Times Higher Education

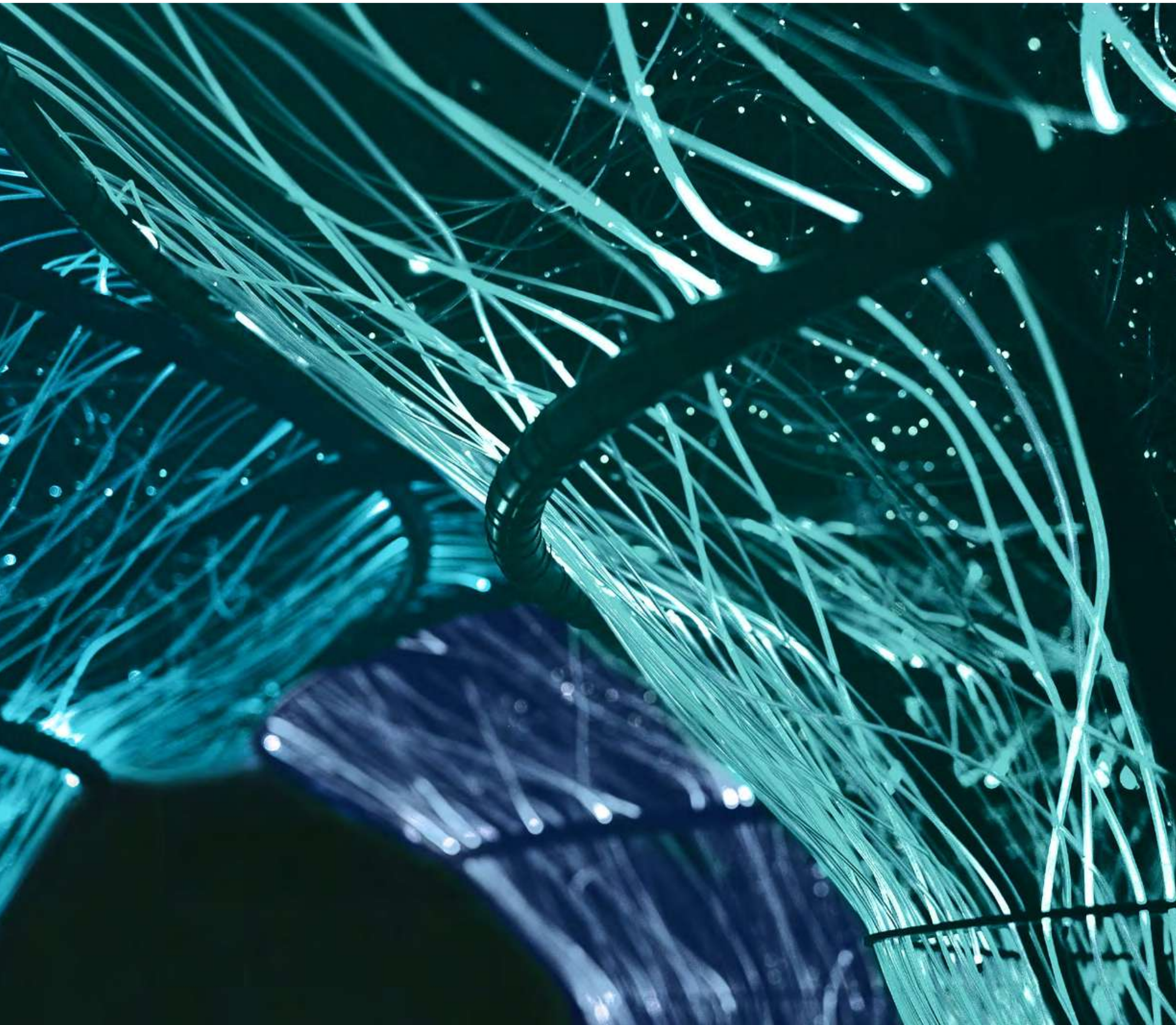
GLOBAL TRENDS IN INTERDISCIPLINARY RESEARCH

An Analysis of the 2025 Interdisciplinary Science Rankings

Interdisciplinary Science Rankings
Powered by THE

In association with
SCHMIDT SCIENCE FELLOWS

November 2024



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GLOBAL TRENDS IN INTERDISCIPLINARY RESEARCH

EXECUTIVE SUMMARY

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> **"The world's challenges know no disciplinary boundaries, so we must find ways to encourage scientists to work collaboratively across disciplines to solve them."**

Megan Kenna, Founding Executive Director, Schmidt Science Fellows

The 2025 Interdisciplinary Science Rankings (ISR) release marks a new phase in assessing the quality and scope of university research. Created by Times Higher Education (THE) in partnership with Schmidt Science Fellows, **ISR is the first global benchmark for the quality of interdisciplinary scientific research within higher education**. By focusing on the key inputs, processes, and outcomes that foster collaboration across scientific disciplines, the ISR offers valuable insights into how institutions are cultivating environments that support and amplify interdisciplinary research. This data provides a foundation for universities to drive even more impactful collaborations across disciplines to address complex real-world problems.

This report reflects on a journey that began in 2022, leading up to the launch of the first edition of the ISR ranking in November 2024. That journey included a consultation phase with the global higher education sector, a 'Pilot Year' of data collection and refinement of methodology and metrics in 2023, and then the ranking itself in 2024. These phases allowed THE to reach out to different geographical markets and ensure both long-term buy-in for the ISR project and the establishment of valid, reliable, and robust measures.

The report shows how three areas are key to understanding the progress being made by institutions on interdisciplinary research. Firstly, the inputs into interdisciplinarity, including dedicated funding and jobs. Secondly, the internal processes and structures that support and incentivise interdisciplinarity, including physical space, administrative support and rewards. Finally, the outputs of interdisciplinary research, as measured by a variety of bibliometrics and global reputation. The report also shows the scale of diversity in terms of the institutions participating, and the number of countries performing well across different metrics and pillars.

With 749 ranked institutions, the ISR is the largest debut of any rankings produced by Times Higher Education in terms of number of universities. By comparison, the first edition of the Impact Rankings in 2019 had 581 institutions ranked, and the first edition of the World University Rankings (WUR) in 2011 had 200 institutions included. As a research-intensive ranking, there are a finite number of institutions worldwide that could be eligible for ISR in the future; as a benchmark, there are around 3000 universities currently eligible for the WUR, which also has entry criteria based on research intensity.

The report shows that there remains room from improvement in terms of participation, but that the ranking offers dynamic ways to understand not just the output and impact of interdisciplinary research, but also how that can lead to better outcomes for funding, partnerships, internationalisation and sustainability.

Figure 1 Journey to the ISR Launch

Pre-2022
Background Context
Research landscape analysis and early discussions on the need for interdisciplinary rankings

2022
Consultation Phase
Global workshops or forums conducted. Stakeholder involvement (e.g., universities, funding agencies, policymakers).

2023
Pilot Year
Metrics tested: Bibliometrics, funding tracking, collaboration incentives. Geographic diversity of pilot participants.

2024
Launch
Development of reports and benchmarks. Institutional readiness campaigns.

SECTION 1

DEVELOPING THE INTERDISCIPLINARY SCIENCE RANKINGS

Case study

At MIT's Koch Institute, scientists and engineers converge on cancer's most difficult problems

KOCH INSTITUTE for Integrative Cancer Research at MIT

The Koch Institute for Integrative Cancer Research brings together MIT's strengths in engineering and the life sciences, entrepreneurship and industry engagement, and culture of collaboration with the goal of making strategic and transformative progress against cancer.

The Koch Institute promotes the convergence of life sciences and engineering through:

- Bringing together more than 1,000 biologists, biological, chemical, mechanical, and materials science engineers, chemists, computer scientists, clinicians, and others.
- A building design and community programs that encourage cross-pollination among scientists and engineers in shared research and social spaces.
- Its central location, situated where MIT's campus meets Cambridge's biotechnology hub in Kendall Square, facilitating collaboration with academic, clinical, and industry partners.
- Robust research centers, training and funding programs, and cutting-edge shared support facilities designed to help researchers translate their ideas into discoveries

Faculty-founded startups and extensive collaboration with clinical and industry partners ensure that Koch Institute discoveries are translated as rapidly as possible into advances and technologies that impact patient survival and quality of life. Koch Institute researchers have created over 120 companies, almost half of which have advanced to clinical trials or commercialization.

Koch Institute spinout Lumicell, Inc. was recently granted FDA approval for Lumisight and the Lumicell Direct

> **"The Koch Institute broke that conundrum by creating the opportunity through the Frontier Research Program."**

Visualization System, a cost-effective, real-time technology designed to help surgeons eliminate even single cancer cells left behind after tumor removal, thus reducing the need for costly and invasive additional treatments and the risk of relapse and progression. The system was developed in collaboration between MIT alumnus W. David Lee, Koch Institute member Linda Griffith, and MIT chemist and Nobel Prize Laureate Moungi Bawendi and leverages their expertise in technology development, the cell biology of cancer, and nanotechnology and imaging. Lumisight received critical early-stage support from the Koch Institute, including seed funding from its Frontier Research Program.

"It's hard to get funding for an idea that's a fundamental problem in engineering and biology, because you can't get funding without preliminary data, you can't get preliminary data until you have the hardware, and you can't build the hardware until you have the funding," said Lee. "The Koch Institute broke that conundrum by creating the opportunity through the Frontier Research Program."

GLOBAL TRENDS IN INTERDISCIPLINARY RESEARCH
SECTION 1

Research, Feasibility Study and Early Recommendations

Between April and June 2022, THE undertook a consultation with the global higher education sector to assess the feasibility of ISR.

Five roundtables were held with leading academics and senior university staff to gain their insight into what kind of measures and metrics could capture the progress made by universities in interdisciplinary science. Two roundtables included a mix of global leaders, and three were geography- specific:

Global Roundtable

Hosted At: THE's Innovation and Impact Summit
In: April 2022
1

European Roundtable

Hosted At: THE's European University Summit
In: May 2022
2

Asian Roundtable

Hosted At: THE's Asia Universities Summit
In: May 2022
3

North American Roundtable

Held In: parallel to an annual convening of Schmidt Science Fellows
In: June 2022
4

Virtual Global Roundtable

Hosted By: THE
In: June 2022
5

A total of 34 university leaders and subject matter experts participated in the roundtable discussions, supplemented with three one-to-one discussions. The outcomes of the roundtables and discussions can be summarised under the following five areas.

