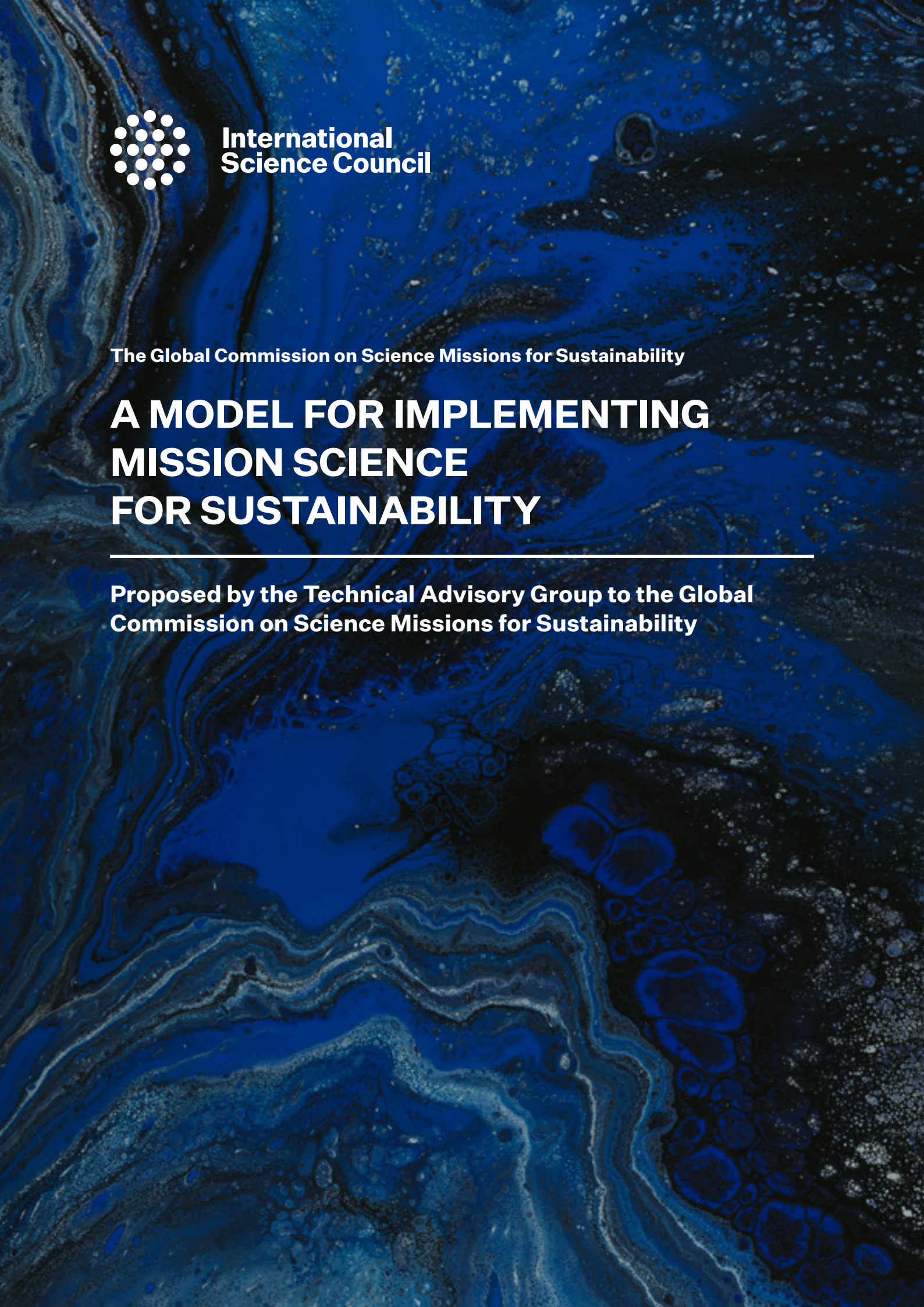

International Science Council

The Global Commission on Science Missions for Sustainability

A MODEL FOR IMPLEMENTING MISSION SCIENCE FOR SUSTAINABILITY

Proposed by the Technical Advisory Group to the Global Commission on Science Missions for Sustainability

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Contributors to this report can be found in Appendix I

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About the International Science Council

The International Science Council (ISC) is a non-governmental organization that convenes the scientific expertise and resources needed to lead on catalyzing, incubating and coordinating impactful international action. It is the largest organization of its kind to bring together natural and social sciences for the global public good, bringing together over 230 international scientific unions and associations as well as national and regional scientific organizations including academies and research councils.

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Executive summary

International scientific collaboration is at the heart of innovative solutions with the potential for worldwide impact. Scientific mobilisation in response to the COVID-19 pandemic is a great example. But until now, sustainability science for has not been given the opportunity and resources to help advance long-term sustainable development at scale.

To rise to this challenge in the face of existential risks to humanity and the planet, the International Science Council (ISC) convened the Global Commission on Science Missions for Sustainability in December 2021. The Commission has the mandate to find new ways to support and carry out mission science, as defined below, that would significantly accelerate humanity's progress on the path towards sustainability: inclusive, intergenerational wellbeing of both people and our planetary life support systems.

This report offers a model proposed by the Technical Advisory Group (TAG), established to assist with the Commission's work. The model includes a co-design process to set priorities for mission science for sustainability, including the core principles and institutional, governance and funding arrangements to achieve the goals set for the Commission. It also proposes approaches for aligning funding with the accomplishment of those missions.

Through its deliberations and outreach to other communities, the TAG recognized some of the limitations that hinder science communities' contributions to the attainment of sustainability goals, including the siloed disciplinary nature of a majority of scientific efforts, lack of trusted relationships with stakeholders, disconnect between knowledge and action, and inadequate funding support for sustainability science. To overcome these limitations, **the TAG proposes a model that foregrounds engagement with complex, multi-sectoral contextual problems and systemic collaboration between scientists and other stakeholders from problem definition to solution implementation.**

The approach is based on pursuing 'mission science for sustainability', a term used here to represent science that engages with society to co-produce accessible actionable knowledge to promote long-term sustainability locally and globally. Mission science for sustainability has a clear goal and scope defined together with key stakeholders, and it is solutions focused, time-bound, and significant in size and ambition. Mission science also directly engages with policy and societal actors to co-design and co-implement interventions required to address specific and contextual sustainability challenges.

As the institutional setting for mission science for sustainability, **the TAG recommends establishing a network of Regional Sustainability Hubs, each focusing on complex local and regional sustainability challenges that occur at the nexus of numerous sectors or Sustainable Development Goals (SDGs) and that will be co-defined with relevant stakeholders**. These Sustainability Hubs will be boundary-spanning organizations that will comprise a core group of dedicated employees who will engage with local and regional stakeholders to identify and frame critical sustainability challenges and, on a temporary basis, bring scientists together with non-academic stakeholders to accomplish specific mission goals.

As the Sustainability Hubs will draw on and engage scientists from around the region and world to address specific issues, they will not require extensive research facilities; for their role in engagement of stakeholders, existing infrastructure will be leveraged, where possible. However, where enhanced capabilities are needed, targeted investments can be made in collaboration with the funding community.

The TAG recommends developing this global network of Sustainability Hubs, ideally at least 20 in total, all linked through a Global Knowledge Sharing Platform. In the long run, these Hubs will allow the building of lasting and trusted relationships with a wide range of stakeholders and decision-makers in the region. Where useful, they will also serve as custodians of regional sustainability data and knowledge. At the global level, the Regional Hubs will be linked through a Global Knowledge Sharing Platform to help exchange experience of what has and has not worked, share expertise, develop capacities, tap synergies across efforts and help integrate and scale efforts. The Global Knowledge Sharing Platform will also be responsible for bringing the attention of Regional Hubs to important sustainability issues that emerge at the global level. It will be critical to ensure that each Hub is able to store and share data with other Hubs in a FAIR (Findable, Accessible, Interoperable and Reusable) manner and comply with the General Data Protection Regulation (GDPR).

