

# Steering Research and Innovation for the Global Goals

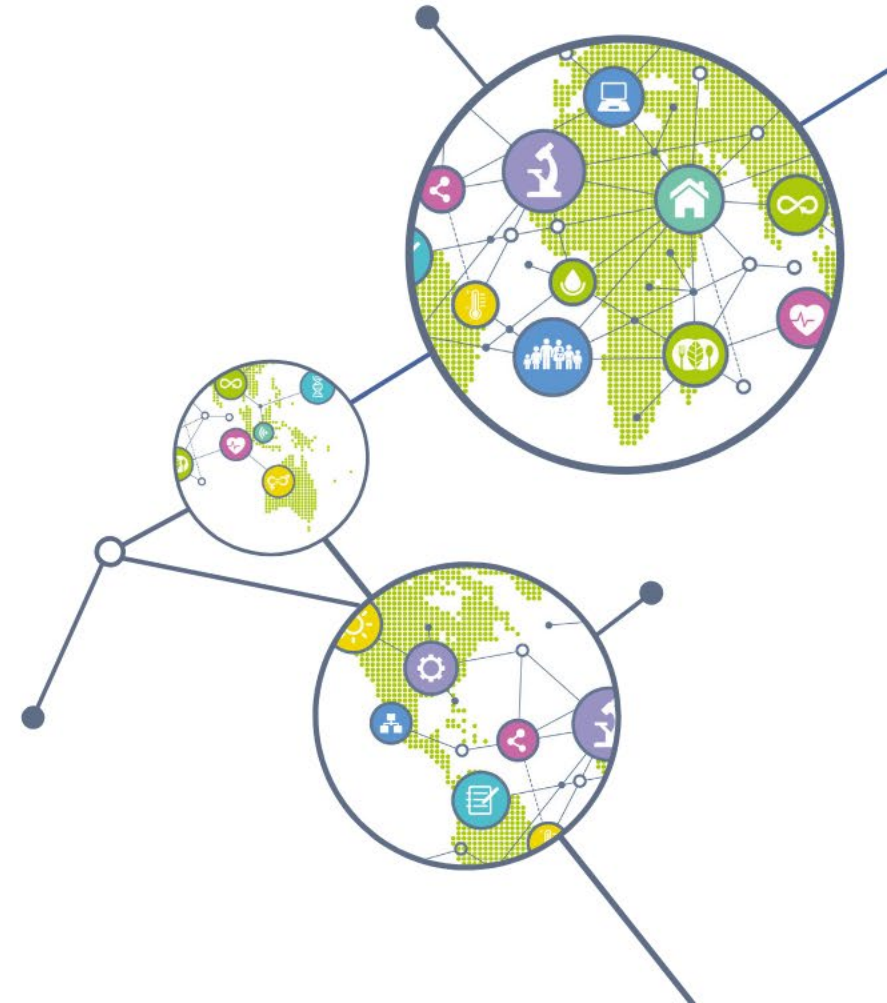
**Presented by:**

**Tommaso Ciarli**, UNU-MERIT, Maastricht and SPRU,  
University of Sussex

2nd Calestous Juma Legacy Seminar

Steering Science, Technology and Innovation to Achieve  
Sustainable Development Goals

November 29-30 2021



# Rebooting African Economies

*STISA's successful implementation requires research and development budgets at the national, regional and continental levels. The African Union encourages each member state to take concrete steps to allocate at least 1% of GDP to research and development according to prior commitments (Juma and Serageldin, 2016)*

## AND ITS ENEMIES

Why People Resist New Technologies



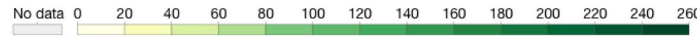
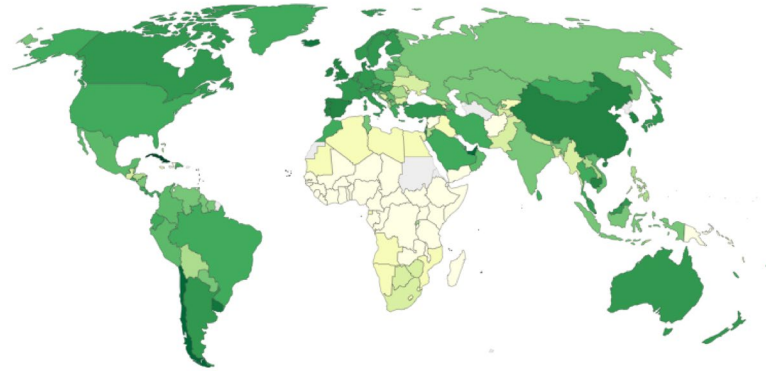
**THE NEW HARVEST**  
Cultural Innovation in Africa  
Juma



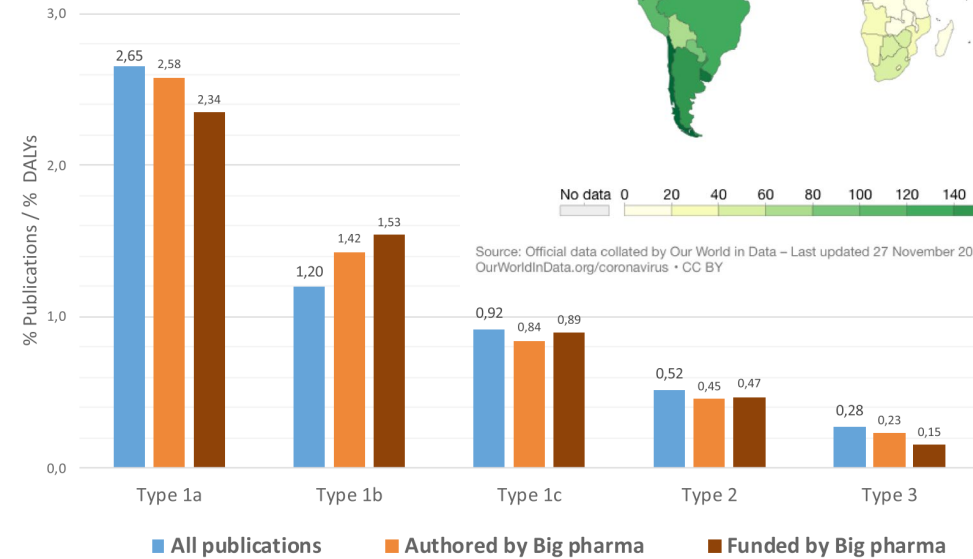
# Rebooting African Development

- 1) Strategic role of STI to address societal challenges (SGDs...)
- 2) Need to develop national research and innovation capabilities
  - *The African Union will also develop a strategy to mobilize domestic and alternative financial resources to accelerate STISA–2024's implementation and to reduce overreliance on external resources (Juma and Serageldin, 2016)*

COVID-19 vaccine doses administered per 100 people  
All doses, including boosters, are counted individually. As the same person may receive more than one dose, the number of doses per 100 people can be higher than 100.