1. There was a **positive sentiment** towards creating the interdisciplinary science ranking, with the belief that rankings can be an effective driver of behaviour and attitude for academic institutions and other parties including policymakers.
2. **Definitions of interdisciplinary research** were varied, but included where experts from distinct disciplines come together to research and solve a problem, and where single individuals work across different disciplines, developing new mindsets through constant multi-disciplinary engagement.
3. **Different incentives** to producing more interdisciplinary science research included funding, creating interdisciplinary physical and virtual spaces, recruiting skilled staff, encouraging the diversification of research and changes in the education system to reward interdisciplinarity.
4. There are distinct **challenges identified** in gathering and measuring data on interdisciplinarity across universities and faculties.
5. There was **existing data on interdisciplinary research** including the National Science Foundation (NSF) and Higher Education Research and Development (HERD) Rankings, which could be taken into account in terms of developing measurements for the ISR.

The outputs of the roundtables and discussions resulted in the production of an internal feasibility study by THE, shared with Schmidt Science Fellows. The study recommended that an ISR was possible, and desirable, with some preliminary suggestions for the metrics.

Parameters were also created to set what kind of metrics would be practical, efficient and useful to collect. This included:

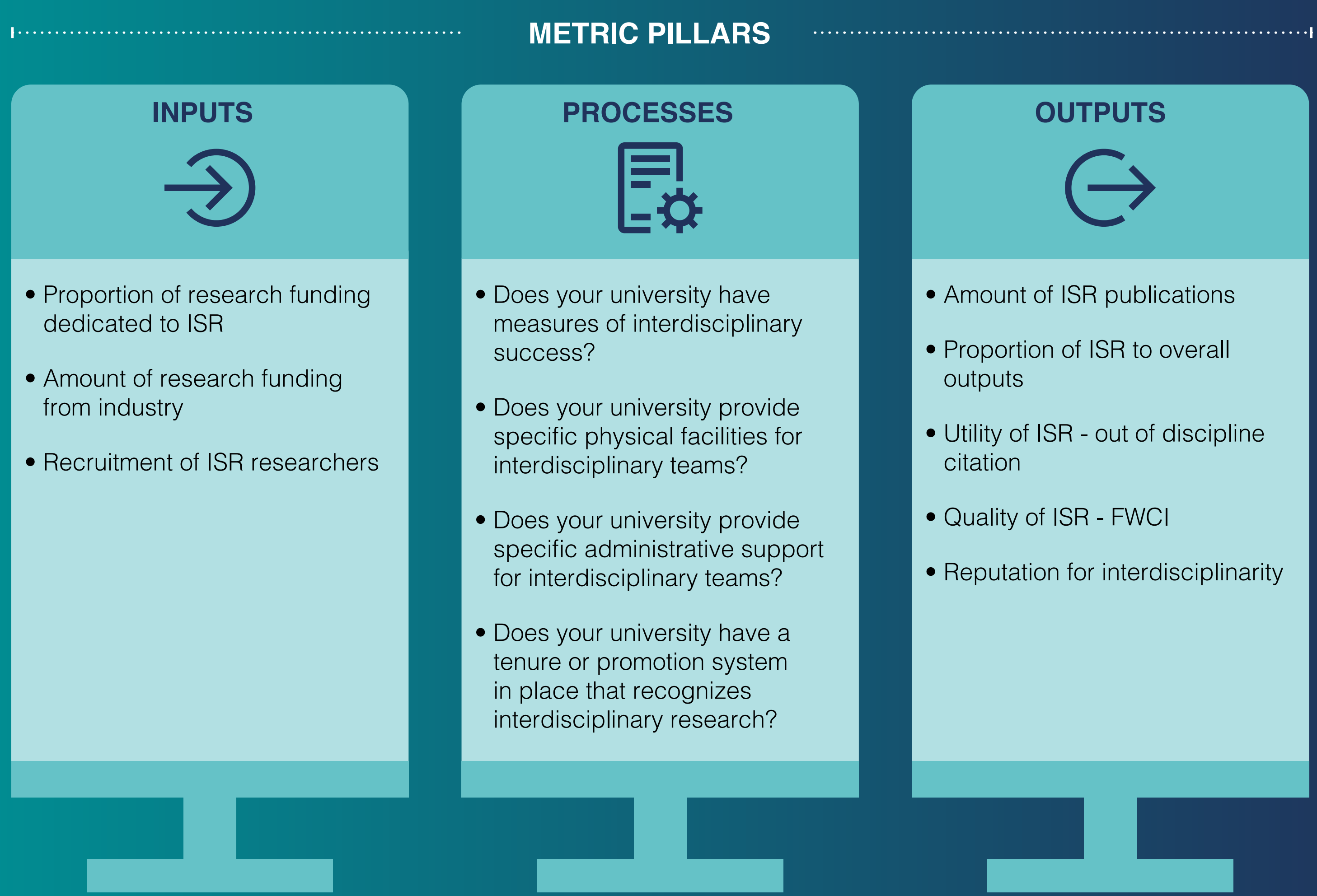
- How metrics might encourage greater interdisciplinarity (positive behaviours and attitudes).
- Any potential unintended adverse consequences of the measurement.
- The potential to collect data effectively, including the capacity of universities to respond to data requests.

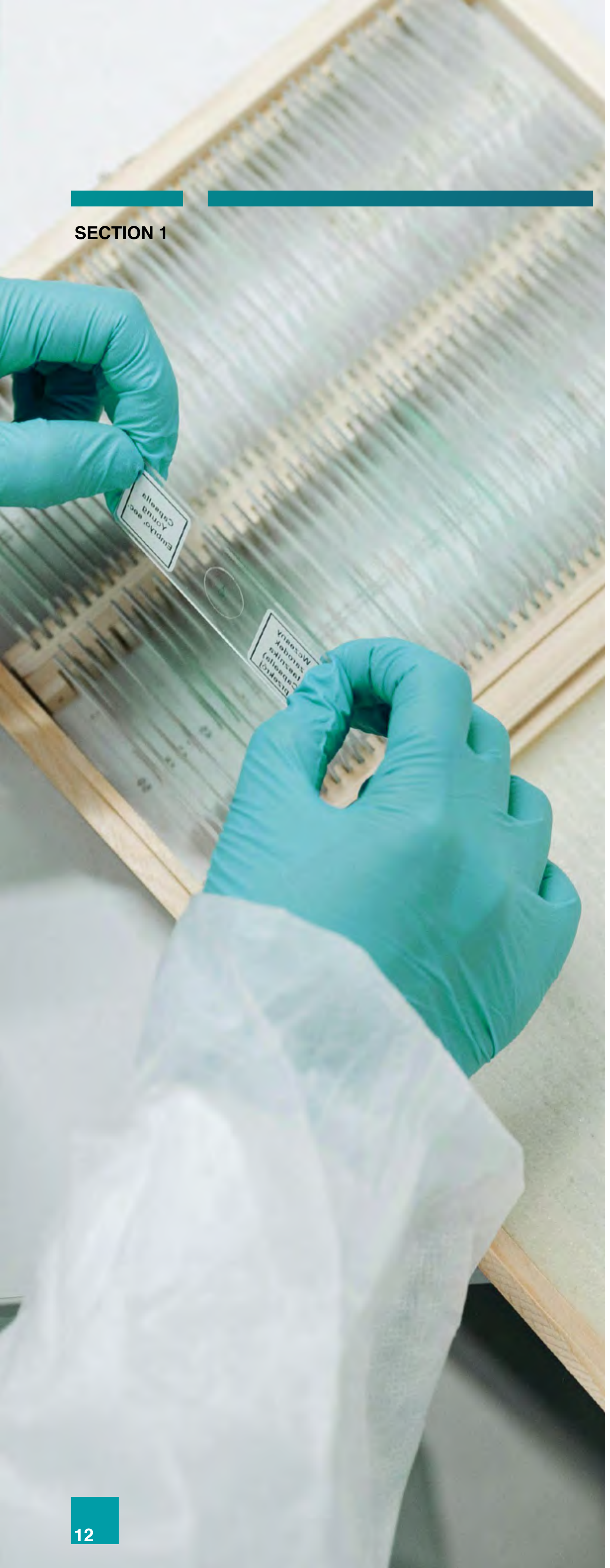
All metrics need to be:

- Powerful – they measure something with meaning.
- Sufficiently accurate – they are complex enough to measure within context.
- Understandable – explicable to a reasonable person in plain language.
- Universal – they should be widely reportable and applicable.

Based on the findings of the roundtables, and THE's own history and experience in developing rankings, it was determined that to best capture and measure interdisciplinary research, a framework of measurement should include the following metric pillars; inputs, processes, and outputs. The following Figure 2 shows the 12 metrics that were initially selected for the ISR under each metric pillar:

Figure 2 Metrics selected for ISR under three metric pillars





Collecting the data

There are three 3 ways in which the data for the ISR is collected:

1) The THE data collection portal (a system used in other THE rankings)
2) Surveys of institutions
3) Bibliometric data

THE Data Collection Portal

The portal is a repository for institutions to submit both quantitative data and qualitative evidence for the purposes of being assessed for rankings. For the ISR, institutions are required to provide three quantitative inputs related to the research funding dedicated to ISR, research funding from industry sources, and recruitment of ISR researchers.

Institutions also use the portal to supply evidence for the four qualitative processes. This includes evidence regarding measures of success for ISR, facilities for ISR teams, dedicated administrative support for ISR and tenure/promotion specifically for ISR.

Survey

The survey use for ISR was the general THE Academic Survey of global university academics that is also used for the THE World University Rankings which gauges university reputation. For ISR, there were additional questions regarding how academics were encouraged, enabled and rewarded for ISR, to ensure that the output reputation metric was specific to ISR.

Bibliometric Data

Using OpenAlex, bibliometric data was sourced for the four other output metrics, regarding the volume of ISR publications, the overall proportion of ISR publications, the out-of-field FWCI of ISR publications, and quality of ISR publications. This drew from a field of 47 million publications between 2018 and 2022, including 32.2 million journal articles, and 142 million citations.

Figure 3 Data collection processes

SECTION 2

2023 OVERVIEW AND METHODOLOGY ADJUSTMENTS FOR 2024

2023: Testing the data and preliminary findings

In 2023, institutions were encouraged to submit data without the production of a final ranking. The purpose of this was threefold; firstly, to familiarise universities with the concept of ISR and the metrics; secondly, to test the viability and ease of collecting the data, including the survey instruments; and finally, to test the veracity of the submitted data itself, including potential adjustments to metrics, weighting and normalisation processes that would underpin the eventual ranking. The outputs of the 2023 process were summarised this Product Development Report, providing a preliminary analysis of the data from universities. It was based on submissions from 1169 universities.