The TAG members believe that funders must collectively enable a process that will address regionally identified sustainability challenges and policy outcomes rather than a predefined output. In that, funders will be asked to support the development of a new model for science, one that is more engaged, more embedded in real-world complex issues. This new model will require innovation and adjustment as the ambitious effort is operationalized. The scale and long-term nature of the effort will require pooling and matchmaking of funding

by different funders. This transformative mission-oriented approach to science supported by a common pool of science funding will shield Hub researchers from the distractions and disincentives inherent in the existing science system, to focus on producing urgent societally relevant and usable knowledge to achieve real sustainability policy outcomes.

Each Hub will require a core support of roughly US$5–10 million per annum, plus an additional $10–40 million per annum of research support and implementation. Based on this rough estimate, a total investment for 20 Hubs and the Regional Knowledge Sharing Platform would add up to a bit more than $1 billion yearly (core Hub support up to $210M and implementation up to $840M). While this might appear to be a large amount, this is not even 1% of global annual R&D investment ($1.7 trillion according to the UNESCO Institute for Statistics). Furthermore, as the COVID-19 response demonstrated, the cost of inaction is far greater than investment in prevention.[1]

This urgent moment in human existence on planet Earth requires visionary thinking and fundamentally disruptive actions from science funders around the world, stepping out of business-as-usual approaches to funding science, doing research and creating supportive institutional arrangements for sustainability science implementation.

Scaling up science investment to strongly and sustainably support a limited number of Regional Sustainability Hubs provides a real opportunity for mobilizing and putting to use the best science for societal transformations in an outcome-driven, coordinated and integrated manner. And this strategic investment has a strong potential to generate a significant return for global society in the long run.

Successful implementation of this Sustainability Hubs model will include a steep learning curve, but we also know that a business-as-usual approach to science and science funding will not lead to any substantial or rapid progress towards sustainable development.

At this moment in time, **the TAG believes that funders must think big, be disruptive and fully enable this mission science for sustainability approach to succeed**.

1 Expenditures for prevention and preparedness are measured in billions of dollars, the cost of a pandemic in trillions. Currently, COVID-19 is estimated to cost the world $11 trillion. According to the World Health Organisation, it would take 500 years to spend as much on investing in preparedness as the world is losing due to COVID-19 (Wellcome, 2021).

The science community is ready; the implementation of the model is pending funds being made available. Therefore, we invite all partners interested in empowering science for sustainable societal transformations in the 21st century to support mission science for sustainability.

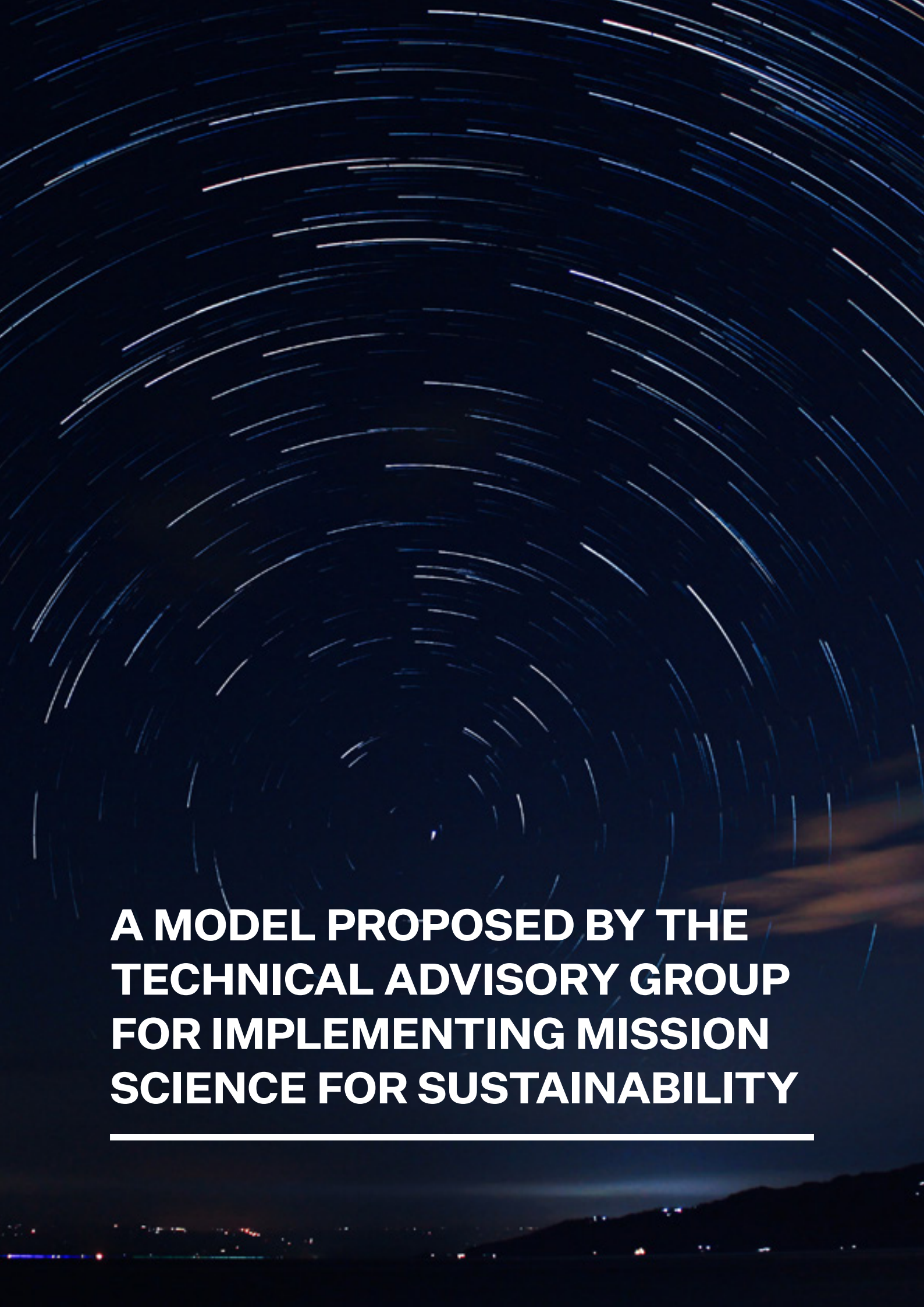
DEFINING KEY TERMS AS USED IN THIS REPORT

This report uses mission science, sustainability challenges and Sustainability Hubs to imply the following:

Mission science for sustainability refers to science that engages intimately with society to co-produce actionable knowledge to achieve sustainability goals.

The **sustainability challenges** that mission science aims to address focus on nexus issues that lie at the intersection of multiple societal sectors or SDGs and play out at the interface of sectors, representing the complex reality facing decision-makers at local, regional and subregional levels. By definition, they are intertwined challenges that require systems-level solutions that attend to interactions and connections across space and time to improve human or environmental wellbeing. Obligatory global sustainability challenges that cannot be addressed at finer scales will require global stakeholder buy-in and commitment.

Regional Sustainability Hubs are the proposed institutional structure that supports mission science for sustainability. Each Hub will serve as a boundary-spanning platform for mobilization, coordination, alignment and direction of diverse relevant actors and existing initiatives for accelerated collective action to solve regionally identified sustainability challenges. The key characteristic of the proposed regionally based hub model is the systematic approach to engaging non-science participants, decision-makers and stakeholders along with appropriate scientific communities in collaborative agenda setting, problem definition, research and knowledge development and integration, implementation and testing. Hubs will identify priority sustainability challenges together with stakeholders and co-design and co-implement interventions required to address them.