Source: Official data collated by Our World in Data – Last updated 27 November 2021, 08:20 (London time)  
OurWorldInData.org/coronavirus • CC BY



Yegros-Yegros et al. (2020)

# The misalignment

MARGINALIZED AND OVERLOOKED?  
MINORITIZED GROUPS AND THE ADOPTION  
OF NEW SCIENTIFIC IDEAS

Wei Cheng  
Bruce A. Weinberg

## RESEARCH

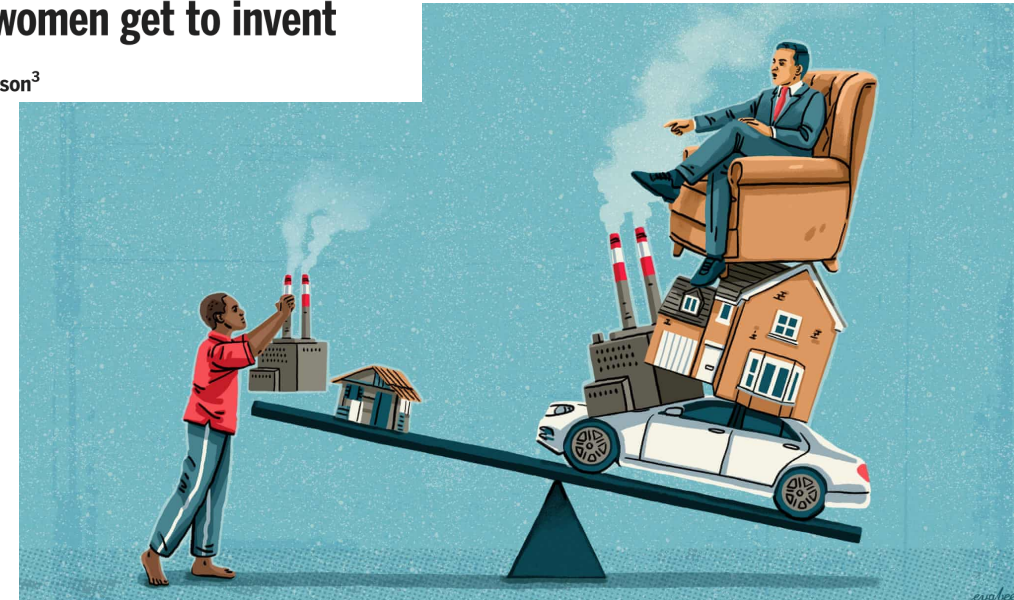
### HISTORY OF INNOVATION

**Who do we invent for? Patents by women focus more on women's health, but few women get to invent**

Rembrand Koning<sup>1\*</sup>, Sampsa Samila<sup>2</sup>, John-Paul Ferguson<sup>3</sup>

Scientific advance is unevenly distributed in society and its diverse demands (Gibbons et al., 1994; Nelson, 2003)

- E.g. Health (Evans et al., 2014); Agriculture (Ciarli and Ràfols, 2019); Goods and services (Walsh et al., 2020)





# SDGs as an opportunity to steer STI to address sustainable development challenges

- The SDGs offer a means for researchers, public and private research funders, policymakers and societies at large to study which directions for STI are most likely to count as progress in relation to the SDGs.

EDITORIAL | 20 January 2021

## How science can put the Sustainable Development Goals back on track

The COVID-19 pandemic has disrupted the UN's flagship plan to end poverty an environment. Researchers need to launch a rapid response.

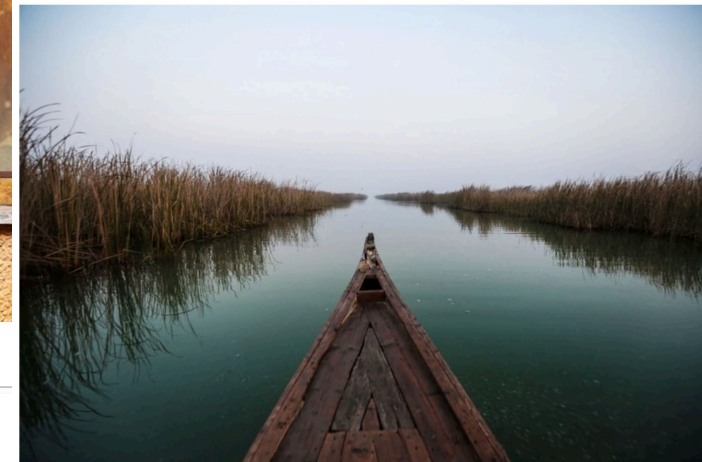


The UN goals to provide jobs and universal education are under threat. Credit: Manish Swarup/AP/Shutterstock

EDITORIAL | 20 July 2021

## Vulnerable nations lead by example on Sustainable Development Goals research

A United Nations study of world science is a wake-up call that richer countries must also shift science towards the SDGs.



Iraq's wetlands are threatened by climate change; the country is pivoting its research towards the SDGs. Credit: Murtadha Al-Sudani/Anadolu Agency/Getty

- Empower plural stakeholders to shaping diverse STI pathways
- Open tools & data for stakeholders/policy to explore STI maps, alignments, and pathways
- Creating global/local spaces governing STI decisions
- Address glaring conditions that steer current STI away from the SDGs





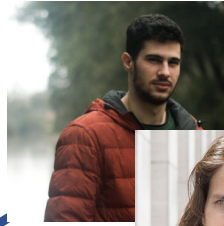
# Related Initiatives

Advisory  
Committee

Sounding Boards

Delphi  
Community

Workshops



cenit



nesta



CWTS  
Meaningful metrics



UK Research  
and Innovation

UKRI



CRIST



UNIVERSITEIT VAN PRETORIA  
UNIVERSITY OF PRETORIA  
YUNIVESITHI YA PRETORIA  
Graduate School of Technology Management



UCL

DEPARTMENT OF SCIENCE,  
TECHNOLOGY, ENGINEERING AND  
PUBLIC POLICY



Empowered lives.  
Resilient nations.