The report showed that university leaders and leading scholars world-wide believe that interdisciplinary research has an important role to play in solving global problems. Furthermore, they agreed that a ranking of institutions for interdisciplinary research could provide performance indicators and incentives to further strive for greater collaboration between academic disciplines.

In 2023, 1169 universities participated in the ISR data submission process, with India leading in valid submissions and strong engagement from the Global South.

The results of 2023 showed that participation was driven by institutions from countries in the Global South, with India having the most participating institutions with valid submissions. For the input pillar, universities from Asian countries performed the strongest, with Russia and Romania performing strongest out of the European nations.

For the process metric pillar, it was found that there was room for improving the quality of data submissions that provide evidence of the processes that support ISR. For the output metric pillar, The US and China, both conspicuously absent in the input and processes metrics, demonstrated relatively high quality ISR output.

Institutional level data analysis showed that universities in the Global North tended to perform better in output metrics than inputs or process metrics. In the Global South, the converse was true; there was real dedication as evidenced in the inputs and processes, but room for developing global standard research outputs and enhanced reputation. The three key recommendations for the sector were provided based on the findings in the report:

- More dedicated policy processes to enhance ISR, including physical facilities, administrative support, and staff incentives such as promotion.
- More funding for ISR as a percentage of overall research funding.
- Greater visibility for ISR outputs from the Global South, potentially through further collaboration with the Global North, to raise impact and reputation.

GLOBAL TRENDS IN INTERDISCIPLINARY RESEARCH
SECTION 2

2024: Revised methodology and launching the ISR ranking.

The results of the preliminary report suggested the ranking was viable at a global scale, and also revealed some potential limitations. In early 2024, THE's data team worked closely with senior representatives from the Schmidt Science Foundation to iron out complexities and inefficiencies with the data. Further consultation was held with universities to understand their perspectives on the data collection process and ranking methodology. These analyses and discussions, led to a decision, to reduce the number of metrics from 12 to 11, to determine the final eligibility criteria, and to refine the weighting of the metrics for the final version of the ranking.

Figure 4 shows that the input metric pillar (i1 and i2) is worth 19% of the ISR, the process pillar (p1, p2, p3 and p4) are worth 16% of the ISR, and the output pillar (o1, o2, o3, o4, and o5) are worth a total of 65% of the ISR. The biggest single weighting is for the reputation metric in the output pillar, whilst the quality of ISR as measured by FWCI is worth 20%. This reflects the decision to emphasize on research quality and reputation.

Figure 4 **Data Collection Processes**

Metric	Name	Weight
i1	Proportion of research funding dedicated to ISR	8%
i2	Amount of research funding from industry	11%
p1	Does your university have measures of interdisciplinary success?	4%
p2	Does your university provide specific physical facilities for interdisciplinary teams?	4%
p3	Does your university provide specific administrative support for interdisciplinary teams?	4%
p4	Does you have a tenure a promotion system in place that recognizes interdisciplinary research?	4%
o1	Amount of ISR publications	10%
o2	Proportion of ISR	5%
o3	Utility of ISR - out of discipline citation	5%
o4	Quality of ISR - FWCI	20%
o5	Reputation of support for interdisciplinary teams	25%

SECTION 3
ANALYSIS OF 2024 ISR RESULTS

Case study

Exploration, Discovery, and Innovation—Without Boundaries

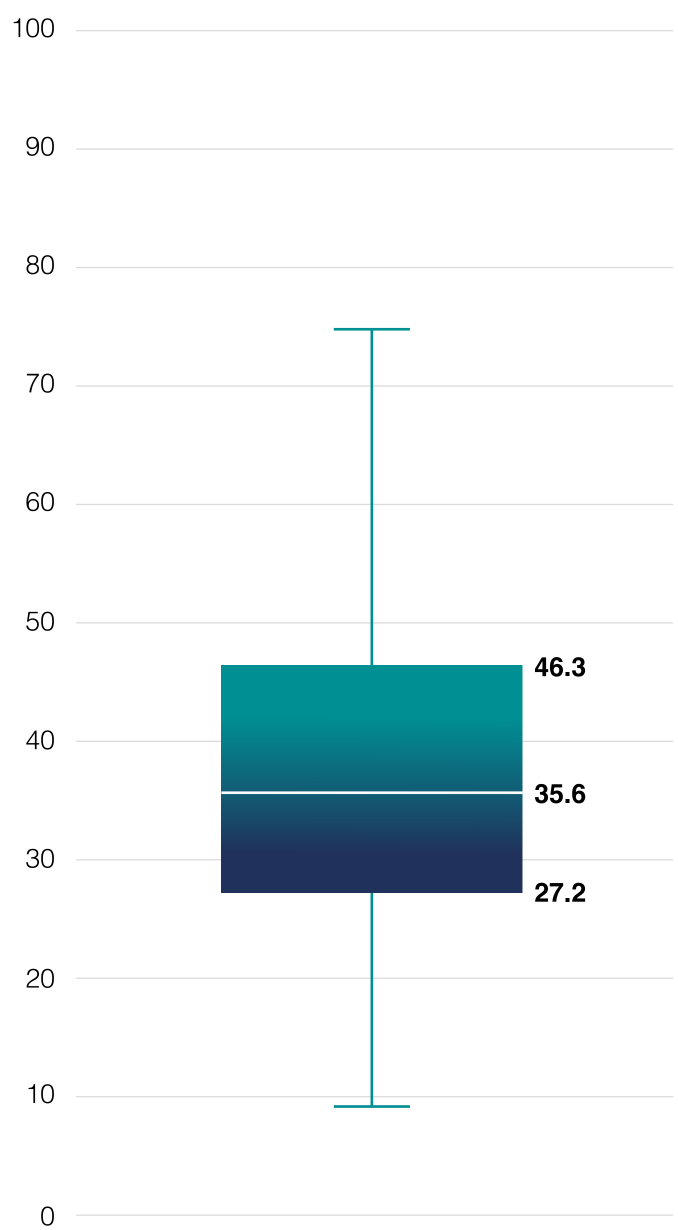
Caltech

The work of Caltech's 300 faculty is deepened and accelerated by the Institute's intentionally small, close-knit community of concentrated excellence. At Caltech, which has avoided conventional academic departments and is organized into just six multidisciplinary divisions, faculty and students meet at the intersections of disciplines and are provided with the resources and freedom to follow their imaginations. Caltech scholars collaborate across fields to foster understanding of the fundamental principles of nature, engineer innovative technologies, and apply these insights to address the most complex challenges of our time.

- Caltech faculty extend across traditional boundaries to launch new fields of study in science and industry. Earthquake engineering, behavioral genetics, neural networks, bioinspired engineering, geochemistry, optoelectronics, quantum information and matter, nanoscience, string theory, femtochemistry, aerospace, and neuroeconomics can all trace their origins to Caltech.
- Caltech's undergraduate students are prepared for the interdisciplinary nature of science and engineering through an academic program that exposes every student to a breadth of areas of study in the basic sciences as well as mathematics, the humanities, and the social sciences.
- In working across disciplines, Caltech faculty have created methodologies that allow for large-scale integrated-circuit design, at the base of today's consumer electronics industry; determined Earth's age; explained the structure of the solar system; linked smog to automobile exhaust; demonstrated how environmental lead accumulates and causes harm to the human body; developed the tools to measure the magnitude of earthquakes; invented automated gene sequencing; and discovered one of the smallest building blocks of matter—the quark.
- Caltech has more than 2,000 active patents and has launched as many as 12 startups per year (as averaged over the last five years).
- Caltech's rate of invention disclosures per faculty is twice that of any peer in the nation.
- Caltech has created more than four dozen cross-disciplinary research centers, institutes, and facilities, which serve as hubs for collaboration and discovery on campus, drawing upon the integrated expertise of the Institute's 300 faculty.
- Caltech's Hurt Scholars Program, brings early career faculty from across the Institute together in cohorts focused on collaboration, building connections across disciplines, and engaging in research and teaching that has the potential to define new fields of study, develop technologies, and advance innovative new solutions.

The Institute's interdisciplinary focus has pioneered fields like earthquake engineering, neural networks, bioinspired engineering, and quantum information.

Figure 5 **The Global Distribution of Overall Scores in The ISR**



Participation and global trends

For the 2025 ISR, **749 institutions** from around the world have been ranked, from a total of 1245 institutional submissions- a very strong participation for a new ranking. 1022 institutions provided meaningful answers- that is, responses that could meaningfully be used as data points. However, due to exclusion and validation criteria, this final list was reduced to 749 ranked institutions. The exclusion and validation criteria ensure stronger and more reliable data, which can be compared effectively over time. These criteria included a publications threshold and restrictions where universities only produce interdisciplinary research in non-science subjects.

The box and whiskers plot in Figure 5 shows the overall global distribution of scores in ISR, with a global median of 35.6, and a 75th percentile of 46.3. The upper 25% of institutions have a 'long whisker' of scores, indicating significant variation globally in the inputs, processes and outputs of ISR, with a few outlier institutions showing genuine global excellence. These outlier 'beacon' institutions are mainly from the United States, with two universities in Singapore and one each from the Netherlands, Germany, Switzerland, Hong Kong, China, Taiwan and Saudi Arabia.

Figure 6 shows that India has the highest number of institutions ranked in the ISR, followed by Turkey, Russia and the United States. With 65 institutions, India provides nearly 9% of all the ISR ranked universities. Amongst the 25 countries that provided at least ten institutions for ISR, there is genuine geographic diversity, with 12 countries from Asia, seven from Europe, four from the Americas, and two from Africa. Furthermore, there is significant developmental diversity amongst the highest-submitting countries for ISR; amongst the top 10 shown in figure 5, three countries are classified as lower-middle income by the World Bank, four as upper-middle income and three as high income. This could indicate that no matter what the region or income group, universities can be encouraged to forge interdisciplinarity as a means of addressing the social, economic and scientific challenges specific to each country and region.