A MODEL PROPOSED BY THE TECHNICAL ADVISORY GROUP FOR IMPLEMENTING MISSION SCIENCE FOR SUSTAINABILITY

I. Introduction

A. CONTEXT

Addressing the complex and overlapping sustainability crises that face us today to put humanity on a path towards long-term global sustainability is the most pressing challenge of our time. Despite the urgency, not enough has been done to make sufficient progress in this regard. This is reflected in the fact that achievement of the SDGs is not on track and the latest predictions are that no country is expected to meet all the goals by the 2030 deadline (UN DESA, 2022). The dominant discourse is that countries and all relevant actors need to urgently intensify efforts and realign their priorities and resources towards longer-term, more collaborative and drastically accelerated action.

> *'We must rise higher **to rescue** the Sustainable Development Goals – and stay true to our promise of a world of peace, dignity and prosperity on a healthy planet.'*
>
> **António Guterres**
> *Secretary-General, United Nations*
> The Sustainable Development Goals Report 2022

How might science more effectively support critical societal transformations? Keeping up with the increased complexity and pace of change of contemporary society will require game-changing shifts in the organization of sustainability science systems and funding globally.

Under the framework of the Global Forum of Funders, science funders mandated the International Science Council to shape a priority action agenda for science that will support and enable societies to accelerate societal transformations towards sustainability. Through a global call and extensive literature review, the ISC developed the *Unleashing Science: Delivering Missions for Sustainability* report (2021). The report called for a concerted effort to produce actionable knowledge through a set of science missions for sustainability and associated support structures that harness the benefits of purpose-driven science, along with policy-makers, civil society and the private sector.

> *'As a science community, we must collectively take a much more holistic approach to empowering science for sustainable societal transformations in the 21st century. It is time to be disruptive and do things differently and with imagination and collaboration!'*
>
> **ISC,** Unleashing Science: Delivering Missions for Sustainability 2021

The report was presented to the second Global Forum of Funders in April 2021, and the ISC was mandated to initiate a consultative process that would identify institutional arrangements and funding mechanisms for implementing mission science for sustainability. This led to the establishment of the Global Commission on Science Missions for Sustainability, supported by a Technical Advisory Group.

B. THE GLOBAL COMMISSION ON SCIENCE MISSIONS FOR SUSTAINABILITY

The Global Commission was established by the ISC in December 2021 with the goal to accelerate the contributions of science to the advance of global sustainability. Co-chaired by Irina Bokova, former Director-General of UNESCO, and Helen Clark, former Prime Minister of New Zealand and previous administrator of the United Nations Development Programme, the Commission represents a high-level coalition of political leaders, science funders, both national and philanthropic, financiers, science leaders and film makers.

The Commission's task is to find new ways to support and carry out mission science that would accelerate progress towards sustainability goals, to put humanity on the path towards inclusive, intergenerational wellbeing of both people and our planetary life support systems, and to propose approaches for aligning funding with the accomplishment of those missions.

C. THE TECHNICAL ADVISORY GROUP

To assist with some of the Commission's tasks, a Technical Advisory Group (TAG) was convened. It is composed of twelve leading scholars and practitioners with broad experience in sustainability transformations and co-chaired by Pamela Matson (Co-Director of Stanford University Change Leadership for Sustainability Program) and Albert van Jaarsveld (Director-General of the International Institute for Applied Systems Analysis). The TAG was asked to:

- propose a co-design process to set priorities for mission science for sustainability (i.e. a process that engages the science community, policy-makers, funders, civil society, the private sector and other relevant stakeholders);

- provide illustrative examples of what mission science could achieve;
- propose a structure(s) required to undertake mission science for sustainability, including organizational governance and management arrangements;
- develop an approach to performance assessment;
- outline core principles of operation;
- suggest minimum funding needs.

The TAG met as a group virtually several times between February 2022 and February 2023 to discuss these points. Discussions were also undertaken by the TAG co-chairs and ISC Secretariat with individual members of the TAG over this time to clarify and detail the ideas that these experts contributed. The Commission met in October 2022 for an appraisal of the direction of the discussion before the preparation of this report that contains the final recommendations of the TAG.

II. Mission science for sustainability: A new science for sustainability

A. LIMITS OF THE CURRENT SCIENCE SYSTEM THAT HINDER PROGRESS TOWARDS SUSTAINABILITY

In its deliberations, the TAG discussed and considered the apparent impediments to fast action towards sustainability goals and debated different structures and approaches that might **harness scientific knowledge** (defined as that from social and natural sciences, humanities scholarship, technical and engineering science, medical science, and development) with **other kinds of knowledge** to help overcome those barriers. We found that, while there is evidence that some sustainability and SDG efforts to date have had impact, it has been highly variable across countries and sectors, with only limited evidence of lasting transformative change (see for example Biermann et al., 2022). Moreover, the nature of the SDGs as articulated in Agenda 2030 (with individual SDGs taking precedence over the ultimate Agenda 2030 sustainability goal of promoting equitably distributed improvements in wellbeing) has intensified the siloed character of international organizations' efforts towards sustainability (Bogers et al., 2022). Unfortunately, a siloed sustainability and SDG-focused approach leaves out some areas of need and overlooks many areas of interaction across sectors, despite the fact that many of the most critical and complex sustainability issues facing nations, regions and the world cut across these silos. Achieving success in one silo may well be to the detriment of another, slowing overall progress towards sustainable development per se (Hynes et al., 2020; United Nations, 2021). Additionally, the top-down nature of agenda setting in many of these efforts appears to have left the concerns of local and regional stakeholders and the conflicting challenges of multiple, cross-sector stakeholders out of the discussion.

Scientific efforts that have been intended to support sustainability progress reflect some of these same issues, too often yielding results that ignore real-life complexity, are focused less on problem solving than problem understanding, and that, while potentially useful, are not trusted by stakeholders, or are not accessible to nor actually used by decision-makers. All these factors contribute to a persistent disconnect between knowledge and action.

The TAG believes there are better ways of producing, delivering and translating actionable knowledge, supported by the following points:

- A broad range of research on what works (or not) in linking knowledge and action suggests that trust-building through collaborative efforts between scientists and stakeholders is essential, and systems approaches improve the chance that all the relevant information and knowledge can come together when needed.
- Efforts that involve careful listening and dialogue between stakeholder/decision-maker communities and the scientific community yield knowledge that is more likely to be perceived as salient (relevant), credible (believed) and legitimate (fair or respectful) by the parties involved (Staples et al., 2021; Emmelhainz et al., 2021; Clark et al., 2016).
- Dealing with the actual complexity of the world by seeking to address issues that arise at the intersection of sectors of interest (or SDGs) is likely to yield more knowledge useful for promoting sustainability with reduced likelihood of precipitating unintended consequences.
- Recognizing that many different organizations or individuals may be interested in similar goals and in contributing to problem solving in any given area, suggests that working in complementary and integrative, not competitive, ways will increase the likelihood of success in mobilizing knowledge to promote sustainable development.
- Current support for global multilateral scientific cooperation on pressing global challenges, at scale and in a timely manner, is incommensurable with the scale of most sustainability challenges. Intense competition for limited science funding creates fragmentation and undermines any effort for researchers to come together and work for the common cause of sustainability. Therefore, if science wants to play a relevant part in addressing complex sustainability challenges, coordination and strategic prioritization in the research should be significantly improved and the funding for global multilateral scientific cooperation should be aligned with the scale of the challenges being addressed.

B. MISSION SCIENCE AS A RESPONSE

To support the urgent societal transformations towards a more sustainable future, the ISC's *Unleashing Science* report (2021) called for:

> *'A nimble, targeted, mission-oriented set of socio-political-science initiatives and associated support structures that harness the best of what science offers.'*

In its deliberations, the TAG noted the complex and sometimes problematic historical baggage that the term 'mission' can carry. For the purpose of this report, the **term 'mission science for sustainability' refers to science that engages substantially with society to co-produce actionable knowledge to promote long-term sustainability, locally and globally**.