SCIENCE POLICY  
RESEARCH UNIT

BUSINESS  
SCHOOL

US  
UNIVERSITY  
OF SUSSEX



# Presentation overview

1. **STRINGS motivation & challenge**
2. How we addressed the challenge
3. Key findings
4. Main areas of action

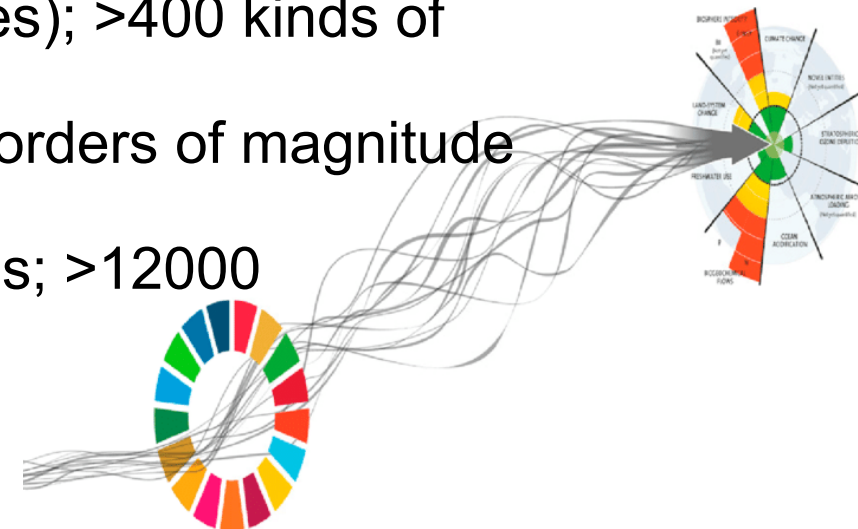


# Challenges

1. The **complex interactions** of Science Technology and Innovation (STI) activities lead to **prioritisations** that may not favour sustainable development, may not address the needs of the majority of the population, and may create inequalities
2. To achieve sustainable development, there is a **need for ‘better’ steering (realignment)**
3. The SDGs offer a shared platform to realign STI with sustainable development
4. Little **previous research** has focused on what policies and investments might work to encourage better alignment, and how to evaluate the efficacy of those approaches

# STI ⇔ SDGs: challenges of complexity

- SDGs: Multiple Directions for Progress
- Key implications for STI: ask which directions are privileged
  - not by chance that priorities are so unevenly distributed across society
- Not straightforward
  - Agendas: 17 goals, 169 targets and 305 (huge difference in achievements)
  - STIs: 42 fields (OECD); 70,000 IPC codes; 254 subject categories (ISI); >21,000 journals
  - Contexts: Nearly 200 nations (and more nationalities); >400 kinds of ecosystems; >500 cities (of >1 million people)
  - Power: two orders of magnitude in pc income; five orders of magnitude in Govt resources; superstar firms
  - Plural perspectives: 7000 languages; 650 ethnicities; >12000 occupations; 4000 political parties; 300,000 NGOs
- Which way now?



# Presentation overview

1. STRINGS motivation & challenge
2. **How we addressed the challenge**
3. Key findings
4. Main areas of action

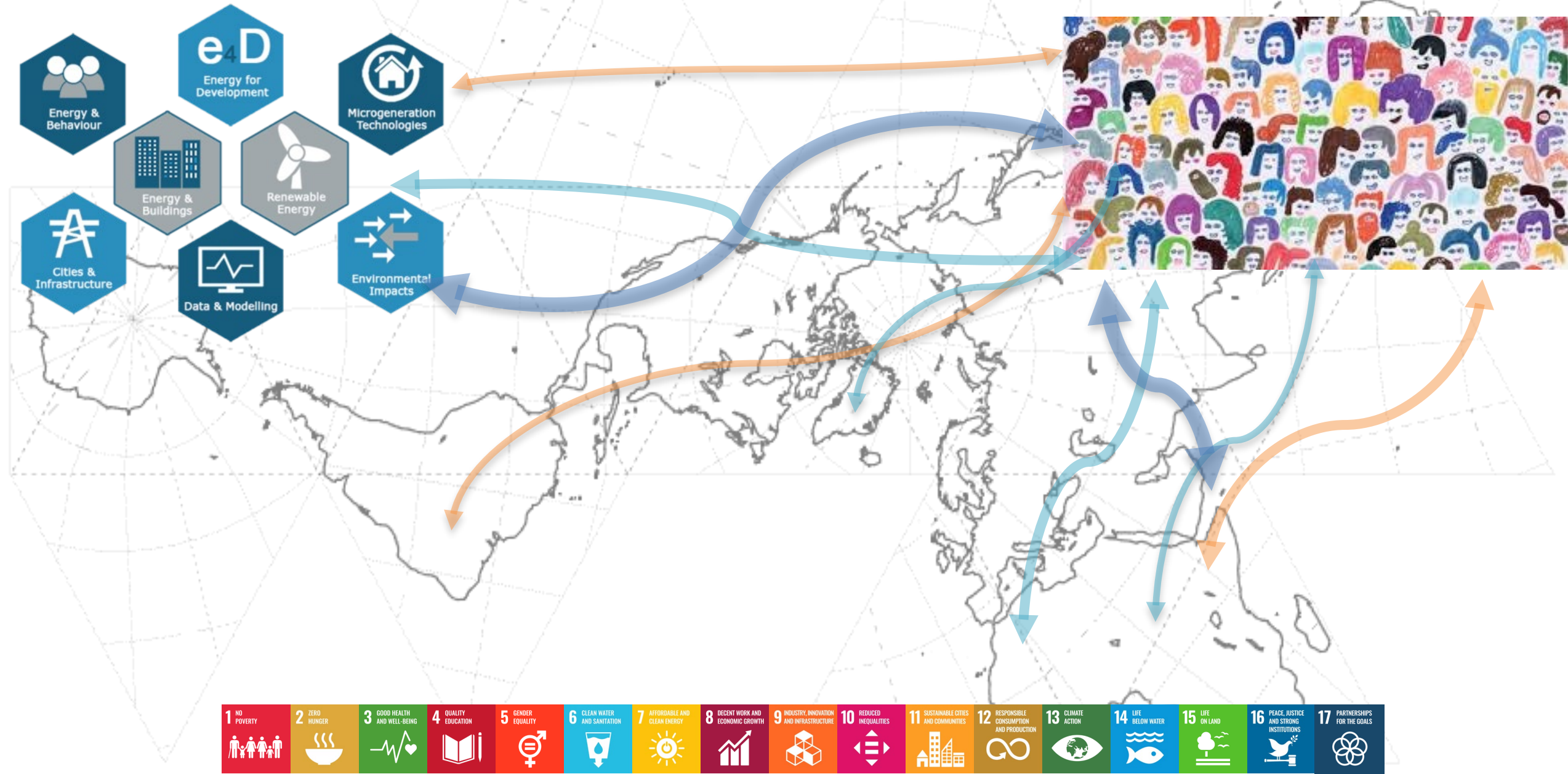
# Combining analytical angles, methods and disciplines to investigate STI-SDG relations

