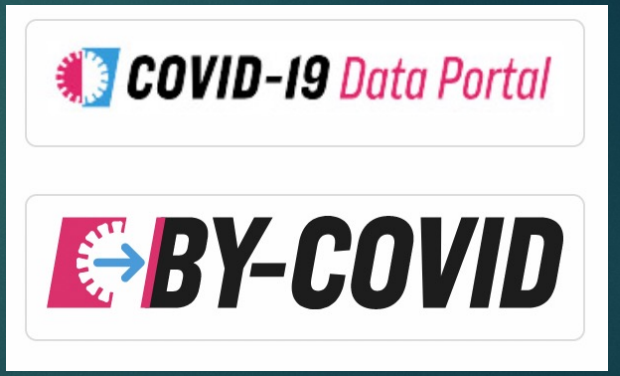
The GISAID case

Global Initiative on Sharing All Influenza Data:

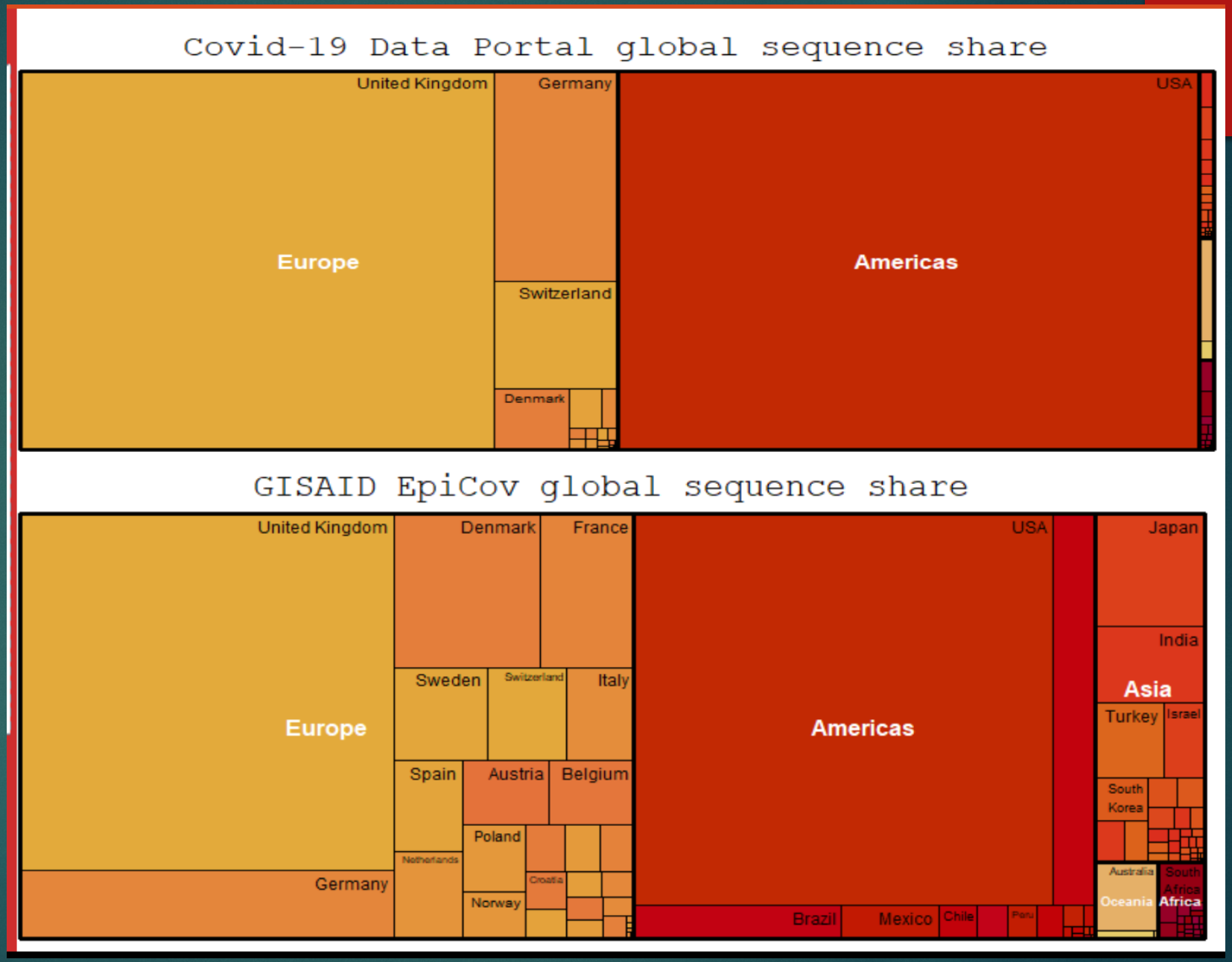
- 2008: share influenza genomic data *securely* and *responsibly*
- Grounded on agreement governing data access and re-use
- 2020: redeployed to include SARS-COV-2 data