Mission science for sustainability should have a clear goal and scope defined by and with stakeholders, and it is solutions focused, time-bound, and significant in size and ambition. Mission science also directly engages with policy and societal actors to co-design and co-implement interventions required to address specific sustainability challenges.

The concept of mission science for sustainability focuses on '***how* not *what***'; that is, it entails a new way of doing science in a bottom-up, engaged manner and not simply focusing on a 'moon shot' or a singular final goal. In other words, it is **science that engages with society, in local to global contexts, in the pursuit of long-term sustainability goals** (see p. 16 for principles and p. 22 for characteristics of mission science for sustainability).

The following proposed model is aimed at making possible such an approach and enabling science to contribute more effectively to key sustainability issues and ultimately to global public good and the wellbeing of both present and future generations.

III. The proposed model for mission science for sustainability

A. GOALS OF THE PROPOSED MODEL

The TAG debated different structures and approaches that might harness all kinds of knowledge to help achieve sustainability outcomes.

A prevailing siloed sustainability and SDG-focused approach leaves out some areas of need and overlooks many areas of interaction across sectors, despite the fact that many of the most critical and complex sustainability issues facing nations, regions and the world cut across these silos. Achieving success in one area may well be to the detriment of another, slowing overall progress towards sustainable development. Additionally, the top-down nature of agenda setting in many of these efforts appears to have left the concerns of local and regional stakeholders and the conflicting challenges of multiple cross-sector stakeholders out of the discussion (Heyl, 2020, 2022; Willaarts, 2021). **The strategy proposed by TAG flips the more traditional science model, allowing the agenda and priorities to be determined by regional communities and stakeholder needs, and engaging science in service to society in which science communities collaboratively design, produce, integrate, implement and evaluate potential pathways to achieve sustainability outcomes**. It also aims to break down silos and radically increase regional capacity to understand and address nexus issues.

Nexus sustainability challenges play out at the interface of sectoral issues such as food, water and energy security; climate change; biodiversity loss; natural resources and so on. Such issues, far more than single sector ones, represent the complex reality facing decision-makers at the household, community, national and regional levels. By definition, they are intertwined challenges, and interventions to address one area are likely to have impacts on others. They require systems-level solutions that attend to interactions and connections across space and time and that seek to avoid the unintended consequences that arise when sector-specific interventions, intended to improve human or environmental wellbeing needs in one sector or at one moment, precipitate negative consequences for other sectors or communities in different areas or later times. The proposed model for undertaking effective mission science efforts for sustainability is therefore organized to achieve the following goals:

- Embracing and supporting regional differences in priorities, knowledge and culture, while organizing and building context-specific knowledge for local to global impact.

- Harnessing context-specific actionable knowledge to address the most pressing, complex sustainability challenges that occur at the nexus of sectors and SDGs at local, regional and sub-regional levels, or even global where justified.
- Focusing efforts to complement and integrate rather than compete with existing efforts to promote sustainability.
- Building trust, salience, credibility and momentum for change through broad stakeholder co-design, co-production and co-implementation processes.
- Emphasizing equity, diversity and long-term sustainability of social, cultural, ecological and economic benefits.

B. INSTITUTIONAL SETTING

Regional Sustainability Hubs: Key characteristics and functions

The TAG proposes the establishment of a globally funded and empowered network of Regional Sustainability Hubs to achieve the above-mentioned goals. Each Hub will serve as a boundary-spanning platform for mobilization, coordination and alignment of diverse relevant actors and existing initiatives to address regionally identified complex nexus sustainability challenges. Nexus challenges here refer to pressing sustainability challenges that cross over or are at the intersection of multiple sectors or SDGs.

To achieve the goal of advancing mission science for sustainability, the network of Regional Sustainability Hubs should adhere to the following principles:

- Be participatory, collaborative and systems-oriented in identifying and tackling complex sustainability challenges.
- Be reflexive, humble and adaptive, focused on learning across the network.
- Be pragmatic, flexible and innovative in seeking sustainable solutions.
- Focus on quality, integrity and transparency in all aspects of collaboration and research.
- Aim for collective benefit, equity, fairness, diversity and inclusiveness in all activities.
- Ensure responsibility, respect and accountability across the wide range of stakeholders.
- Promote open science and FAIR (Findable, Accessible, Interoperable and Reusable) data principles to facilitate sharing and learning.

The **key characteristic** of the proposed regionally based hub model is therefore the systematic approach to engagement of decision-makers and stakeholders in collaborative agenda setting, and engagement of appropriate and relevant scientific expertise along with non-science participants in problem definition, research and knowledge development and integration, implementation and testing – the kind of effort that is now known as 'transdisciplinary or co-produced research' (see Figure 1). Co-design, co-development, co-implementation and co-evaluation will be core processes underpinning the Hubs' operation. Furthermore, Hubs will seek and promote complementary and integrative and not competitive ways of working with other stakeholders and ongoing sustainability initiatives, and will establish processes to ensure accountability and effective procedures for managing data.