Research design	Research questions
<b>Mapping past global STI priorities</b>	<ul style="list-style-type: none"><li>• What SDG-related STI has been carried out? By whom?</li><li>• What are the interactions across SDGs?</li><li>• What is SDG-related STI? Is it more impactful?</li><li>• How are countries' priorities aligned with their main SDG challenges?</li></ul>
<b>Surveying future STI priorities across contexts and expertise</b>	<ul style="list-style-type: none"><li>• What STI areas are perceived as priorities for addressing the SDGs by civil society organisations, practitioners and researchers?</li><li>• How is incumbent STI aligned with future priorities?</li></ul>
<b>Current local STI pathways to address specific challenges</b>	<ul style="list-style-type: none"><li>• How are STI pathways constituted in practice by different actors in the system?</li><li>• How do these different actors, with different priorities shape local STI prioritisation for SDG-related problems?</li><li>• How do conflicting prioritisations lead to (mis)alignment between STI pathways and SDGs?</li></ul>



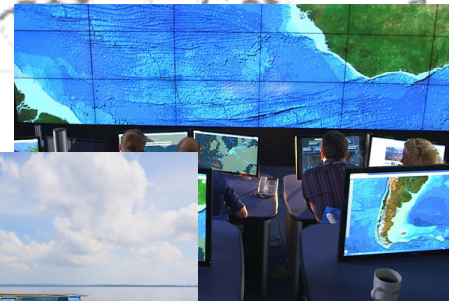
[illegible]

# Surveying future STI priorities across contexts and expertise





# Current local STI pathways to address specific challenges



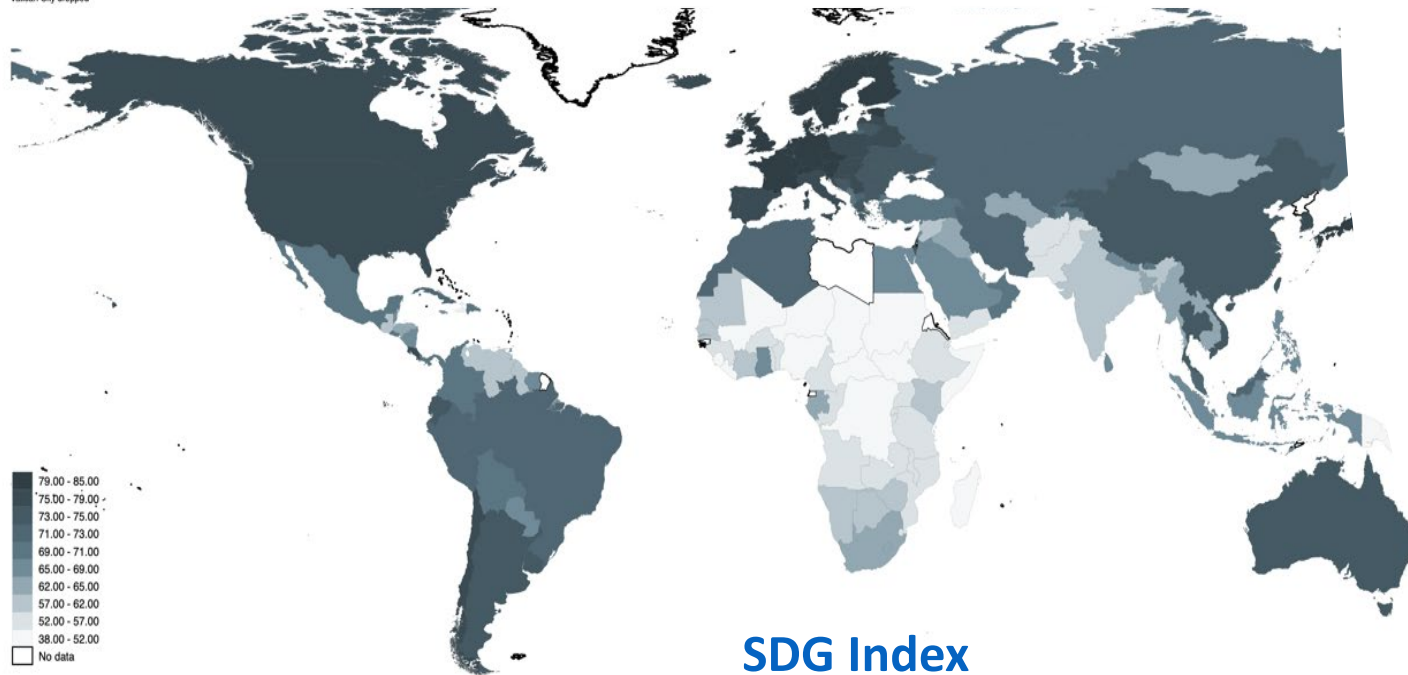
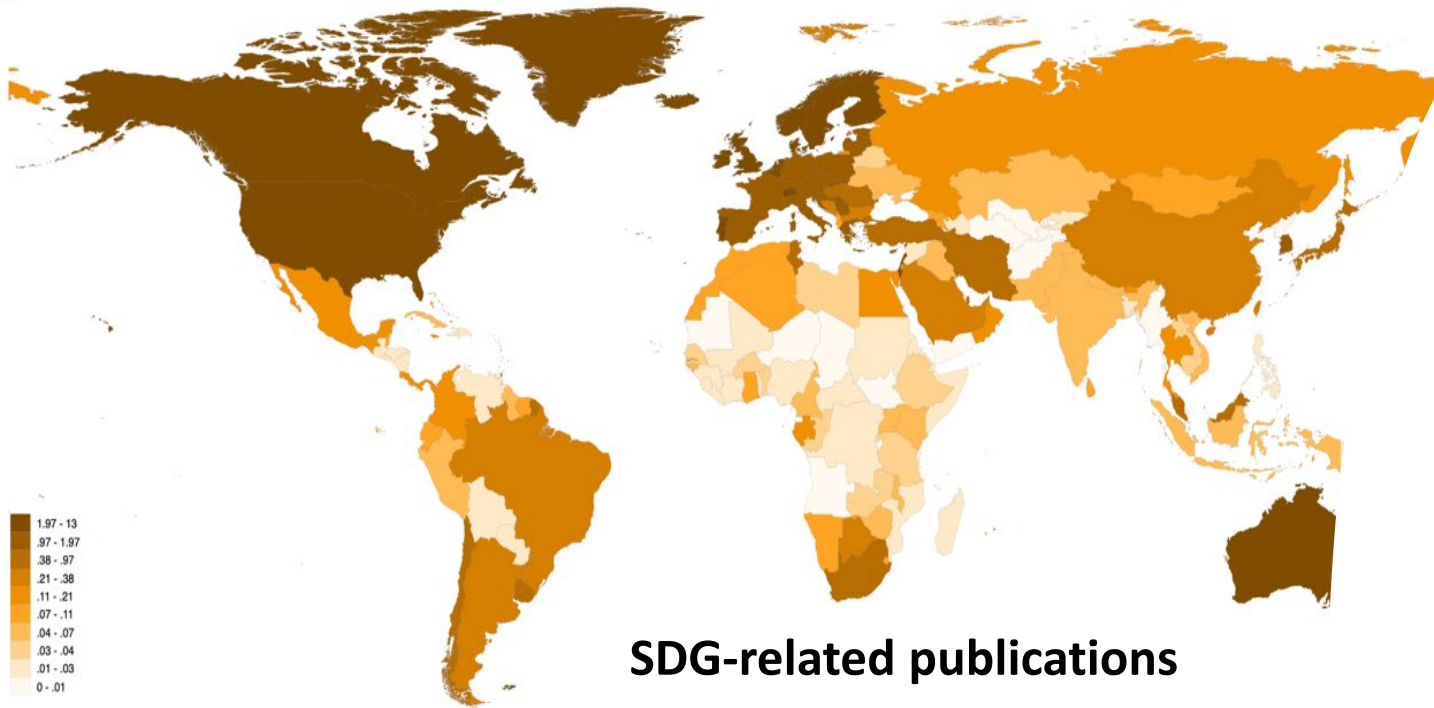
# Presentation overview