Figure 6 **The Top 10 Countries With The Highest Number of Institutions Ranked in ISR**

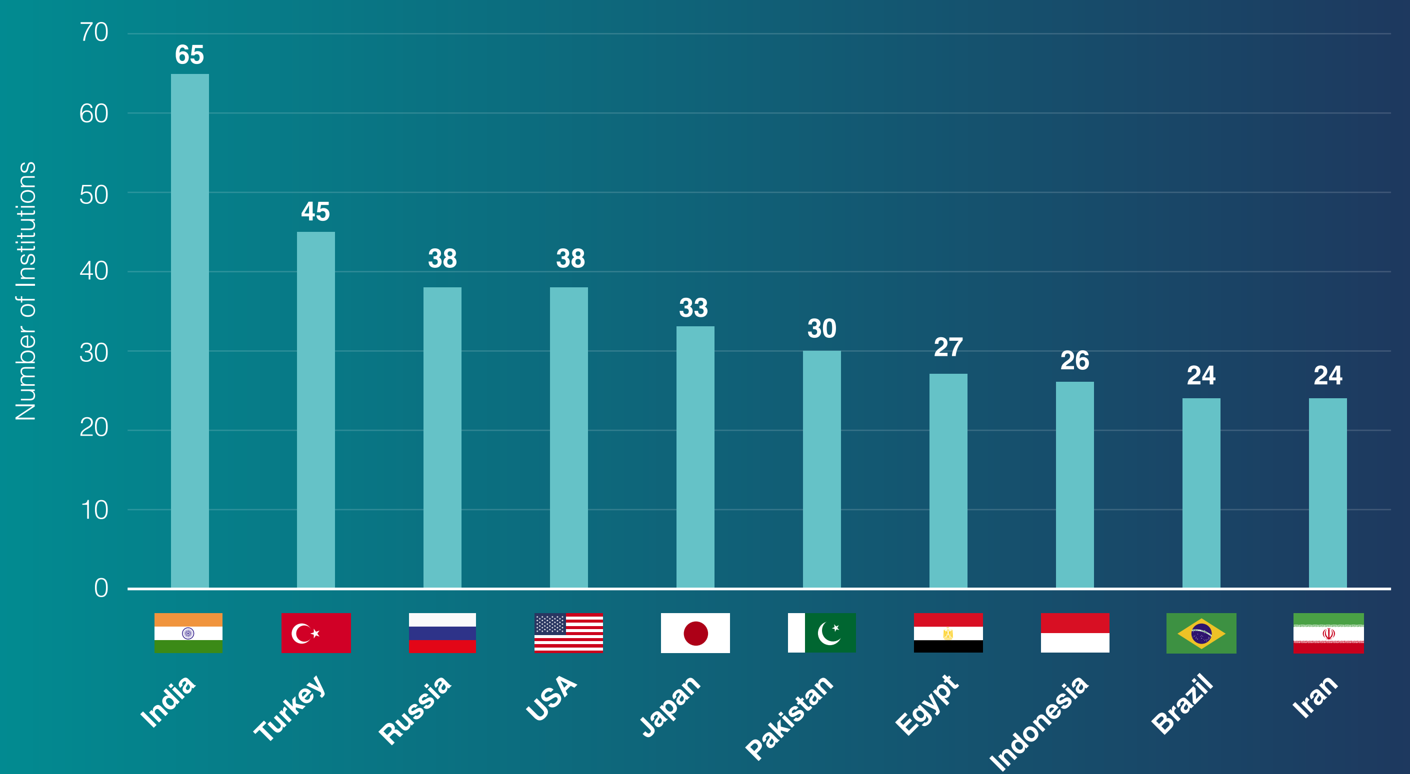


Figure 7 shows that Hong Kong has the highest average score in ISR (72.2), for countries that have at least five submissions in the ISR. Singapore, which provided only two universities for ISR, has the overall highest average, with a score of 86.6.

Figure 6 again reflects the geographical diversity of ISR, with ten countries from Asia, six from Europe, two from Africa, and one each from the Americas and Oceania. All with average countries scores above 50 are from higher income countries, most likely reflecting higher levels of investment in interdisciplinarity and a more substantially global impact in interdisciplinary science research. However, it can also be seen that lower-middle income countries can be as impactful, with Egypt less than one point behind France, and India marginally ahead of Portugal.

It should also be noted that Hong Kong, Australia, Germany and the UK all had only five universities ranked in ISR, and therefore only just make the threshold in figure 4. With 38 submissions, the USA can be regarded as the best performing 'large' country markets in terms of number of universities ranked. The top 10 US institutions average 85.5 in ISR. 72.2

Apart from Singapore, other countries with ISR average scores above 50 that did not make the threshold for figure 5 include the Netherlands, Switzerland, Denmark, Finland, Norway and Vietnam. This shows that participation in ISR needs to increase in order to better capture data on interdisciplinarity, demonstrating best institutional practices as well as indicators about what environments are created for interdisciplinary science at a macro-level.

Figure 7 **The top 20 countries by average overall score in ISR**
(minimum 5 institutions ranked per country)

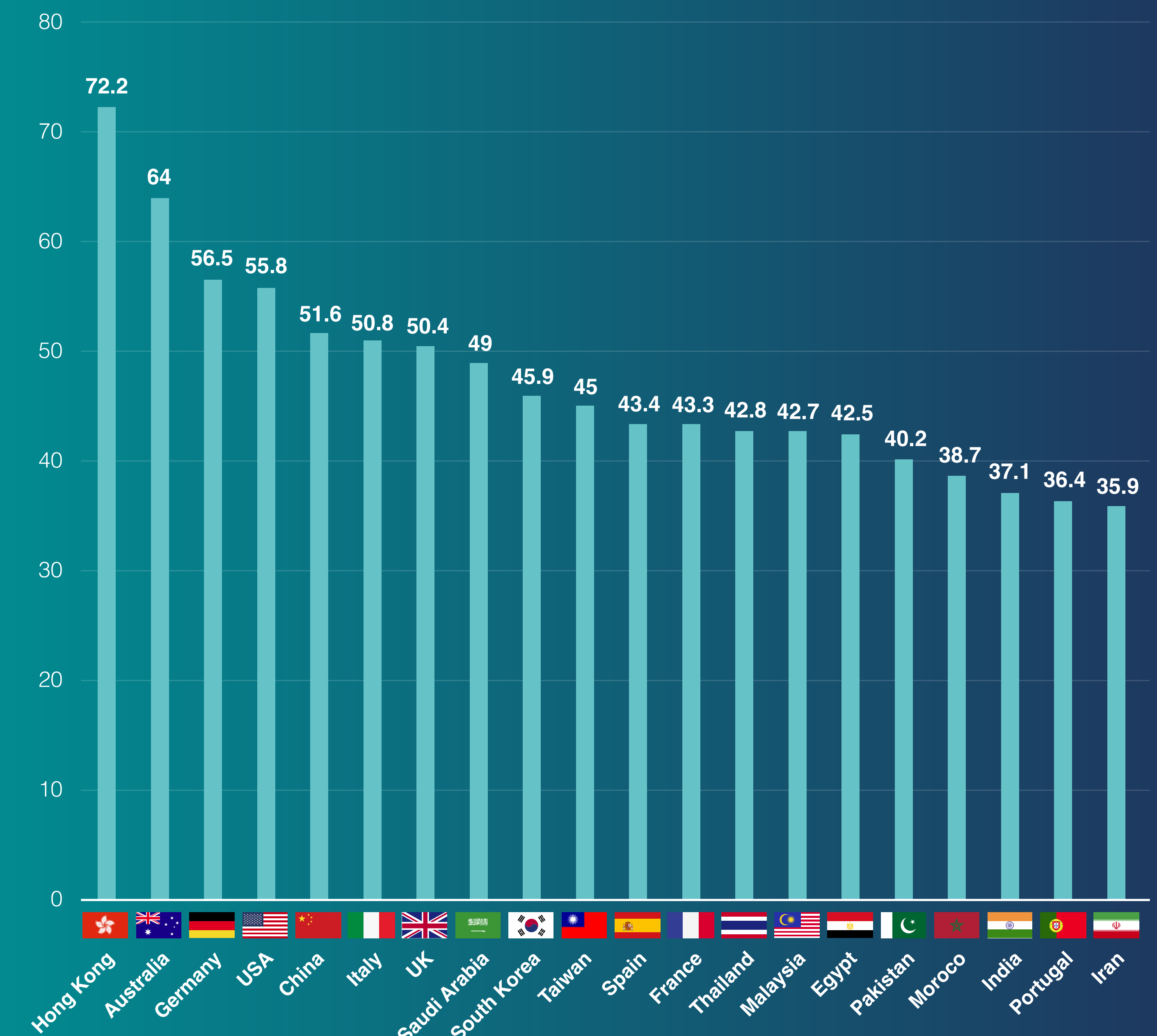
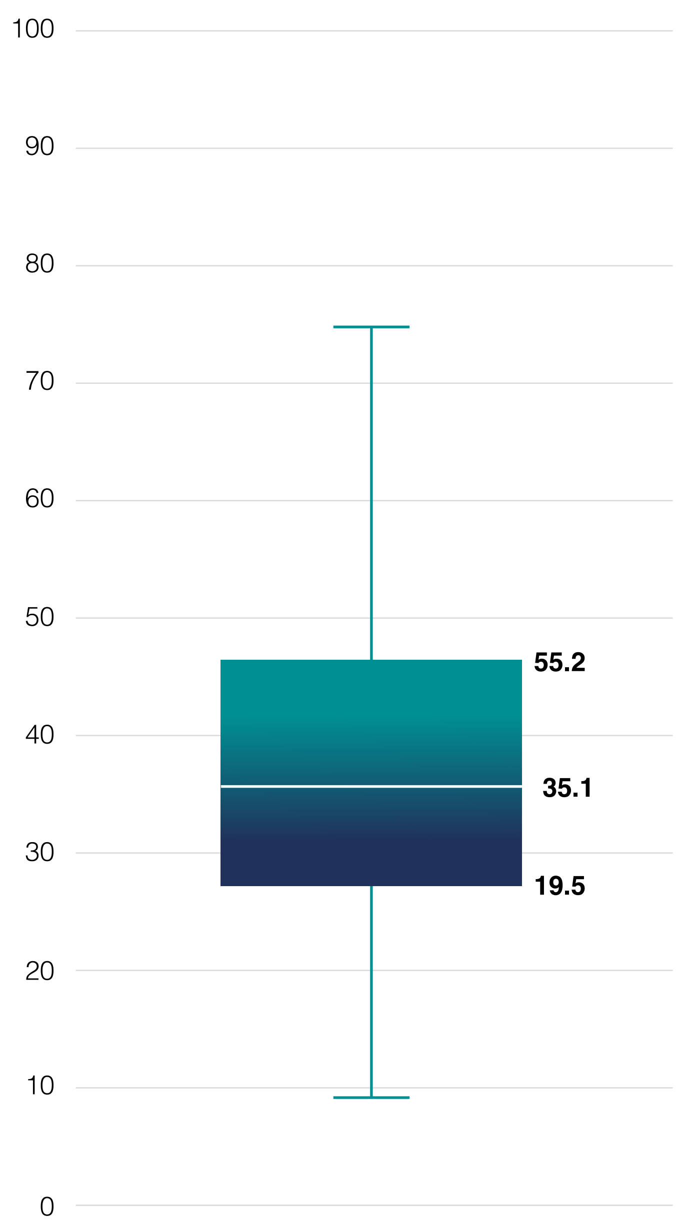


Figure 8 **The global distribution of overall scores for the Input Pillar in ISR**



Metric pillar-level analysis

The 11 metrics underpinning the ISR are divided into three metric pillars: inputs, processes, and outputs. Across all of these pillars, Hong Kong and Australia are top two performing countries in terms of the average score, amongst those with at least five ranked institutions in ISR.