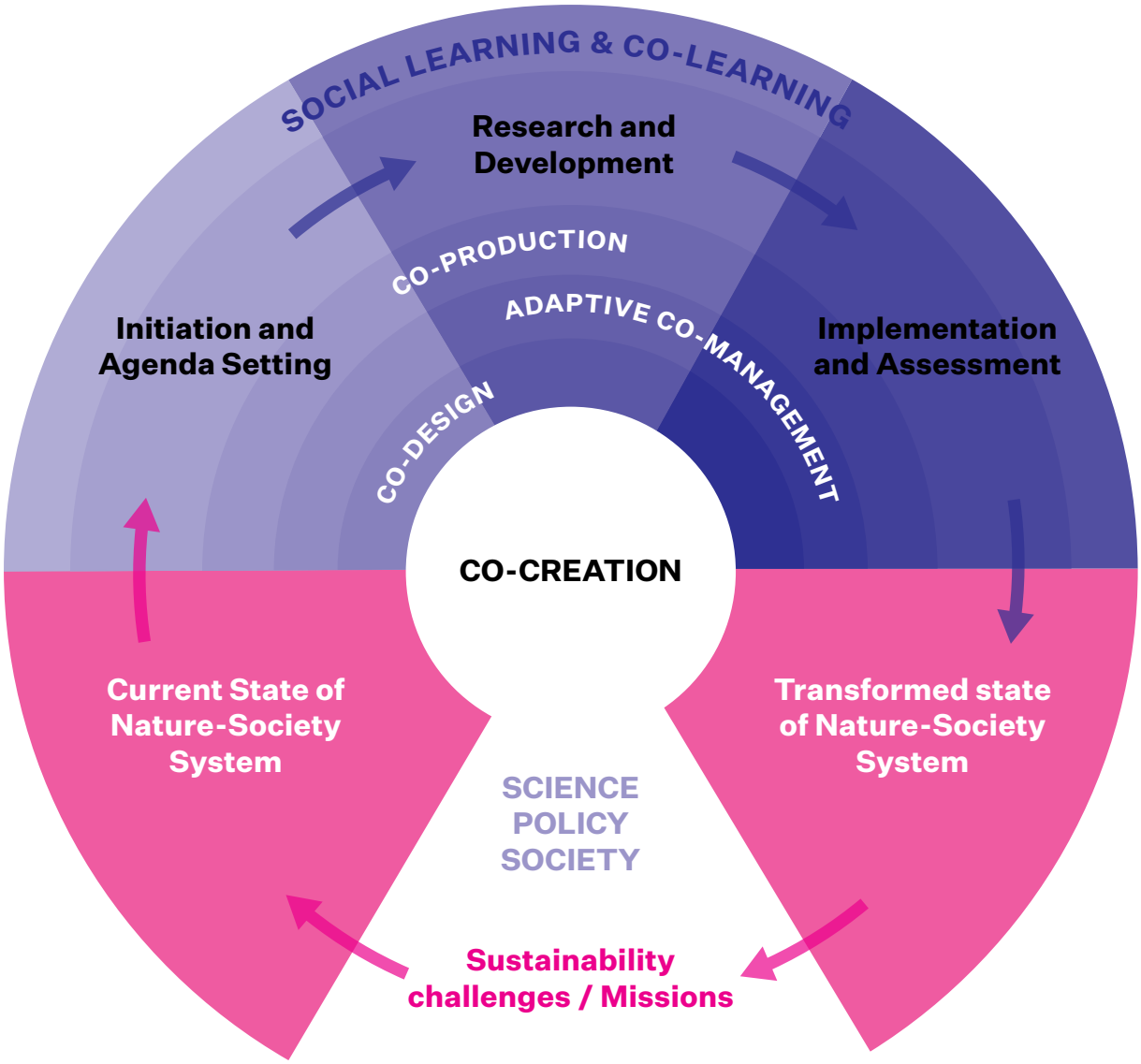


Figure 1: The transdisciplinary activities of Sustainability Hubs.
Source: Adapted from Hakkarainen et al. (2022)

The Hubs will have the following **functions**:

- Engage with relevant stakeholders to identify and frame a critical nexus challenge at the local, regional and sub-regional levels that requires knowledge input, and then, together with appropriate research communities, co-design, evaluate and implement specific interventions to address it.
- Develop and allocate funding to support all dimensions of the work, from collaborative agenda setting and question definition, to research-based production of knowledge of the issues and its integration with traditional and experiential knowledge, to implementation, evaluation and assessment.
- Collaboratively track progress, evaluate and learn from each team effort, while sharing approaches and learnings to catalyse action more broadly through a global network.
- Become long-term custodians of actionable, sustainability-related knowledge in the regions.

The Sustainability Hubs will need to be equipped and funded to facilitate context-specific sustainability processes. Their **structures are not pre-determined** and could be:

- virtual hubs;
- physical entities possibly supported by existing facilities but remaining independent;
- new stand-alone facilities; or
- hybrid combinations.

It is important to mention that the **Sustainability Hubs are not expected to require extensive new brick-and-bench research facilities of their own**. They will need to employ and host leadership and core staff, to have access to essential science infrastructure that would enable interoperable data collection, storage, management and sharing with other Hubs, applying the FAIR data principles in a General Data Protection Regulation (GDPR) compliant manner.[2] The Hubs would also require facilities for the transdisciplinary process, such as workshopping for stakeholder engagement. The Sustainability Hubs should be able to engage external scientific expertise from local and global science communities along with non-academic stakeholders to accomplish the challenge goals. Hubs will use existing infrastructure where possible. However, where enhanced capabilities

2 The General Data Protection Regulation (GDPR) is the data privacy and security law adopted by the EU in 2018. Though passed by the EU, it imposes obligations onto organizations anywhere, so long as they target or collect data related to people in the EU. Violating GDPR privacy and security standards will lead to significant fines and penalties. The GDPR has significant implications for the entire scientific enterprise.

are needed (e.g. instrumentation, computation, experimentation), Hubs in collaboration with the funding community will seek to bring targeted investments in partner institutions such as regional universities or government laboratories.

Organization of Sustainability Hubs and required capacities

Each Sustainability Hub will have:

- hub leadership, with the ability to manage transdisciplinary teams, and core personnel;
- Sustainability Solutions Teams of transdisciplinary groups of experts engaged for specific tasks and related timelines;
- a Steering Committee, composed of representatives from the science community, policy-makers, regional stakeholders and other partners, primarily responsible for holding Hubs accountable for pursuing sustainability goals, analyzing impact and providing fiduciary oversight of the Hub.

Hub leadership and core expertise: The Regional Sustainability Hubs will act as 'boundary-spanning organizations' (see Figure 2), with Hub leaders purposefully engaging in trust-building relationships with actors in the region; listening and engaging in challenge definition; building relevant partnerships for problem solving; and identifying and supporting scientific engagement through Sustainability Solutions Teams (see p. 21 for more detail).

These Hubs would of necessity require inspiring leaders who are themselves 'boundary spanners' or linking individuals – scientists or others with transdisciplinary experience who have a record of bridging and linking the science and decision-making communities and have the trust of both.

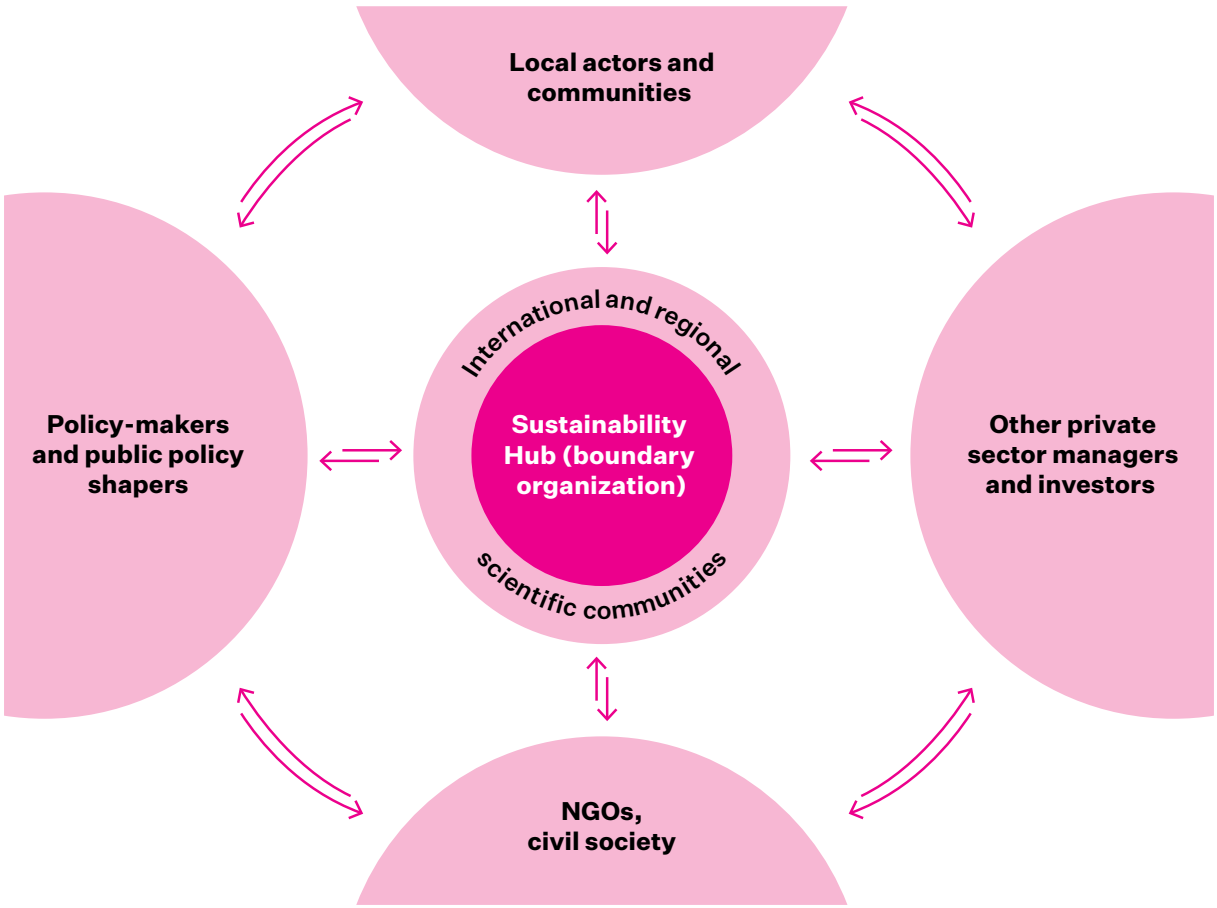


Figure 2: Sustainability Hubs embedded in local contexts and networks. Source: Adapted from Liu (2004)

The tasks of the Hub leadership will be to:

- engage and connect stakeholders to identify complex and the most pressing sustainability challenges that require scientific input; that is, 'boundary-spanning' functions;
- identify and engage appropriate scientific and technical communities to work together with stakeholders in co-designing the research effort and project implementation (scientists will be identified and brought, contracted or co-opted to participate but will not be permanent employees of the Sustainability Hub);
- support all dimensions of the work;
- allocate funding;
- track progress and evaluate; and
- represent their hub within the global network (see below).