1. STRINGS motivation & challenge
2. How we addressed the challenge
3. **Key findings**
4. Main areas of action

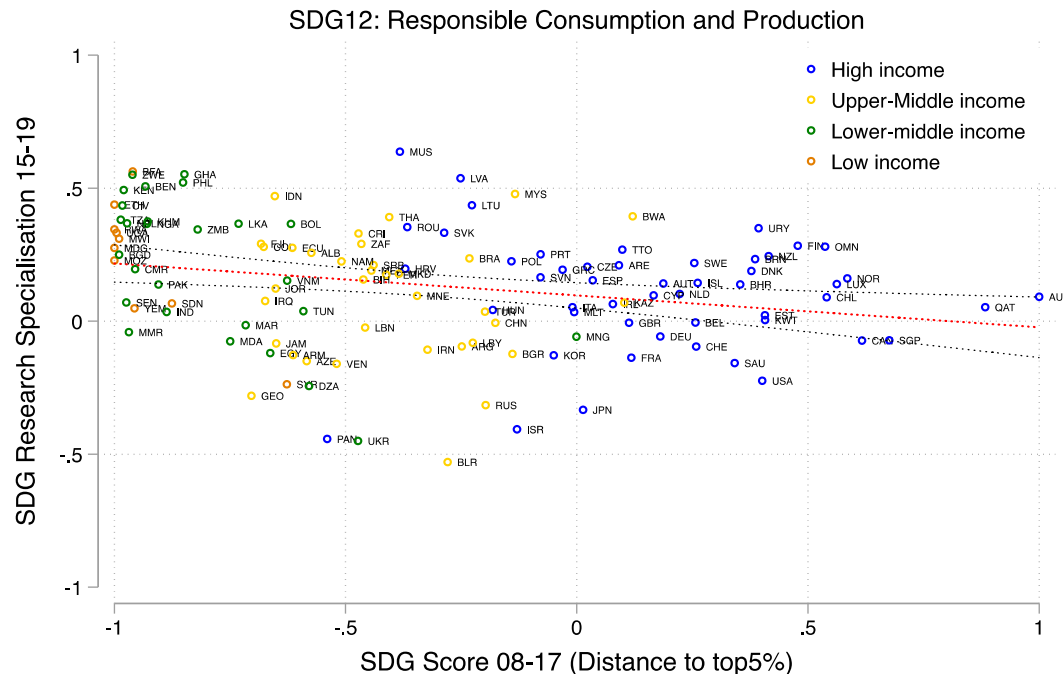
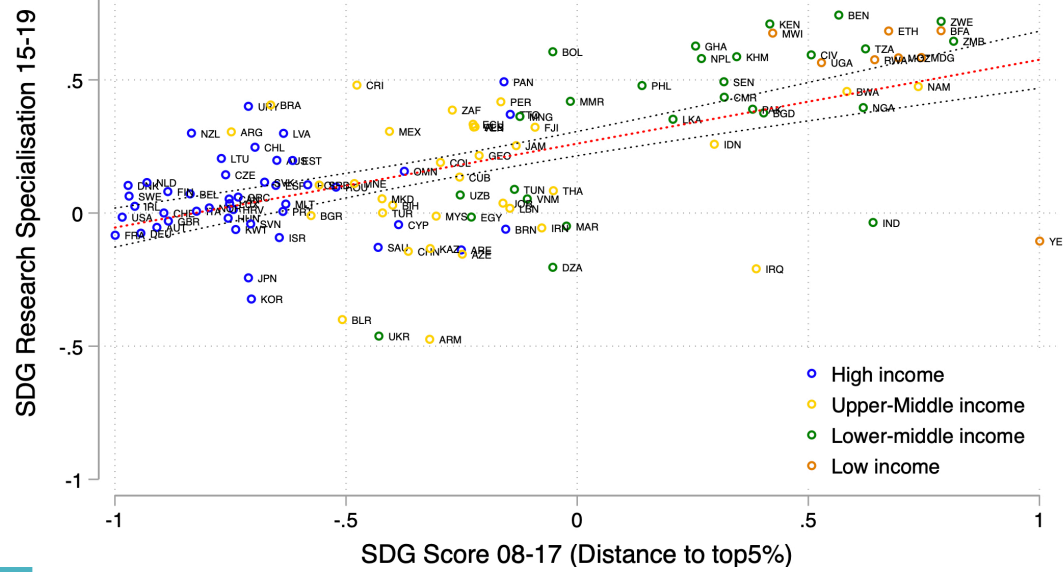