Input pillar analysis

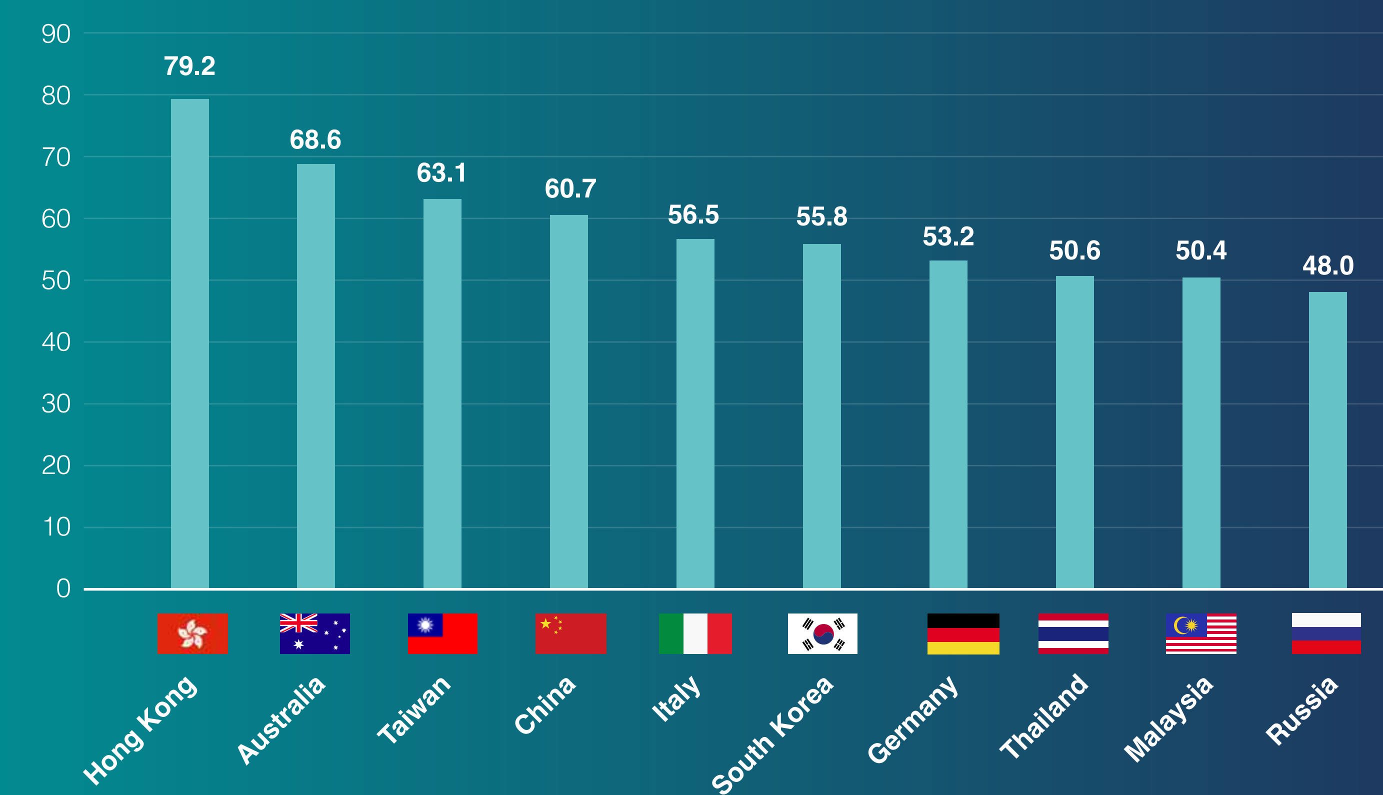
The box and whiskers plot in Figure 8 shows that the global median score for the input pillar is 35.1, with a 75th percentile of 55.25. The universities above the 75th percentile were drawn from a highly diverse group of countries, demonstrating a worldwide dedication to supporting more productive environments for interdisciplinary research.

Input pillar metrics account for **19% of the overall rankings.**

Figure 9 shows the top 10 country average scores for the input pillar metrics. Overall, the input pillar metrics account for 19% of the overall ranking. There are two metrics in this pillar: i) measuring the proportion of research funding dedicated to ISR, and ii) measuring the amount of research from industry. These metrics provide an indicative sense of the environment that can encourage interdisciplinary research across the sciences, with dedicated funding streams as well as industry-led funding to provide research and solutions to real life problems.

Figure 8 shows a limited geographical diversity, with strong representation from East Asia and more limited representation from Europe. Russia is the best represented country in the top 10 for the input pillar, with 38 institutions. Some countries with average input pillar scores above 60 but had less than 5 institutions ranked in the overall ISR include Cuba, Singapore, Ghana, Latvia, North Macedonia, Ireland and Brunei. This increased diversity can be encouraged through further participation in the data collection processes.

Figure 9 **The top 10 countries by average Input Pillar scores in ISR**
(Minimum 5 institutions ranked per country)



Interview with Schmidt Science Fellow Dr. Rebecca Pinals

Dr. Pinals is currently a Burroughs Wellcome Fund CASI Fellow at the MIT Picower Institute. She is an incoming Assistant Professor of the Department of Chemical Engineering at Stanford University, a Sarafan ChEM-H Institute Scholar, a Knight Initiative Faculty Fellow, and a MAC Impact Philanthropies Faculty Fellow, beginning fall 2025.

1 Can you describe your journey as an early career interdisciplinary scientist?

I spent my pre-Ph.D. career exploring different avenues of research, everything from heterogeneous catalysis for biofuel production, to characterization of deep subsurface sediment, to pharmaceutical dissolution kinetics. However, it was in the summer of that I discovered my love of nanoparticles as part of an NSF REU program working with Prof. Alan Sellinger at the Colorado School of Mines. My fascination with the subject has kept me here at the nanoscale in various forms over the past decade.

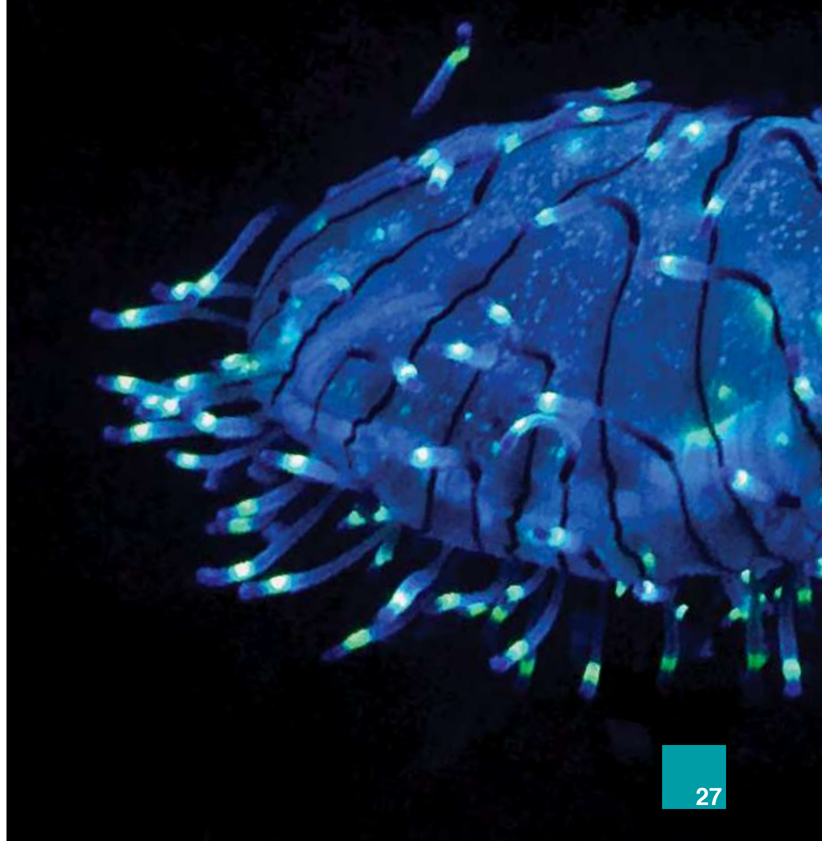
I completed my Ph.D. research with Prof. Markita Landry in UC Berkeley's Chemical and Biomolecular Engineering Department. Here, I worked to develop a fundamental understanding of how nanoparticles interact with biomolecules, and subsequently how to apply this insight toward rational nanosensor design. I adopted a joint experimental and theoretical approach to study the complex phenomenon of protein corona formation, resulting in a body of work that quantitatively described the composition, morphology, kinetics, and driving forces of such nano-bio interactions. These insights enabled me to design and create improved nanosensor constructs for targets including the SARS-CoV- spike protein.

For my postdoctoral work, I was inspired to pivot into neuroscience research for a few reasons, with a particular focus on Alzheimer's disease. I reached out to Professor Li-Huei Tsai, who is the head of the Picower Institute for Learning and Memory at MIT, and she welcomed me into her laboratory. Shortly thereafter, I was thrilled to receive the support of the Schmidt Science Postdoctoral Fellowship to pursue this research pivot. This timeline is important to me in underscoring the fact that Li-Huei, as well as Markita and my other mentors, have all intrinsically valued interdisciplinarity and have supported me even when I came in with a lot to learn.

As a Schmidt Fellow at MIT, my research focuses on building tools and models to discover the mechanistic underpinnings of Alzheimer's disease. I take an interdisciplinary approach, drawing upon my formal training in chemical engineering to solve problems in neuroscience. I am building human induced pluripotent stem cell (iPSC)-derived brain models that recapitulate key biological structures and functions, including an integrated blood-brain barrier with neuronal components. Such D brain models are critical to represent the human brain more holistically under both healthy and diseased states, providing a better depiction of neurodegenerative disease during the early stages of onset and subsequent progression. Further, I am mapping biomolecular signatures associated with neurodegenerative disease and investigating how certain Alzheimer's disease risk genes impact cerebrovascular function. Throughout my career, I have been extremely grateful to learn from, collaborate with, and mentor scientists across a broad range of disciplines. During my time as a postdoctoral researcher, I was honored to receive another award that exemplifies interdisciplinarity: the Burroughs Wellcome Fund Career Award at the Scientific Interface (CASI).