To carry out its role, each Sustainability Hub will also need to be equipped with **core staff with the following required capacities and expertise:**

- Transdisciplinary expertise
- Expertise in facilitating participatory approaches
- Links to local and regional scientific communities
- International analytical, modelling and pathway exploration capabilities to evaluate nexus challenges and solutions
- Capacity to conduct *preliminary* systems analysis and theories of change
- Capacity to obtain, curate and archive generated regional sustainability information
- Capacity to mobilize and develop computational and facilitation infrastructure, sourced through partnership institutions and universities/research institutions

Sustainability Solutions Teams: These will be specific to a sustainability challenge and created to engage scientists with stakeholders in agenda framing, research, development and implementation. Members of these teams should be committed to linking knowledge with transformative societal action with equity and fairness in mind, recognize and engage with complexity and integrate diverse ways of knowing. They will not be permanently employed personnel of the Hubs but will be engaged for a specific set of challenge-related tasks; they will be supported by voluntary contributions, short or long-term sabbaticals, term-based grants or contracts, endowed/named fellowships and so on. Adequate support is needed to temporarily shield Hub researchers from the distractions and disincentives inherent in the existing science system, and to focus on producing, with engagement of stakeholders, urgent societally relevant and usable knowledge to achieve real policy outcomes around sustainability.

From a science career perspective, we expect selection and engagement as a member of a Sustainability Solutions Team will be viewed as a career accomplishment. Engagements in such collaborative science/implementation efforts, and rewards associated with it, could provide a new system of incentives that change science cultures and add new career tracks, helping to shift the standards and rules of academia towards research efforts that are more complex, more integrative and more aligned with providing direct benefit to the world and society.

Likewise, a global network of Regional Hubs will create for scientists a new space of belonging, where the transdisciplinary and transnational approaches of 'science for, and in service of, society' are valued and lived. The TAG recommends

that the ISC and its members, national academies of science and other relevant organizations, establish processes for awarding high-profile recognition to people who invest substantial parts of their career in Sustainability Hub activities. Additionally, the collaboration and research partnerships of regional and international scientists could provide powerful capacity building opportunities.

Steering Committee: The Steering Committee for each Hub will include appropriate representatives from the science community, policy-makers, regional stakeholders and other partners. The tasks of the Committee would involve:

- holding Hubs accountable for pursuing sustainability goals;
- negotiating and reviewing relevant performance goals;
- oversight of the work of the Hub's leaders;
- supporting the strategy for implementation developed by the Sustainability Solutions Team;
- assisting with building buy-in in the region;
- tracking and analyzing impact; and
- providing fiduciary oversight of the Hub.

Identifying sustainability challenges for Sustainability Hubs: Guiding characteristics

Co-design will be central for defining sustainability challenges to be addressed by each Sustainability Hub as well as for identifying interventions. The Hubs will therefore be the sites of organizing and ensuring this. Once the Hub leaders engage with stakeholders to identify a critical sustainability issue, they will reach out to the local and global research community. They will then work with stakeholders to clarify the problem and co-design the research needed.

Appropriate sustainability challenges that are to be addressed by the Hubs should have the following characteristics:

- Focused on promoting sustainable development, i.e. improvements in human wellbeing that are equitably distributed within and between generations
- Demand-driven and clearly co-defined with various stakeholders
- Locally/regionally contextualized but globally relevant
- Focused on 'hotspots' – in regions where efforts to meet sustainability goals are seriously lagging, and especially in the Global South, where the failure to transition towards sustainable development may have devastating consequences, or on transcending global or regional problems (for instance trade relations or global pollutants and their manufacture)

- Focused on interactions and feedbacks across sectors
- Able to address cross-sectoral nexus issues rather than narrow sectoral issues alone
- Conducted for a limited period of time (that is, not expected to continue for an unlimited amount of time), recognizing that for some challenges, that period may be many years
- Requiring transdisciplinary approaches
- Potential for scalable and transferable sustainability outcomes in other parts of the world

These Hubs would be built for **long-term engagement**. They would **not** be dedicated exclusively to single sectoral issues (e.g. energy, food security, health), nor to only one issue. Instead, they would be **designed to address multiple, often overlapping issues** that will change over time. All new sustainability challenges would be brought forward by regional stakeholders; all efforts to address these issues would be solution-oriented, collaborative and intended for impact. Hubs would also become long-term custodians of actionable sustainability-related knowledge in the regions.

Each Hub should be reviewed every four years, to decide whether its operation should continue, be terminated or replaced.

A global network

This ambitious initiative seeks to develop a **global network of Sustainability Hubs**, ideally at least 20 in total, that would form a global learning community, sharing each other's successes and failures.

It will be important to ensure that all Hubs are fully equipped and critically staffed to continuously share interoperable data between all Hubs in a FAIR based and GDPR compliant manner. The Regional Hubs will be linked through a **Global Knowledge Sharing Platform** to develop and implement improved sustainability interventions at scale. Depending on the needs emerging from the ongoing efforts, this platform will most importantly focus on developing and sharing experience, knowledge, expertise and results in the various domains of sustainability objectives across Hubs. It might also share best practices and procedures, management innovations and capacities, financial and fundraising expertise, not as oversight or 'command and control' but in the context of sharing what works and what does not in varying situations. Any emerging sustainability challenges at the global level will also be coordinated by the Global Knowledge Sharing Platform.

The global coordinating capacity may take physical or virtual form, and the cost for this role would not be expected to exceed that of a single Sustainability Hub. The network would be one major way in which the experience of the regional scales could come together to integrate and catalyze actions at the global scale.

C. GOVERNANCE AND PERFORMANCE ASSESSMENT

Hub governance, including fiduciary responsibility and strategy, will be carried out by Hub Steering Committees in conjunction with the Hub leadership. The Committee along with the Hub leadership should be empowered to make decisions and develop strategies that are deemed appropriate to their location, and to carefully track, analyze and share findings on the impacts of those strategies. The Steering Committee will also be responsible for the performance review of their Hub. Their assessments should be based on the internal feedback of the Sustainability Solutions Teams' processes together with formal evaluation and feedback from stakeholder groups associated with the respective region.

Given the regional basis and bottom-up nature of the Regional Hubs, strong attempts at top-down guidance and control would not be helpful nor appropriate; however, a certain level of global coordination and strategic coordination will be necessary to maintain the smooth functioning of the entire system and ensure benefits at scale.

The global network of Regional Sustainability Hubs will be overseen by a **Global Governing Board** which will carry mainly fiduciary responsibilities of the entire enterprise as well as responsibility for global fundraising and overall strategy for the entire network. This body will be composed of funders, science partners and NGOs, together with the ISC as secretariat.