# Can such uneven STI support the SDGs?

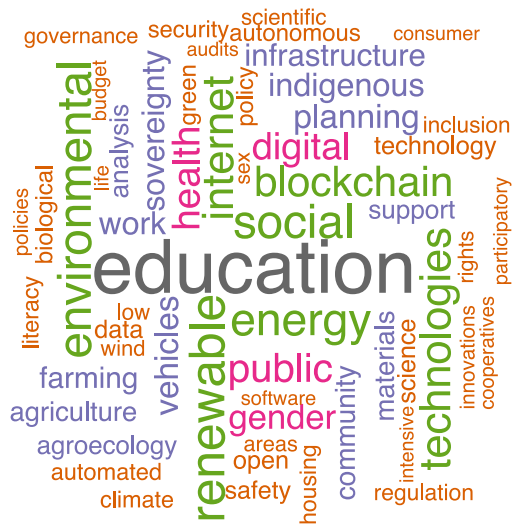
- Only between 26% (LMC) and 64% (LIC ~ 0.2%) of WoS publications are related to SDGs
- 94% of SDG-related research is published in HIC and UMC.
- LIC has the highest share of SDG-related research, but 0.2% of WoS
- 60% of SDG-related research in SDG3: mainly HIC diseases, and not relevant to other SDGs
- SDGs related to pressing inequalities, conflict and education (4, 5, 10, 16) attract low research everywhere: they are also disconnected from research on other SDGs



# Countries do not focus research on their SDG priorities



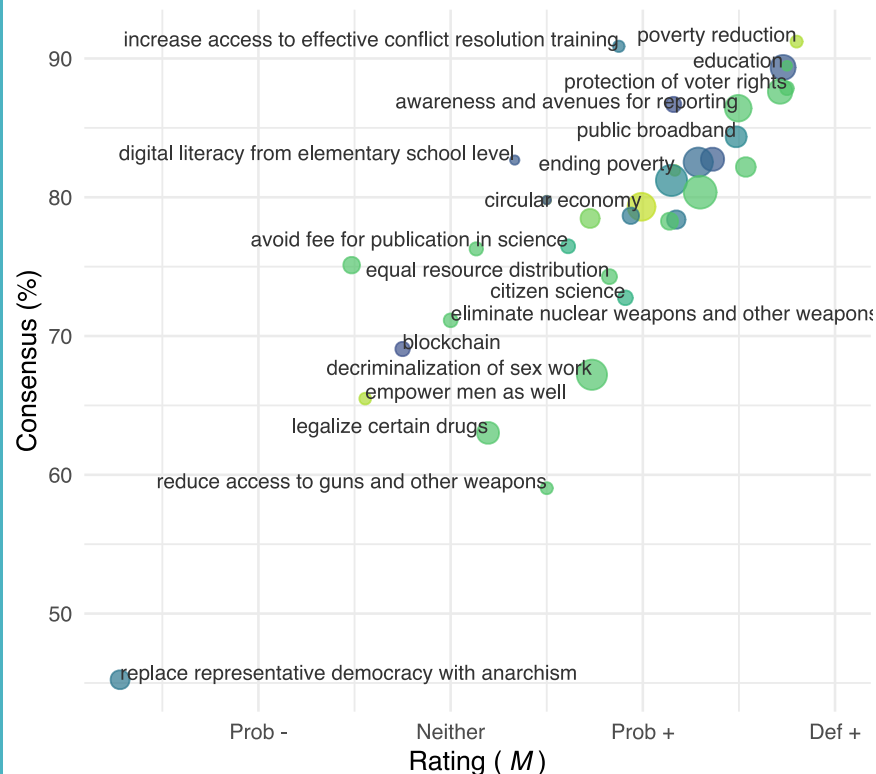
- Individual countries' research priorities often do not align with their greatest SDG challenges – strong historical influence
  - While most SDG challenges are worse in lower income countries, only a tiny amount of SDG-related research takes place in those regions.
  - Research users in lower income countries need to rely on research done elsewhere, which is likely to be less relevant to their contexts.
  - Alignment between research priorities and SDG challenges only in few SDGs and dictated by past research specialization (linked to funding)



# Future priorities do not align with past R&D

- Priorities are sought beyond S&T: innovation in models, social, policy
- Plural understanding of STI and SDGs lead to diverse priorities
- Different stakeholders, in different contexts, with different expertise, background and role have very different priorities – and do not always agree
  - Consensus varies across STIs
- Some STI cut across SDGs