The Schmidt Science Fellows program has been instrumental in empowering me to switch fields and providing the freedom to apply my engineering and nanoscience training to neuroscience research challenges. Moreover, I have found some of my closest friends as part of the Schmidt program; the community is incredible. As a next step in my career, I am ecstatic to be starting my own laboratory at Stanford University, as part of the Chemical Engineering Department and the Sarafan ChEM-H Institute. The ChEM-H Institute embodies these ideals of interdisciplinarity, and I cannot wait to be a part of this vibrant scientific ecosystem with an emphasis on transformative research for human health and training the next generation of STEM leaders. In my lab, we will leverage chemical engineering principles to explore the nano-neuro interface. We will build cellular neuro-models of the human brain and rationally designed nano-tools to tackle problems and answer questions in neuroscience and neurodegenerative disease.

"Throughout my career, I have been extremely grateful to learn from, collaborate with, and mentor scientists across a broad range of disciplines. Interdisciplinarity has empowered me to switch fields and apply my engineering and nanoscience training to tackle challenges in neuroscience."



2 What key challenges have you encountered while working on interdisciplinary research projects, and how have you and your team addressed them?

Working on interdisciplinary research projects during my time as a postdoctoral fellow has often felt like studying abroad in a new intellectual landscape. Entering a different field, I found myself navigating a "language barrier" to make sense of the new terminology and jargon. Beyond the language itself, the questions of interest were fundamentally distinct. What sparks curiosity for me as an engineer might not hold the same interest for a biologist or neuroscientist. However, I found that our commonalities outweighed our differences, and our shared passion for discovery transcended these divides. We all loved a well-designed experiment, the elegance of robust controls, and those elusive "aha" moments when new insights emerge in the lab.

> **"Working on interdisciplinary projects often felt like navigating a 'language barrier,' but shared curiosity and collaboration transcended these divides, driving research in unexpected and exciting directions."**

I am grateful to be a part of an environment that embraces these differences. My mentors and colleagues in the lab are open and engaging, and as I reached out for help in unfamiliar areas, they responded with patience and understanding. Merging different ways of thinking is undoubtedly challenging, but it's this blend of perspectives that drives research in unexpected and exciting directions. I brought my molecular lens to the table, and through collaboration, learned to think on a larger scale: How do these molecular changes propagate to impact the cellular, tissue, and organismal levels? These challenges of interdisciplinary science drive us to be better scientists and engineers.

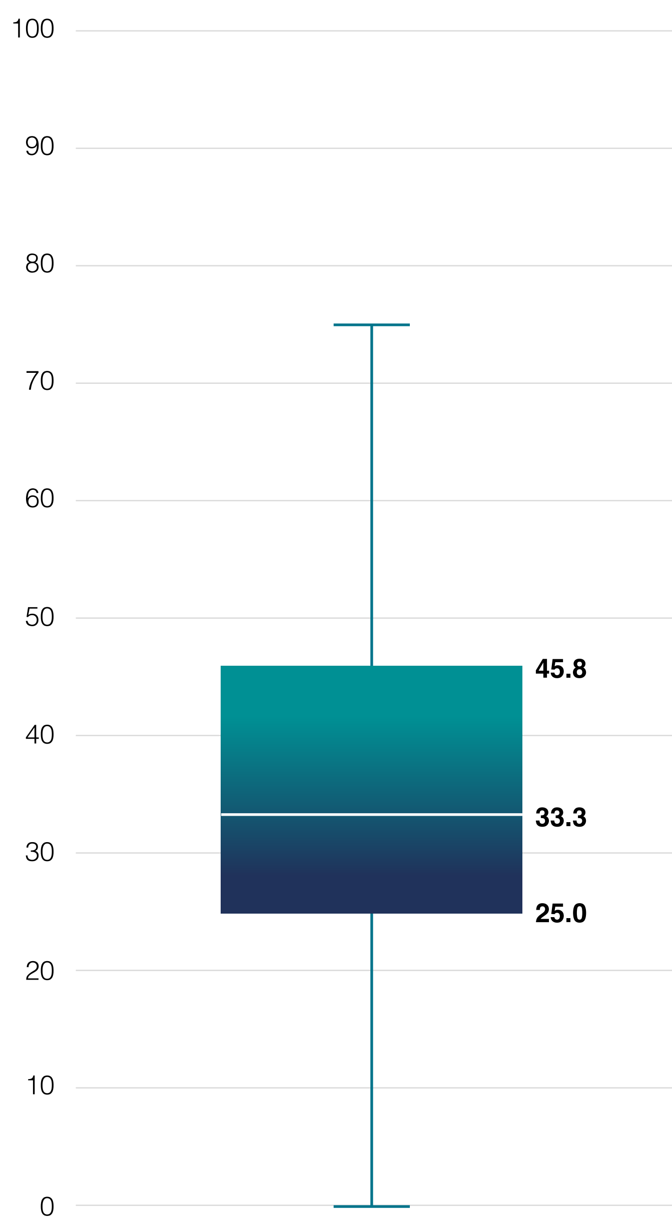
3 Looking to the future, where do you see opportunities for further improvement in the practice of interdisciplinary science?

During the Schmidt Fellowship, a speaker shared an analogy that resonated with me: interdisciplinary scientists should aim to be "pi-shaped"—having depth in two fields (the two vertical bars representing our PhD and postdoctoral work) and connecting these fields through a new, unified perspective (the horizontal bar representing our future endeavors). I love this analogy, and I also recognize the importance of first developing deep expertise before broadening into new areas. For me, a strong foundation in chemical engineering provided powerful tools to approach global challenges that I then applied to new research domains. I believe interdisciplinary science could be enhanced by encouraging collaboration and exploration early in one's career, while reserving major field transitions for a more independent stage, when the depth of knowledge can fully support new applications. Building a strong sense of community is also vital, so that researchers do not feel like lone explorers venturing into unfamiliar territory.

4 How would you sum up your experience with interdisciplinarity, its value, impact, and future potential?

- My scientific pursuits are grounded in a sense of epistemological modesty—a recognition that, while we seek truth, we cannot fully grasp all aspects of complex systems, and so our conclusions must remain open to revision. By embracing interdisciplinarity, we broaden our framework for understanding these complex systems; pushing the boundaries of how we think about the science, validate those ideas, and uncover what we have yet to learn.
- Very few ideas are truly novel. Rather, it is by applying ideas across disciplines that we are able to achieve innovation, to tackle the big problems, to make an impact. To me, innovation is less about isolated creativity and more about the connection of knowledge across disciplinary boundaries to address real-world challenges.

Figure 10 **The global distribution of overall scores for the Process Pillar in ISR**



Process pillar analysis

The box and whiskers plot in **Figure 10** shows that the global median score for the process pillar is 33.3, with a 75th percentile of 45.8. There is a relatively long whisker for the upper 25% of universities in the process pillar, including several outliers. The upper tier of the process pillar has a significant number of universities from the US, but also has a lot of geographical diversity, with universities from countries and territories including Northern Cyprus, Egypt, Azerbaijan, Algeria, Nigeria and Palestine joining more established universities from Hong Kong, Singapore and Germany.

The upper tier of the process pillar **has a significant number of universities from the US**

Figure 11 shows the top 10 country average scores for the process pillar metrics. Overall, the process pillar metrics account for 16% of the ISR. There are four metrics in this pillar weighted at 4% each, relating to questions about success measures, dedicated physical facilities, specific administrative support and promotion system all related to interdisciplinarity. These metrics are also related to the environment for collaboration between sciences, focused on how universities can enable and reward further interdisciplinarity at an institutional and individual level.

The process pillar averages for the top 10 countries show some geographical diversity, with representation from the Latin American region, the Middle East, South Asia, East Asia, Oceania as well as European and North America. However, the average scores and the global median for this pillar are the lower across the three pillars, indicating global potential for improving the measures that support interdisciplinarity. Strategic recommendations may include developing institutional key performance indicators to monitor the processes and impact of interdisciplinary research, developing specific collaborative research spaces, creating new independently administered interdisciplinary research centres, and creating a transparent system of reward and incentivisation for academics working across scientific and non-scientific fields.

A number of countries with less than five universities ranked in ISR scored above 60 in the process pillar metric, including North Cyprus, Palestine, Singapore, Denmark and Ireland.

Figure 11 **The top 10 countries by average Process Pillar scores in ISR**
(Minimum 5 institutions ranked per country)