In support of the Governing Board, a **Global Oversight Committee** will be responsible for performance assessment of the global network of Hubs, assessment of lessons learned through the Global Knowledge Sharing Platform, and assistance to the ISC in reporting and coordination activities. It will include representation from the Hubs' leadership and Steering Committees as well as from the science community, policy-makers, regional stakeholders and partners. Indicators for evaluation will be drawn up by this Committee in collaboration with each Hub at the outset (see Figure 3 below).

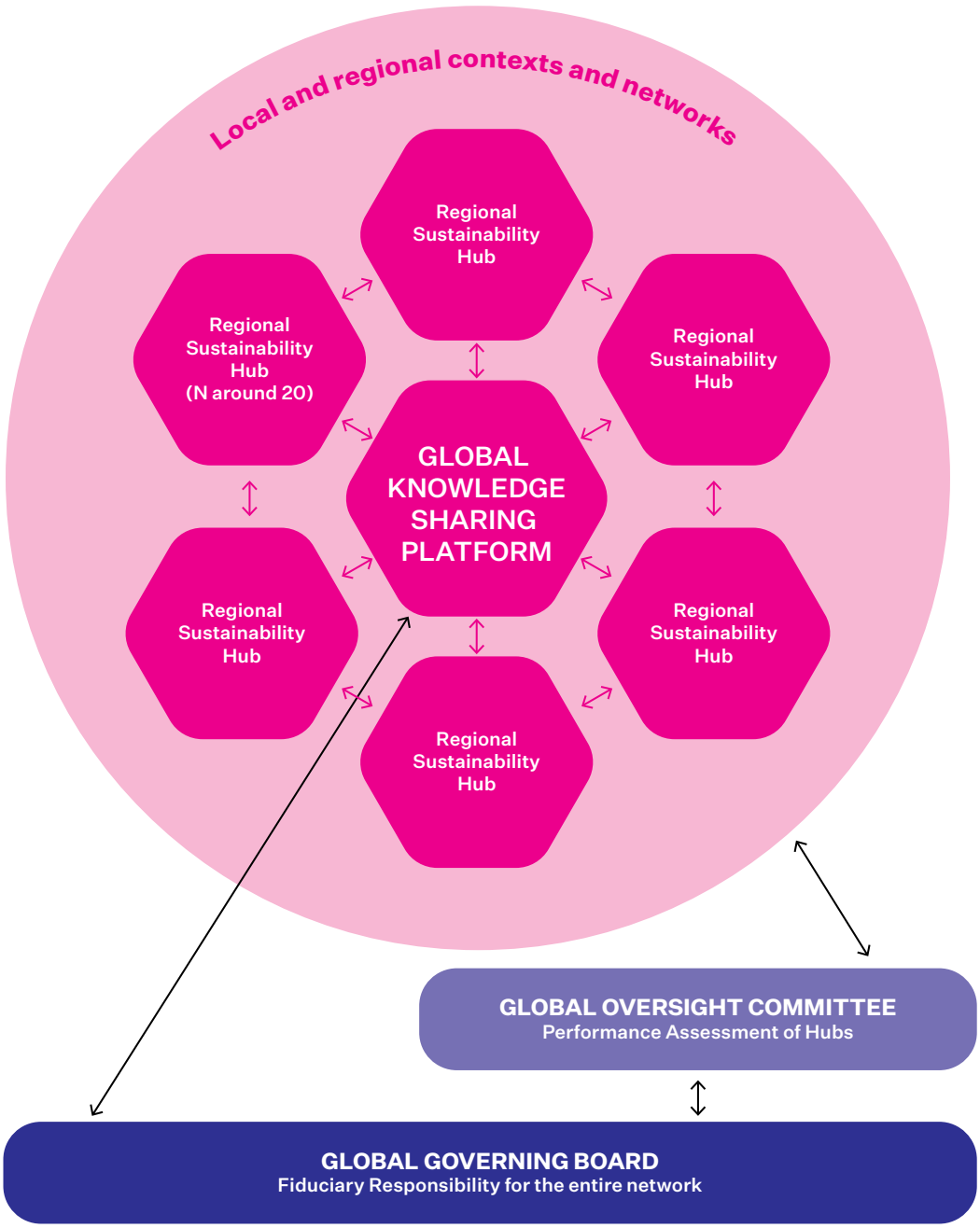


Figure 3: Governance and structure for the proposed model

D. FUNDING APPROACHES AND REQUIREMENTS

This initiative calls for different approaches and relationships with funding partners. Funders should be engaged early on in any mission co-design process. There is also a need for a shift in funding culture, moving away from solely funding singular products/outputs to supporting, in a sustained way, processes that harness the power of the dynamic interplay of complex socio-economic systems and that have the potential to stimulate a transformative societal change.

To ensure that the goals of mission science for sustainability are met, funders will be committing resources to the setting up of the model described here in stages.

In addition, funders are committing to ensure that the conditions for an engaged process of co-defining and addressing nexus sustainability issues can be realized. In that sense, supporting the process rather than working on specific issues or towards specific outcomes would be a new way of supporting the scientific effort.

This 'mission science for sustainability' effort will ideally require a common pool of science funding and an enabling system that allows scientists and partners from all parts of society to focus their collective efforts and resources on key sustainability issues and to produce urgent, usable knowledge to achieve real policy outcomes and tangible societal transformations. This would best be achieved through a **central fund** created by all participating funders and partners, or alternatively regional funds, or dedicated Hub funders, provided the core is adequately supported. To ensure a degree of operational equity in funding across the network, a tax or allocation for core support of a central fund may be required if a targeted funding model is preferred by individual funders.

Exactly how much funding will be needed for each Hub is impossible to pin down a priori, because it will depend on the location, kinds of challenges to be addressed, the numbers and kinds of researchers that would be required for each specific project and the cost of their efforts, the amount of in-kind support from various participants, the kinds of research capacity that must be built locally rather than borrowed globally, the amount of time that needs to be committed to particular projects, and other factors. Clearly, one size will not fit all here. On the other hand, the base funding level can be roughly estimated for the Hubs' core staff and facilities in support of all activities in the Regional Hub (for example, regional data acquisition and management).

TYPES OF EXPENDITURES REQUIRED TO IMPLEMENT MISSION SCIENCE FOR SUSTAINABILITY:

- Salaries for the leadership and core staff
- Remuneration of members of Sustainability Solutions Teams: provision of short- or long-term sabbaticals, term-based grants, contracts, endowed/named fellowships
- Stakeholder engagement activities
- Data acquisition and management, including supplementary IT infrastructure and tools
- Building capabilities required to accomplish missions
- Implementation activities aimed at putting science into policy and practice
- Communication and public campaigns
- Production and dissemination of knowledge products

A rough funding estimate per Hub would be:

- core Regional Hub support of **$5–10 million** per annum; and
- additional **$10–40 million** per annum of challenge research support and implementation for each Regional Hub.

Based on this estimate, a total investment for 20 Hubs and a Regional Knowledge Sharing Platform would add up to a bit more than $1 billion yearly (core Hub support up to $210 million and implementation up to $840 million). While this is only a small fraction of global annual R&D investment,[3] a significant potential return on investment for global society could be expected.

For the Sustainability Hubs to follow through on their broad commitment of delivering knowledge-to-action, sufficient and longer-term funding will be required. Teams must have adequate resources to accomplish system level analyses and to develop and test combinations of interventions wherever they are needed to drive change. In our experience, many potential solutions developed by scientific efforts (even those engaged with stakeholders) are lost because of the typical piece-by-piece funding models, which leave essential pieces of work undone or truncated. In a sense, the 'supply chains' of different innovations and information that are needed to develop and implement solutions are left incomplete, and thus solutions cannot be implemented. Adequate funding for system level analysis, development and implementation is key to empowering lasting change.

In many ways, this new strategy of regionally based integrative problem-solving efforts and capabilities around highly challenging nexus issues is a 'moon shot' for sustainability outcomes. As one of the TAG members said, 'One can't do a moon shot with cottage industry funding'. Serious financial commitments will be needed.

