Global research priorities in support of risk informed sustainable development and planetary health 2020-2030

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For the science and technology community to effectively support, engage and guide the implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030 (Sendai Framework), the Paris Agreement on climate and the 2030 Agenda for Sustainable Development (2030 Agenda), in humanity's attempt to establish resilient development pathways for society and planetary health, we must expedite greater alignment and more effective deployment of finite scientific, academic and technological capabilities in risk science.

This non-paper presents preliminary thoughts of the International Science Council (ISC) and the UN Office for Disaster Risk Reduction (UNDRR) with regard to the development of global research priorities and related implementation support structures in support of risk informed sustainable development and planetary health 2020-2030.

1. Rationale

Risk-informed sustainable development in a time of non-linear change

As presented in the Global Assessment Report 2019 (GAR 2019)[1], extreme changes in planetary and socioecological systems are happening now. These changes occur across multiple dimensions and scales more quickly and surprisingly than we ever thought possible. Non-linear change is a reality, and new risks and correlations are emerging in ways that we have not anticipated. Threats that were once considered inconceivable, no longer are.

Risks generated by the interaction of complex human and natural systems, amplified by changes in the climate, are increasing the propensity for systems reverberations, setting up feedback loops with cascading consequences that are larger, more complex and more difficult to foresee – ultimately reversing efforts to achieve the 2030 Agenda (GAR 2019; Keys et al. [2] 2019). The Sendai Framework reflects the certainty that in an ever more populous,

[1] gar.unisdr.org
[2] Keys et al. 2019. Anthropocene risk. Nature Sustainability: The understanding of risk and its components of hazard, exposure and vulnerability should be underpinned by a better integration of the changing human-

networked and globalizing society, the very nature and scale of risk has changed, to such a degree that it surpasses established risk management institutions and approaches. Recent events – such as large-scale prolonged droughts and heatwaves, financial and commodity market crashes, large scale and long-term human migration, cyber vulnerabilities and political upheavals – carry the potential to generate diverse types of damage and destruction simultaneously, to vital infrastructure and even to the life support systems of very large parts of societies and economies.

In seeking to build the resilience of economies, communities and ecosystems, UN Member States adopted the Sendai Framework, which considerably expanded the scope of hazards beyond natural, to include man-made hazards and related environmental, technological and biological hazards and risks. In so doing, States endorsed the shift from managing disasters to managing risks, calling for a better understanding of the underlying drivers of risk[3] as well as their impacts.

The Sendai Framework stipulates that the global community must come to terms with a new understanding of the dynamic nature of systemic risks, new structures to govern risk in complex, adaptive systems and develop new tools for risk-informed decision-making that allows human societies to live in and with uncertainty. This compels new conceptual and analytical approaches to improve understanding and management of risk dynamics and risk drivers at a range of spatial and temporal scales. It requires particular emphasis on the interaction among *social, ecological, economic and technological systems* resulting from the activities of humans in nature.

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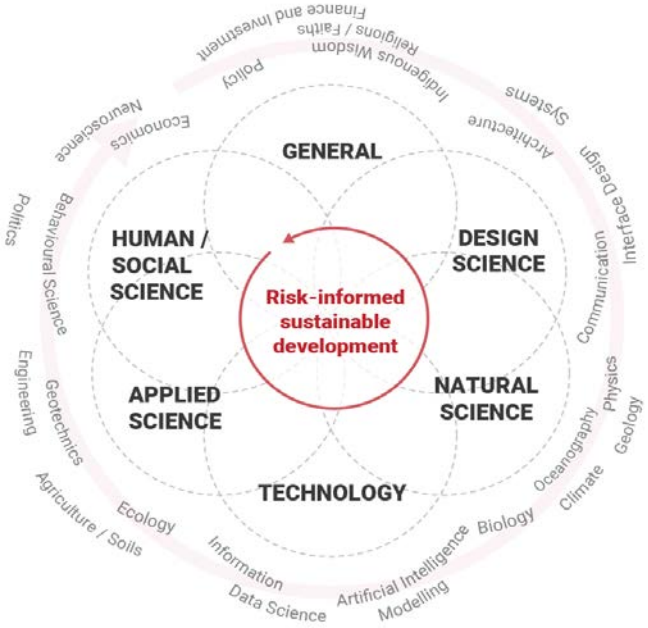
The understanding of risk and its components of hazard, exposure and vulnerability should be underpinned by a better integration of the changing human-environment interactions (anthropogenic changes in key functions of the Earth system, inequality, cross-scale interactions), poorly captured in standard risk assessment

[3] across all risk components – hazards, exposure and vulnerability

The era of hazard-by-hazard risk reduction is therefore over, and while modelling and metrics are important, we can no longer use the past as a reliable indicator of the future. We need to reflect the systemic nature of risk in how we understand and seek to manage it, tuning our understanding of anthropogenic systems in nature. This means moving away from working on distinct areas of risk (e.g. spatial, geographic, temporal, disciplinary) when researching, designing and implementing interventions. We need to incentivize transdisciplinary, integrated, multisectoral risk assessment, analysis and decision-making to improve efficiency, reduce duplication of effort and allow for connected, collective action. The pluralistic, systemic nature of risk demands a shift in the way we organise our research, our thinking, our decisions, how we invest.