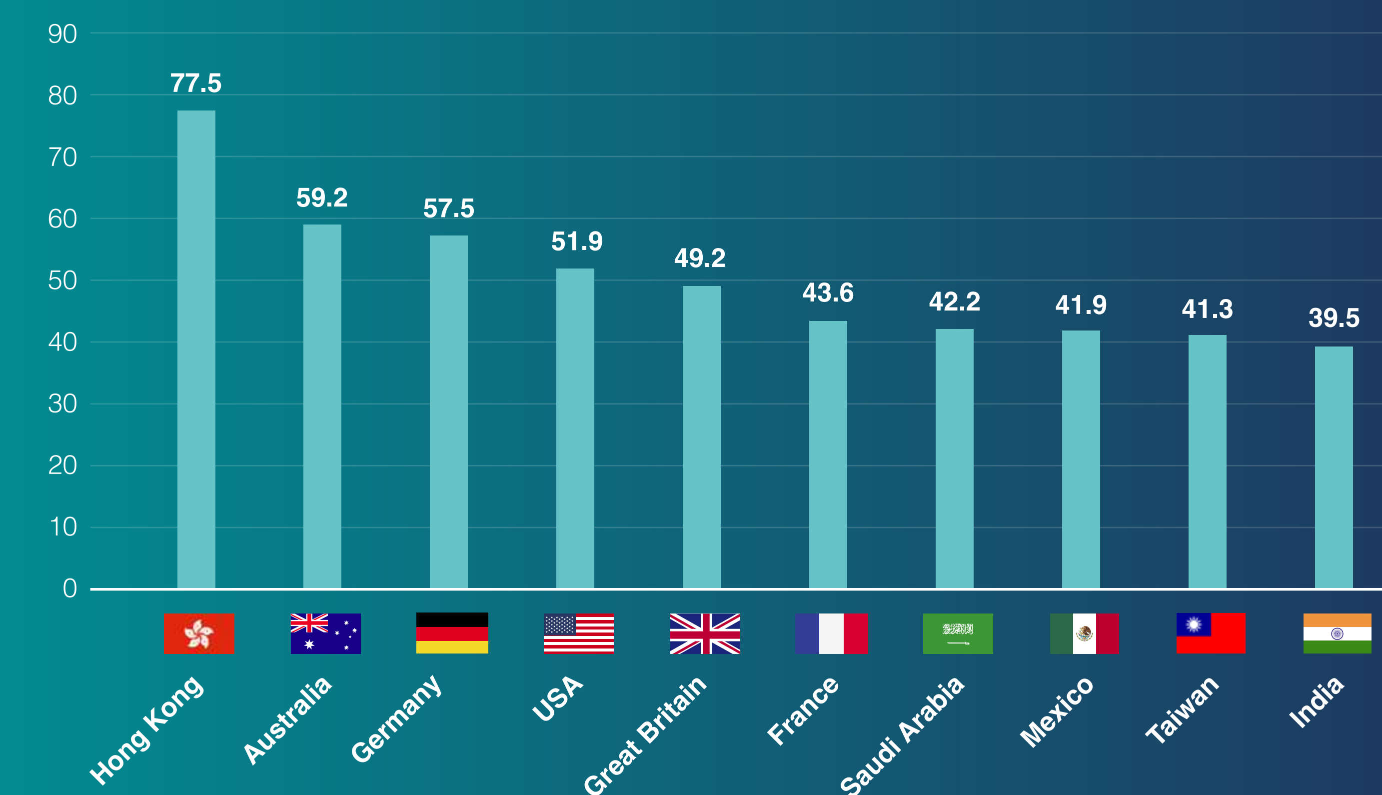
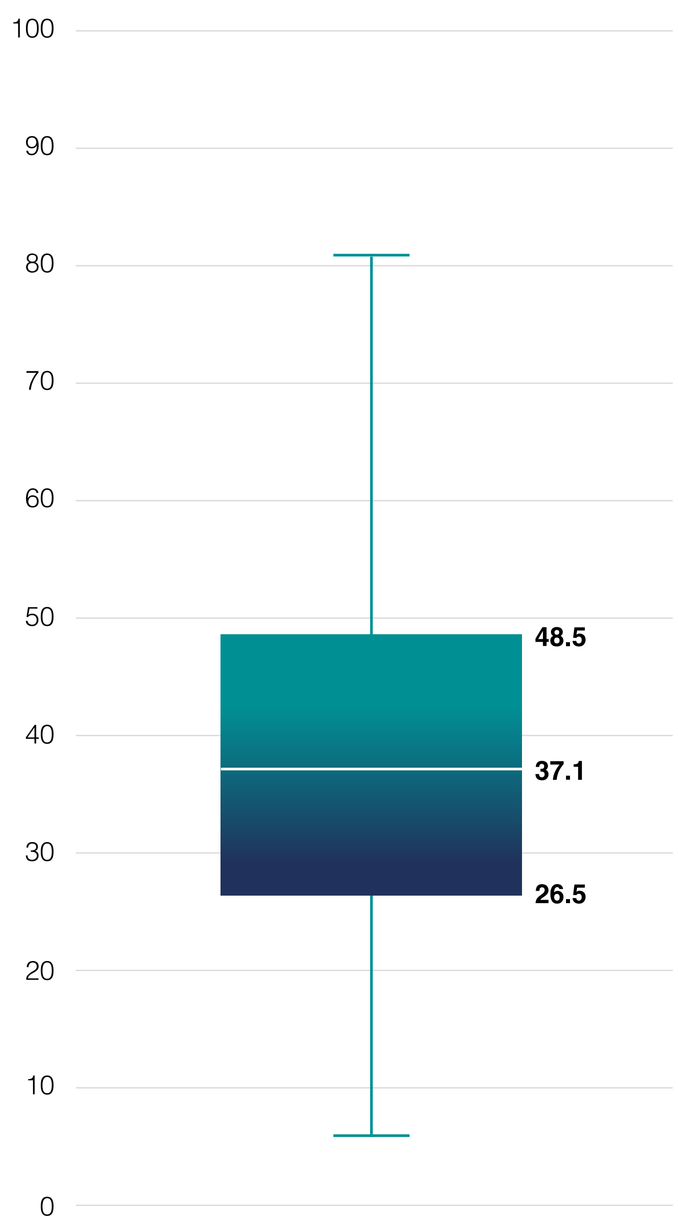


Figure 12 The global distribution of overall scores for the Process Pillar in ISR



Output pillar analysis

The box and whiskers plot in Figure 12 shows that the global median score for the output pillar is 37.1, with a 75th percentile of 48.55. Worth 65% of the overall ISR, the output pillar has the greatest impact on a university's final ranking, and reflects both the quality of its interdisciplinary science research, as well as its reputation for interdisciplinarity approaches more broadly.

The output pillar upper 25% tier is dominated by US institutions, with beacon outliers also from the Netherlands, Singapore, Germany, Switzerland, China, Spain and Malaysia.

Though global research is generally dominated by the Anglosphere, **interdisciplinary research showcases greater diversity**

Figure 13 shows the top 10 country average scores for the output pillar metrics. Overall, the output pillar metrics account for 65% of the ISR, and therefore the most important contributor to a university's overall rank in the ISR. As a research-intensive ranking, the outputs and impact of research are the core focus of ISR, giving the output pillar a higher weighting. There are five metrics in this pillar, four related to research that are captured through bibliometric data, and one related to a university's global reputation for supporting interdisciplinarity. The reputation metric by itself is worth 25% of the overall ranking.

There is a diversity of countries represented in the top 10 for the output pillar in terms of geography, including two lower-middle income countries in Egypt and Pakistan. This suggests that even though global research is generally still dominated by the Anglosphere, interdisciplinary research showcases greater diversity, with some strong performances from outside of the traditional research powerhouses. This may indicate growth opportunities to develop greater interdisciplinary and transnational research, with greater collaboration between universities of the Global North and Global South.

Other countries with a score of over 60 in this pillar, but had less than five universities ranked in ISR, include Singapore, Netherlands, Switzerland, Estonia, Finland and Vietnam.

Figure 13 The volume of ISR versus the quality of ISR

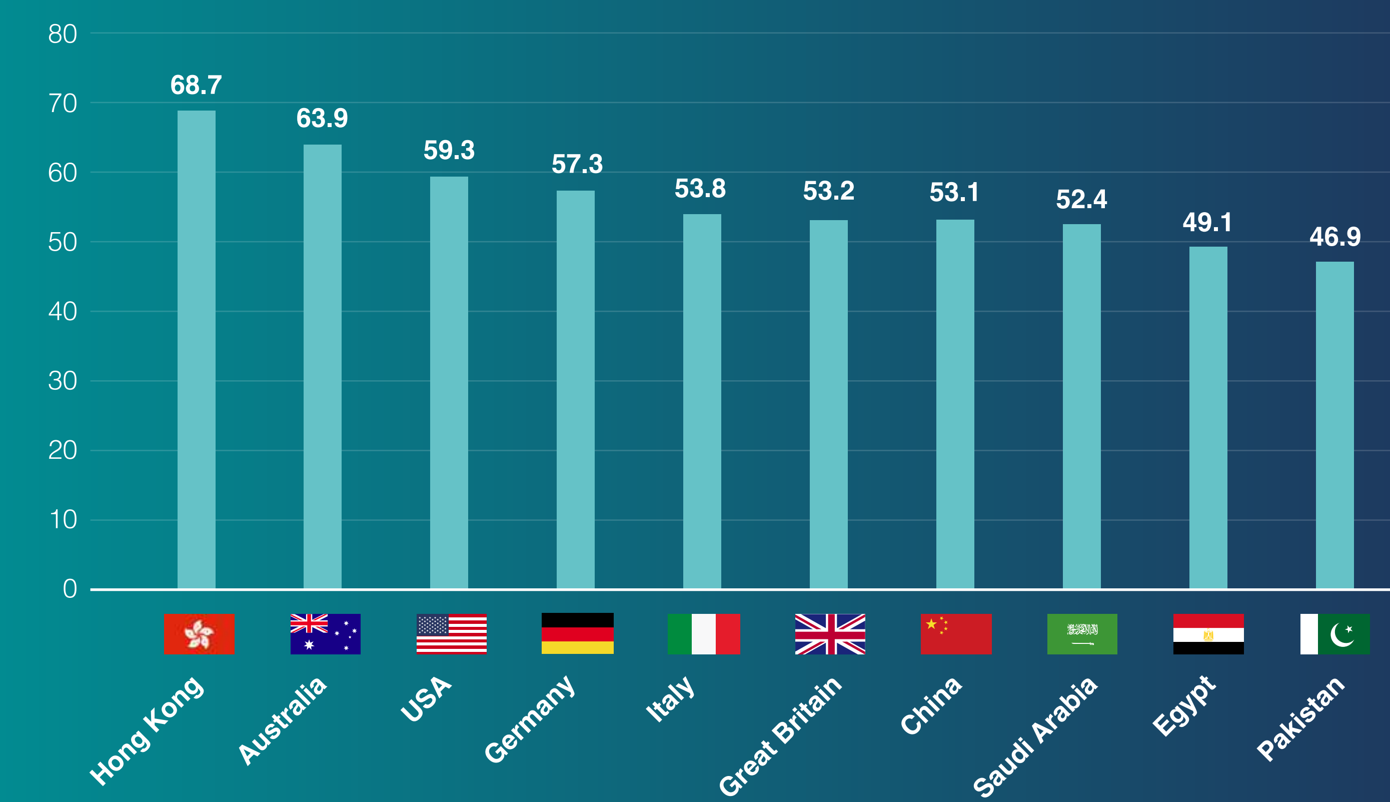


Figure 14 shows one of the key output metrics- the quality of interdisciplinary science research as measured by FWCI at the 75th percentile (known as 'Research Quality'), against the volume of ISR publications, showing only countries with at least 50,000 overall science publications in the last four years. For all the countries displayed, 23% and 28% of their overall science publication are ISR. The US and China lead in terms of volume of ISR publications, both scoring above the global median of 1.4 for Research Quality. Universities from India also score above the global median.