## Distribution of STI ratings and consensus scores



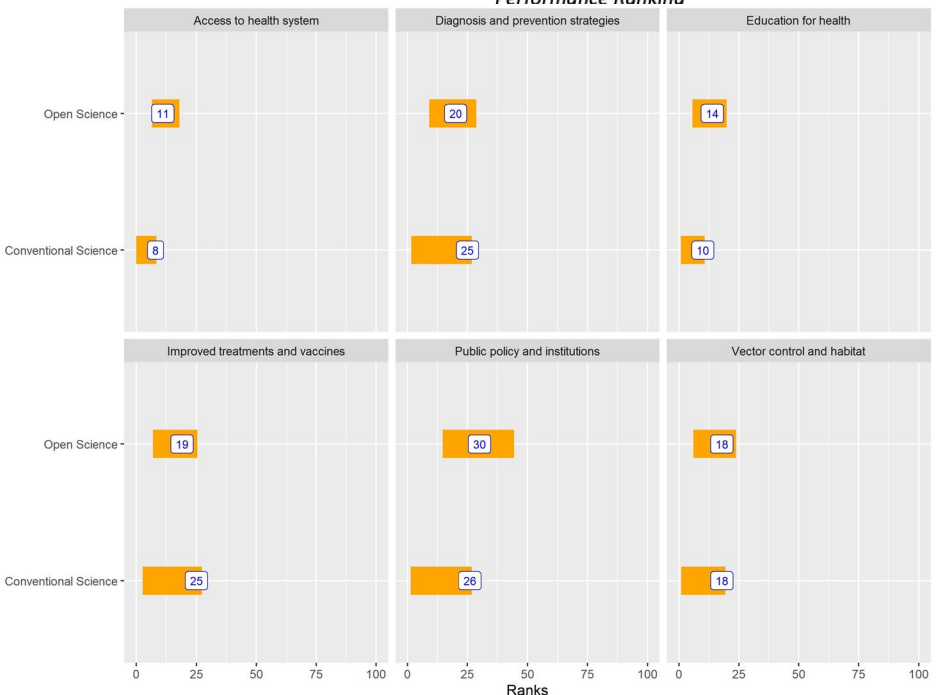
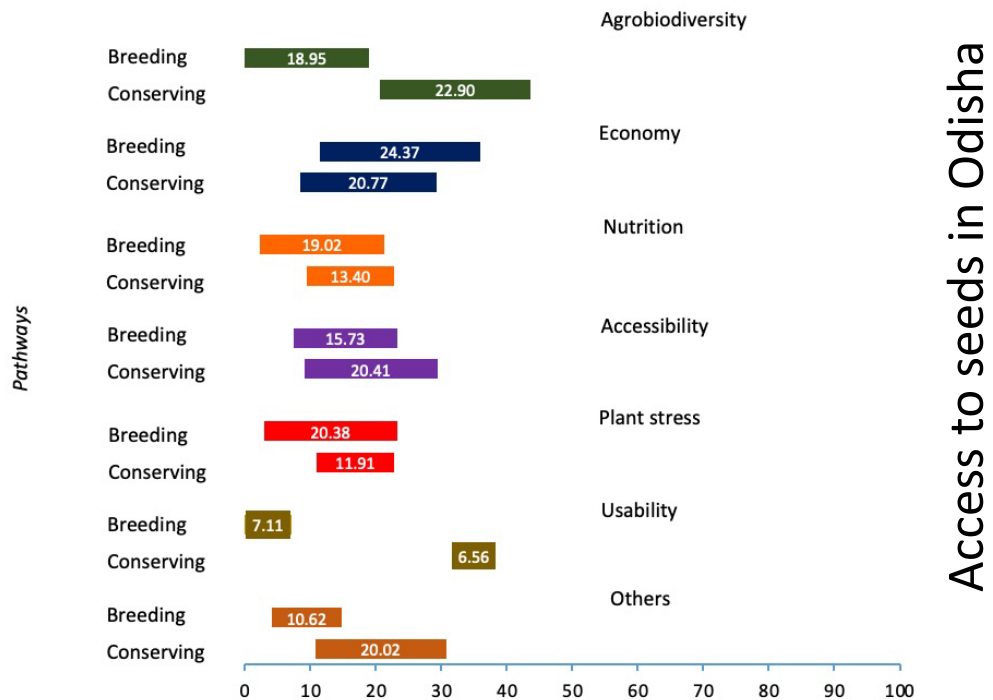
Size of point indicates number of ratings

## SDG 16

## STI category

- Data processing
- Education innovation
- Finance
- Governance
- ICT
- Open science
- Policy or regulations
- Satellite technology
- Social innovation
- Sustainable cons & prod

# Aligning STI with SDGs requires different pathways



- Also because of different priorities, different STI pathways can address the same SDG-related challenge
- Different stakeholders offer plural perspectives on the (mis)alignment of STI pathways SDG-related challenges
- Need for balanced policy support for a diversity of STI pathways



# Presentation overview

1. STRINGS motivation & challenge
2. How we addressed the challenge
3. Key findings
4. **Main areas of action**

# Diversity and plurality



- International governance of STI for sustainability to ‘open up’ the pluralities around different SDGs as well as the rich benefits of diversity in research and innovation
- Open spaces for questioning analytical findings from plural perspectives
- Analytical mappings need to be complemented by an equally essential role for transparent communication, inclusive access, participatory involvement, open accountability and wider democratic governance

# Coordinated options for global governance

- A global platform observatory with regular surveys of global R&D, its scale, locations, purposes and impacts
- More organized 'constellations' of funders , interested parties and science policy decision makers to align actions, using open data, open coordination and engagement of users
- Formal global funding pools to combine R&D resources on key global goals
- Regular gatherings to promote discussion, absorption and action