- 2021 Attacks: "not open enough"

- EU/EMBL/Elixir set up alternatives (bulk downloads with no user tracking)
- Ongoing battle around licensing and standards



Nathanael Sheehan & Sabina Leonelli, in preparation



1. The access wars: COVID research

Lessons learnt:

- Science is not a level playing field
- Key is what makes data "reusable", rather than just accessible
- Perceived trade-off between *representativeness* and *actionability* of data: methodological cutting-edge does not necessarily support inclusion and trust
- Different interpretations of openness *and* responsible research

2. The "mangle of practice": technology and quality standards

Low uptake of **Free and Open Source Software** in universities in Bangladesh, Tanzania, Ghana and Nigeria.. why?

- Perception:
  - Lack of recognition for FOSS in international quality assessment
  - Use of proprietary software unlocks consideration by Anglo-American journals

2. The "mangle of practice": technology and quality standards

- No universal criteria for **data quality assessment**:
  - case-by-case judgment based on field-specific knowledge
  - standards, technologies and knowledge change -> *maintaining* quality in databases is hard, time-intensive and expensive

- Strategy: Equipment as indicator of data quality
  - E.g. Next Generation Sequencing tools (Leonelli 2018)

- Lack of equipment makes researchers *insecure*
  - Vicious circle: impact on self-confidence and wish to share data and publish work internationally(Bezuidenhout et al 2017)

2. The ”mangle of practice”: technology and quality standards

- Lessons learnt:
  - visibility, reputation, even (self!)consideration as reliable science depend on access to high-end technology
  - technological tools and preferences embody systems of research assessment, resourcing and geo-political location
  - technological uniformity limits methodological and conceptual choices

The challenge of epistemic diversity

- *the condition or fact of being different or varied in ways that affect the development and/or understanding of knowledge*

- implementing OS: recognizing different alignments of sources of diversity
  - significance of different alignments of infrastructural, methodological, conceptual and institutional sources of diversity for the implementation and understanding of OS

Sources of epistemic diversity

CONCEPTUAL

MATERIAL

- Target objects
- Materials
- Provenance

METHODOLOGICAL

- Methods
- Standards

INFRASTRACTURAL (capacity of res. environment)

- Funding
- ICT and other digital technologies
- Mobility and transports

SOCIO-CULTURAL

- Systems of research assessment (locally and nationally)
- Legal and ethical accountability
- Geo-political location
- Language
- Values and goals
- Demographic characteristics of researchers (gender, class, ethnicity, age, physical ability..)

INSTITUTIONAL

- Career stage and power dynamics
- Institutional and administrative support
- Field of study and related norms / venues for publishing and exchange
- Intellectual property regimes

Units of epistemic diversity: beyond disciplines?

- Capillary, situated nature of epistemic diversity: focusing on systems of practice rather than "disciplines"
  - "system of practice" (Chang 2012): "coherent set of epistemic activities performed with a view to achieve certain aims"

- What do you see as the right units of analysis here?

[We'll come back to this Q tomorrow]

Summing up

- Analysis: an overly standardised and generalised conceptualisation of OS and its implementation
  - privileges some forms of inquiry over others
  - exasperates divides within and across systems of research practice
    - complex interrelations among multiple sources of diversity of relevance to OS
    - difficulties in adequately addressing such interrelations through universal policy frameworks or appeals to disciplinary differences.

- *Normative proposal: alternative foundation for debates around Open Science* *[We'll get to this on Wednesday]*
  - *grounded on characteristics of research identified by pluralist studies of science*

THANK YOU

for your attention
& huge thanks to colleagues, the ERC and the Wissenschaftskolleg zu Berlin

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