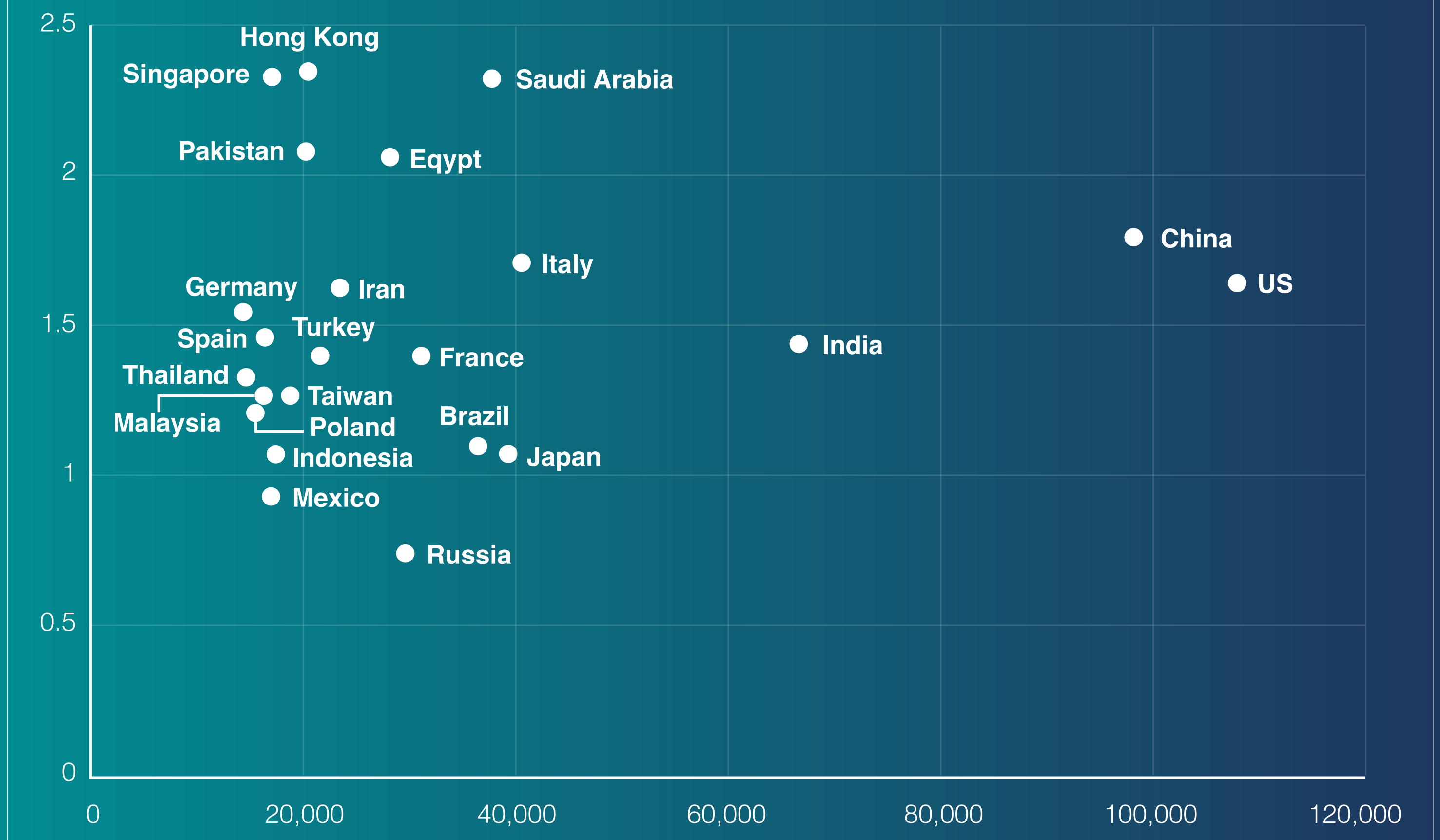
At the lower end of FWCI 75 scale, Brazil, Japan and Russia are three significant markets for ISR (all above 25,000 ISR publication) that are currently below the global median for Research Quality. All three of these countries had over 20 universities ranked in ISR, providing a good snapshot of the overall quality for ISR in those countries.

The upper end of the Research Quality scale is significant as it demonstrates the quality of ISR in countries that could be deemed to be a part of the Global South- that is, a group of countries that have traditionally been outside of the spheres of major global influence in terms of shaping society, industry and economy, and may have been subjected to unequal colonial relations during the 19th and 20th centuries. Nevertheless there is a great deal of income diversity in the Global South (e.g., the significant GDP per capita difference between Saudi Arabia and Pakistan), leading to differential rates of investment in higher education systems and research.

The US and China lead in ISR publication volume, both exceeding the global median of 1.4 for Research Quality.

All five countries in Figure 13 with a Research Quality median score of over 2 are from the Global South, representing different parts of Asia and Africa. Though Hong Kong and Singapore provide only five and two universities respectively for the ISR, the sheer volume of their ISR output coupled with high quality (Research Quality median scores of 2.35 and 2.33 respectively) makes them significant contributors to global ISR, with the highest FWCI ratings. However, Saudi Arabia, with over 37,700 ISR publications and a Research Quality median score of 2.32 is also an emerging global force for interdisciplinary science. Pakistan and Egypt are the final two countries with Research Quality median scores of over 2, and both topped over 20,000 ISR publications. The achievements of universities in Pakistan and Egypt in ISR can be particularly lauded given that they are in the lower middle-income group.

Figure 14 The volume of ISR versus the quality of ISR



Institutional Analysis

The ISR country-level analysis has demonstrated a strong participation from countries in the Global South, and highlighted relatively low participation from countries such as the UK, Australia, Germany and the Netherlands. However, at an institutional level, there is still good representation from the Global North in the upper tiers of the ISR. For example, the US provides 21 out of the global top 200, and 16 out of the global top 100. Despite Australia only having five universities overall in ISR, three of those are in the global top 30. There are also 21 universities from Europe in the global top 100.

Seven institutions in the global top 10 of ISR are from the US, with **Massachusetts Institute of Technology** the highest ranked university in the world for ISR. **Stanford University** is the highest ranked university in the output pillar, and is joint first with **California Institute of Technology** and the **University of Michigan** for the process pillar. **Duke University** is the second highest ranked university for the input pillar.

Hong Kong and Singapore provide a total of six of the global top 30, with both the **National University of Singapore** and **Nanyang Technological University** from Singapore in the global top 10.

Institutional performances at pillar-level demonstrates how diverse the ISR is. For the input pillar, which focuses on the environment created for interdisciplinary research, **Prince Mohammad Bin Fahd University in Saudi Arabia** is the highest ranked university. Overall, 13 countries are represented in the top 20 for the input pillar, though only one of those- the Duke University- are also in the top 20 for the output pillar. Whilst there is demonstrable geographical diversity in the upper tier for the input pillar, only one university, **Kalinga Institute of Industrial Technology** in India, is from a lower-middle income country.

Seven of the global top 10 institutions in ISR are from the US, with MIT ranked as the highest in the world for interdisciplinary research.

Overall, there is less geographical diversity in the upper tier of the process pillar, with 12 of the top 25 being from either the US and France. There are four French universities in the top 15 for the process pillar, led by **Aix-Marseille University**, though none of them are in the overall global top 50 for the overall global ISR ranking.

Finally, for the output pillar- which accounts for 65% of the overall ISR ranking- 11 of the global top 20 universities from the US. **Wageningen University** is the 2nd highest ranked institution for the output pillar, and the highest from Europe, which is also represented from **Technical University of Munich** in Germany in the top 15. Outside of Singapore there is less representation from the Global South in the global top 20 for the output pillar, with **Fudan University** in China, **Universiti Teknologi Malaysia** and **Cairo University** in Egypt all in the top 20 of the output pillar, and who are all also in the global top 40 for the overall global ISR ranking.

CONCLUSIONS

The first edition of the ISR showcase the largest number of universities to debut in a THE global ranking. Developed over a two and half year period, the ISR is the result of wide ranging sector consultation, preliminary data collection and analysis, and ongoing refinement to metrics and methodology to bring about an approximation of the world's leading institutions in interdisciplinary science.

1. The highest ranked universities in ISR- which can be said to be those with the highest quality research in ISR and the most significant impact- are dominated by the US, which provides 12 universities out of the global top 20. Singapore is the only other country with more than one university in the top 20.
2. Yet beyond the top 20, there is a genuine diversity of countries represented in the ISR rankings, with 21 countries represented in the global top 50. This includes universities from lower-middle income countries, as well as upper-middle and high income countries
3. There is relatively strong participation from universities in the Global South, which may evidence a greater emphasis on interdisciplinary solutions to the direct challenges faced in those societies.
4. In terms of volume and quality, the United States can be said to be the global leader in ISR, though China and India are also other large higher education sectors demonstrating dedication and quality to ISR. The city-states of Hong Kong and Singapore have an outsized impact on global ISR in terms of both volume and quality.
5. Countries that sometimes are outside of the radar of discussions of global university rankings, such as Saudi Arabia, Pakistan and Egypt, all evidence good quality of ISR, particularly using FWCI indicators. This shows that the loci of excellence in ISR may be more distributed to include the Global South.
6. The output pillar is dominated by the United States, but the input and process pillars show geographic and income-level diversity, indicating the dedication to enabling a good environment for interdisciplinarity, is widespread.
7. Funding levels are understandably variable across different countries and territories, but the percentage of ISR publications to overall science publications are relatively consistent globally.

RECOMMENDATIONS

There are six key recommendations from this report, relating to participation, funding, partnerships, internationalisation and sustainability.

1 **The ISR ranking provides metrics that can allow universities to track how changes to inputs (such as funding) and processes (such as administrative support for ISR) can lead to impacts on outputs including research quality and reputation.** Participation in ISR can give universities the tools to monitor and evaluate more effective ISR and more impactful discoveries as a result.

2 **The ranking allows a better understanding of the relative proportions of income for ISR**; this can be leveraged by universities and policymakers to lobby for better allocations of public funding for ISR, and to understand how shortfalls in funding can be addressed through partnership with industry and commerce.

3 Whilst interdisciplinarity is to be encouraged within universities, **the ISR ranking can also provide transparent information about the kind of institutions a university may have research synergies with,** including data on their quality and research environment. The ranking can act as an enabler for better partnerships.

4 Relatedly, there is clear evidence of excellence in many universities of the Global South, and **the ISR ranking should act as a stimulant to accelerating greater co-operation between institutions and governments** between the Global North and South to solve genuine global challenges.

5 Interdisciplinary is also at the core of the United Nations Sustainable Development Goals (SDGs). **There is opportunity for universities and policymakers to use data from the ISR and THE Impact Rankings to formulate targeted, data-driven research strategy to meet the UN SDG targets.**

6 Despite record participation in terms of a debut ranking, there are a number of countries, mainly from the Global North, that have far less universities participating in the ISR, which leaves a gap in the data analysis in terms of the true global picture for ISR. Efforts must be made to ensure the benefits of participation are clear.

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