Global Assessment Report 2019 (UNDRR)

With the certainty of near-term non-linear changes, the critical assumption of the relationship between past and future risk must now be revisited. The Sendai Framework defines a new era for the classification, description and management of risk – *one that encompasses all sciences as well as indigenous wisdom* – for it to be applied in integrated, transdisciplinary approaches seeking the realisation of the outcomes and goals of the 2015 agreements.

Achieving progress on these issues and generating the insights necessary to guide the determination of mutually reinforcing, collective action assumes inter alia a robust science-policy discourse, a global community of research funders supportive of a transdisciplinary global risk research agenda, and a new cadre of transdisciplinary, systems thinkers, researchers, and decision-makers in the public and private domains. Moreover, beyond a new conceptual framework that better capture the dynamic and complex nature of risk, another major gap is how to operationalise this for policy and decision-makers.

In this context, a number of opportunities for, and expectations of, science can be presented (non-exhaustive):

1. Nurture and foment integrated, transdisciplinary approaches to understanding the systemic and multidimensional nature of risks
2. Encourage greater trans-generational collaboration
3. Strengthen science in the global south
4. Engage more effectively with policy-makers, and decision-makers in the public and private sectors, providing relevant, actionable, systems-based insights

5. Mobilise data, information and scientific evidence at all levels of decision from local and community-based through to the global level to support disaster risk reduction and resilience building

2. Global Research Priorities in support of Risk-Informed Sustainable Development and Planetary Health

ISC and UNDRR are suggesting the development of global research priorities to guide the work of scientists, researchers, academics, technical institutions in both the public and private sectors, to build the evidence base needed for risk-informed decision-making in all geographies, sectors and scales.

There is currently a wide range of existing risk science capabilities, initiatives and networks, many with overlapping mandates, workstreams and members. These include:

1. UNDRR Science & Technology Advisory Groups, enhanced after the adoption of the Sendai Framework in terms of scope and resources. Made up of a global STAG and five regional STAGs, these provide scientific and technical advice to UNDRR and coordinate strategic engagement of science, research and technology institutions in the implementation of the Sendai Framework. In 2016, a S&T Partnership was also established bringing together over 200 institutions with an interest in the contribution of science to the implementation of the Sendai Framework[4].
2. The Global Assessment Report, the flagship report of the United Nations on worldwide efforts to reduce disaster risk and implement the Sendai Framework. The GAR is published biennially by the UNDRR, and is the product of the contributions of nations, public and private disaster risk-related science and research, amongst others.
3. The Global Risk Assessment Framework – launched at the Global Platform for DRR in May 2019 by UNDRR – aims to foster transdisciplinary systems-thinking and transform behaviours and catalyse a proactive decision-making culture by increasing the understanding of the interactive nature of risk and provide actionable insights and tools for decision-makers.
4. The Risk Knowledge Action Network, initiated in 2019 as a joint initiative of the Future Earth, World Climate Research Programme and IRDR, and led by a development team of 17 experts, it brings together scientists from the DRR, climate change and development disciplines to exchange knowledge and data and stimulate new research on risk reduction including in relation to systemic, complex and cascading risks. It has several working groups under consideration. It has no formal secretariat.
5. The Integrated Research on Disaster Risk (IRDR) programme, established in 2010 as a 10-year research programme and co-sponsored by the ISC and the UNDRR. IRDR is an internationally integrated, multidisciplinary, all-hazards research programme to address the challenges surrounding natural and human-induced environmental hazards. IRDR has established a large scientific network of 13 national committees and 16 International Centers of Excellence. on a range of thematic issues such as

[4] See the UNDRR Science and Technology Roadmap 2019, which outlines concrete activities for the science community under each of the four Sendai Framework priorities.

community resilience, risk and safety, education and leaning, risk interpretation and action, infrastructure, climate extremes; and a network of young scientists. The IRDR International Programme Office is located at the Institute of Remote Sensing and Digital Earth, Beijing.

6. The Understanding Risk Forum, an open and global community of over 9,000 experts and practitioners interested and active in the creation, communication and use of disaster risk information. UR community members share knowledge and experience, collaborate, and discuss innovation and best practice in disaster risk assessment.