COVAX

CEPI



unicef



ipcc

INTERGOVERNMENTAL PANEL ON  
climate change

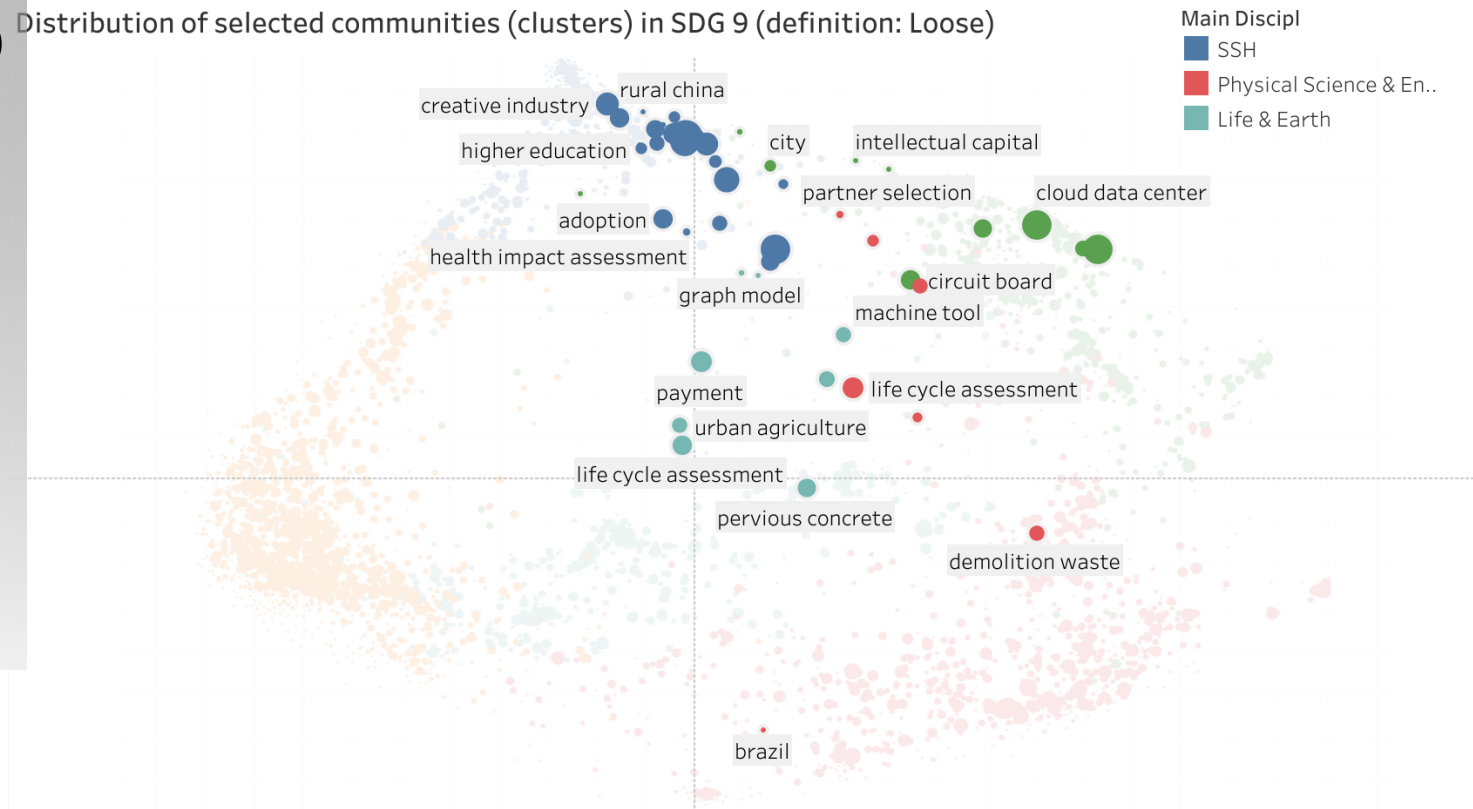


The Global Fund  
To Fight AIDS, Tuberculosis and Malaria

# Empowering stakeholders to build different interpretations of what consitute SDG research: dashboard

## SDG 9 - Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Distribution of selected communities (clusters) in SDG 9 (definition: Loose)



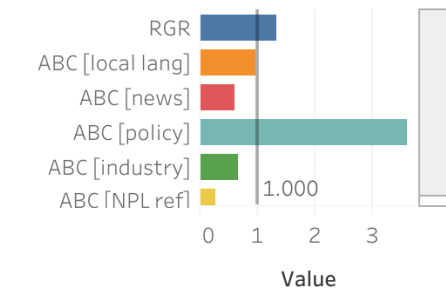
Selected communities (clusters) in SDG 9 (definition: Loose)

Id	Sublabel	weight<Strings>	score<Strings>
10	absorptive capacity; open innovation; knowledge management; innovative performan..	3,713	0.30
300	corporate social responsibility; financial performance; csr; iso; sustainability	1,321	0.14
310	environmental kuznets curve; financial development; economic growth; environment..	1,232	0.13
825	sustainability transition; solar home system; feed; social acceptance; rural electrifica..	1,138	0.17
739	endogenous growth; public capital; demographic transition; fertility; income converg..	1,068	0.27
581	device communication; femtocell network; device; device communication underlying ..	853	0.09
604	intra industry trade; wto; free trade agreement; anti; exporting	720	0.14
846	self employment; entrepreneurial intention; social entrepreneurship; gibrat	655	0.12
2231	academic entrepreneurship; entrepreneurial university; university industry collabora..	640	0.32
535	data envelopment analysis; dea; efficiency; productivity; dea model	636	0.10

SDG  
9

Perimeter  
Loose

characteristics



Categories

(Top in selected clusters)

Subject Category

Economics
Environmental Sciences
Management
Business
Education & Educational Research
Environmental Studies
Engineering, Electrical & Electronic
Telecommunications

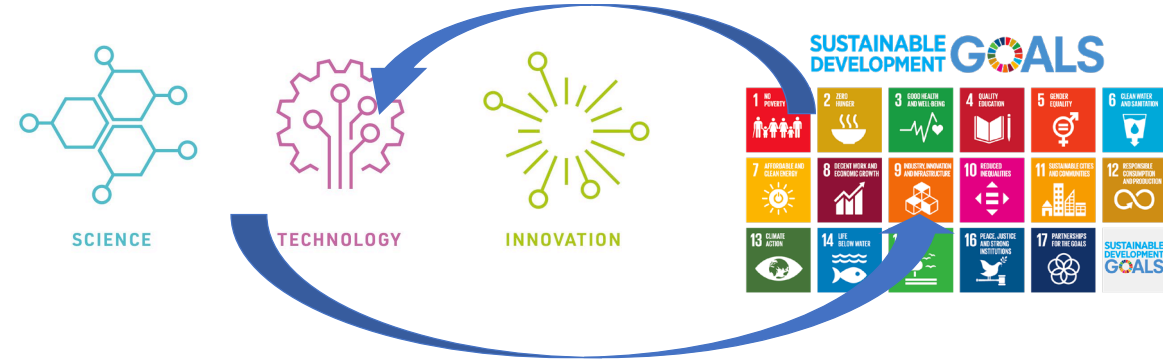
Keywords

(Top in selected clusters)

Noun Phrase

china	8,854
evidence	3,992
impact	3,198
role	2,673
case study	2,672
effect	2,669

# Policy interventions



- Increase funding for SDG-related research and innovation
  - Involving a wider range of actors
  - Focusing on low-income countries
  - Prioritising equitable international collaborative research
- Prioritise underlying social issues, social innovations and informal research
  - Focus on areas that relate to several SDGs, and strengthen connections
  - Inter- and transdisciplinary research, increasing the involvement of users
  - Multidimensional approach to the evaluation of STI
- Revise misalignments between STI portfolios and SDG priorities
  - Combine excellence and addressing challenges
  - Open and plural decision-making
- Funding for better data and evidence





**Thank you for your attention**

**We will publish a full report in February 2022**

**<http://strings.org.uk>**



**BUSINESS  
SCHOOL**

**SCIENCE POLICY  
RESEARCH UNIT**

**UK Research  
and Innovation**



**UNITED NATIONS  
UNIVERSITY**

**UNU-MERIT**



**Graduate School of  
Technology Management**



**DEPARTMENT OF SCIENCE,  
TECHNOLOGY, ENGINEERING AND  
PUBLIC POLICY**