1. The Belmont Forum (partnership of national science funders and science organisations to support interdisciplinary and transdisciplinary sustainability research) launched in 2019 a collaborative research action on Disaster Risk Reduction and Resilience for transdisciplinary research proposals around the assessment and reduction of disaster risk, enhancing disaster resilience and the co-design of resilience strategies with relevant stakeholders, and more effective disaster response including through technology. Six funding agencies involved: Brazil, China Taipei, Japan, Qatar, United Kingdom, United States for a total of 10 million Euros over three years.

2. The International Network of Government Science Advisors (INGSA), a collaborative platform for policy exchange, capacity building and research across diverse global science advisory organisations and national systems. Through workshops, conferences and a growing catalogue of tools and guidance, the network aims to enhance the global science-policy interface to improve the potential for evidence-informed policy formation at sub-national, national and transnational levels.

A rationalization of the global science landscape for disaster risk reduction would potentially entail the following considerations:

1) Whilst responding to countries' needs, encourage focus of the research priorities on systemic risk and related challenges to the way science and research currently works.
2) Reducing overlaps and costs between science programmes.
3) Increasing the impact of science, including through enhanced uptake of scientific evidence by policy- and other decision-makers.

It is suggested to initiate a broad consultation regarding priorities and required implementation support structures with a wide range of relevant science bodies, science/research funders and other donors. Below is an outline of a proposed process for this endeavour.

3. Process for the Development of Global Research Priorities and related implementation support structure for Systemic Risk Reduction and Risk-Informed Development

Following initial discussions of the ISC, UNDRR and the Chinese Academy of Science (CAS) on 30 September 2019, and consultations with the IRDR Science Committee members on 8-10 October 2019, this paper is suggested to be further revised and updated for a broader

consultation with relevant science partners as well as other groups such as statistics offices and data institutions, United Nations and other international organizations, relevant professional associations, multilateral development banks and public and private decision-makers over the course of 2020.

In the development and implementation of global research priorities, the below schematic proposes the steps that could be taken to address the following:

1. Identify the science and science-to-policy gaps for disaster risk reduction.
2. Map the ongoing activities, role and focus areas of existing science and networks and research funders.
3. Define of resources needed to implement 1 and 2, as well as governance and structures to address the knowledge and capacity needs identified in light of existing programmes and science groups and their comparative advantages and mandates.

A two-stage process is proposed:

- STAGE 1: A consolidation of knowledge and capacity gaps from the global scientific community and development of draft research priorities (a “science mission for resilience”).
- STAGE 2: A wider consultation of the draft research priorities through the wider policy and stakeholder community to identify expectations from science and opportunities for collaboration.
- STAGE 3 Building the implementation structure and securing required resources for implementation of the research priorities 2020-2030.

STAGE 1, to be implemented between October – March 2020, will build on the work of global network and processes in DRR; in particular, on the latest Global Assessment Report, on the Global Risk Assessment Framework (including the working group on gap analysis), the UNDRR STAGs, the IRDR community, the ISC membership and networks including the International Network for Government Science Advice, technical/science groups of other UN and international organisations (e.g. World Bank), the Risk Knowledge Action Network, the Belmont Forum and other global and regional networks of research funders.

STAGE 2 will expand the consultation process to policy-makers, relevant private sector, civil society organizations and multilateral development banks. This phase may require a longer process and a different set of tools from surveys to in-person meetings, capitalisation from conferences such as the Regional and Global Platforms, networks such as the UNDRR Private Sector Alliance for Disaster Resilient Communities, etc. The output of STAGE 1 will provide a base to elicit feedback on the knowledge gaps from these groups, but also application and implementation gaps and opportunities for synergistic collaboration.

STAGE 3 implementation of the research priorities 2020-2030: this will require the set up of relevant structures, resources and processes to ensure comprehensive and coordinated approach amongst existing and new science groups and networks as well as other public and private partners across the globe through linkages between the science community with relevant other mechanisms, processes and groups.

Dates of relevant upcoming meetings for consideration:

- IRDR SC meeting 8-10 October 2019, Xiamen, China: Opportunity to define IRDR IPO, SC and ICoE engagement
- GAR Advisory Board meeting 9-10 October 2019, Geneva, Switzerland: Consultation
- E-STAG meeting 28 October 2019, Huddersfield, UK: Consultation
- GRAF Expert Group meeting 25-26 November 2019, Geneva, Switzerland: Consultation
- G-STAG meeting (Date TBC): Review of Consultations and Initiation of science mission drafting process
- Understanding Risk Forum, 18-22 May 2020, Singapore
- UNDRR Regional Platforms 2020-2021