3 This investment would amount to a small fraction of approx. $1.7 trillion in 2020 spent on R&D globally (UNESCO Institute for Statistics)

IV. Illustrative examples of potential sustainability challenges that Hubs might address

Hubs will need to focus on addressing complex sustainability challenges that meet the principles listed in Section III on p. 22. They should require interventions across spatial and temporal scales and have high potential societal value. Below are examples of complex challenges with which Hubs could engage.

Many of these activities may not sound novel. What is new about these mission science activities is a systematic approach to engagement, from problem definition to implementation, and enough funding and time to develop and test interventions wherever they are needed. That is where the Hubs come in – they could make these mission team efforts both more relevant to decision-makers and other stakeholders' needs and easier to accomplish.

EXAMPLE 1: Trade-offs and risks in infrastructure development for the wellbeing of countries, communities and ecosystems over time and space

Infrastructure development is accelerating in many parts of the world and is expected to change the face of land and water systems over the coming decades. Nations and regions are facing questions about trade-offs, unintended consequences and risks that may arise with such developments, with important implications for the short- and long-term wellbeing of economies, communities and ecosystems. In Nepal, for example, increased damming of rivers that drain from the Himalayas to India will be intended to provide for the growing energy needs of multiple regions across national boundaries as well as a source of economic growth. Likewise, building of roads and railways to connect with China in the north and India in the south could provide not just economic benefits at national scale but also access to facilities for remote communities. While such developments carry opportunities to increase the wellbeing of billions, they also have the potential to have unintended negative consequences for people and ecosystems over multiple spatial and temporal scales.

Before investments are made, government and non-governmental actors in this complex system need to understand the potential trade-offs among energy, water, food, biodiversity conservation and human health benefits,

among others, associated with different infrastructure development trajectories, and governance approaches that will be needed to address such challenges. Interdisciplinary analyses that examine the options and implications at the nexus of energy production, water use, agriculture and food production, biodiversity protection, ecosystem services, economic growth, indigenous cultures and rights, human health, poverty alleviation – across space and time – for Nepal and its upstream and downstream neighbours, can help. Analysing feedbacks, tipping points, trade-offs, risks, governance and financial challenges under various development scenarios as well as identifying potential cross-sectoral solutions will require contributions from different disciplines in interaction with stakeholders and decision-making groups. It also will require long-term engagement, follow up and course correction as impacts of decisions become apparent.

EXAMPLE 2: Interdependent needs for food, energy and water in the Zambesi River basin

From a global perspective, there are interdependent needs to achieve food, energy and water security in river basins around the world. The growing demand for these resources to satisfy human wellbeing needs will amplify existing global challenges, particularly in the Global South. Up to 70% more food production will be required globally by 2050. An urgent need exists for more integrated and inclusive development pathways that capture the synergies and trade-offs among food, energy, water and ecosystems and their consequences for the pursuit of lasting human wellbeing; and a need for cross-sectoral solutions responding to various alternative futures that also take into account intergenerational equity.

What is required is the development of a systems analysis framework which can be applied to various regions of the world for assessing integrated evidence-based policy and management options for the water, energy and food nexus across societies and generations by assessing developing basin pathways and future scenarios. These solutions will have to be locally and regionally focused.

Along with a systems analysis framework, tools and capacities should be developed that support the sustainable management of the water, energy and food nexus in various contexts through a truly integrated, rather than sectoral, approach that promotes human wellbeing.

Testing systems analysis frameworks and emerging solutions at global and selected regional contexts will be beneficial. The Zambezi River basin is a good example as it presents a critical resource central to all these requirements in southern Africa.

EXAMPLE 3: The dual burden of malnutrition

Many marginal communities are facing the dual burden of malnutrition. As traditional sources of food are compromised and particularly as a rural–urban migration occurs, there is persistent evidence of both undernutrition (e.g. stunting, impaired brain function, infant co-morbidities) and malnutrition (e.g. obesity, diabetes, stroke, heart disease), both of which fundamentally undermine long-term human wellbeing.

The causes are multiple and related to pricing, food waste, poor use of production land and environmental degradation, resistance to technologies, inappropriate marketing, corruption, regulations and lack of nutritional understanding.

While in any one context the balance of factors will differ, understanding how to transition towards food and nutrition systems that foster universal good health and eliminate malnutrition while minimizing environmental impact is a pressing need. All stakeholders would need to work together to make substantial changes to existing infrastructure, policies, regulations, norms and preferences. Understanding how to mobilize communities, farmers/fishers/cultivators, small and big business and governments to stimulate changes within existing food and nutrition systems is key. Given the global nature of this challenge and its wellbeing implications, this project could well span countries, regions and generational cohorts.

EXAMPLE 4: Plastic pollution in terrestrial and aquatic systems

A recent study identifies at least twelve SDGs directly or indirectly impacted by (micro)plastics (Walker, 2021). Plastic pollution is present everywhere, in both aquatic and terrestrial ecosystems and is clearly detrimental to ecosystem service delivery, a fundamental threat to human health and wellbeing (Beaumont et al., 2019). Its presence is problematic for all life forms, now and into the future. Unfortunately, its production and presence in the natural environment is taking place at an extraordinary pace. The universal use, the lack of proper recycling, the dumping in water systems, and deposits

in landfills are the major cause. In 2019, 370 million tonnes of plastic were produced globally. Of this, only a small percentage (9%) was recycled, 12% was incinerated, leaving the rest to pollute the environment, the oceans and the landfills (Kumar et al., 2021). Leaving the planet in a state fit for human habitation into the future is a fundamental goal of Agenda 2030 and the threat of plastic pollution must be curtailed.

V. Outcomes

The proposed model aims at establishing a novel mechanism to fast-track the achievement of sustainable development in regions where progress is lagging most, as reflected in sustainability and SDG attainment.

Given our existing understanding of the current shortcomings of the science-policy effort towards sustainability, this model is targeted at enabling trust-building between the scientific community and the societies it serves by ensuring that science is institutionally located, performed and deployed in the complex real-world situations it seeks to transform.

It is hoped that this approach will contribute to the building of a global community of scientific, policy development and stakeholder expertise capable of resolving complex and nexus SDG matters that is so sorely needed today.

For science funders, this means orienting funding towards enabling this new way of doing science; that is, committing resources to the process of co-defining issues and co-implementing solutions rather than focusing on narrow and predefined or singular outputs and outcomes alone.

Ultimately, the goal is to promote a viable model for global cooperation which foregrounds complex local and regional challenges and solutions in service of a more sustainable planet and a dignified future for humanity.

References

Beaumont, N. J., Aanesen, M., Austen, M. C., Börger, T., Clark, J. R., Cole, M., Hooper, T., Lindeque, P. K., Pascoe, C. and Wyles, K. J. 2019. 'Global ecological, social and economic impacts of marine plastic'. *Marine Pollution Bulletin*, Vol. 142, pp. 189–195. https://doi.org/10.1016/j.marpolbul.2019.03.022

Biermann, F., Hickmann, T., Senit, C. A., Beisheim, M., Bernstein, S., Chasek, P., Grob, L., Kim, R. E., Kotze, L. J., Nilsson, M., Llanos, A. O., Okereke, C., Pradhan, P., Raven, R., Sun, Y., Vijge, M. J., van Vuuren, D. and Wicke, B. 2022. 'Scientific evidence on the political impact of the Sustainable Development Goals'. *Nature Sustainability*, Vol. 5, pp. 795–800. https://doi.org/10.1038/s41893-022-00909-5

Bogers, M., Biermann, F., Kalfagianni, A., Kim, R. E., Treep, J. and de Vos, M. G. 2022. 'The impact of the Sustainable Development Goals on a network of 276 international organizations'. *Global Environmental Change*, Vol. 76, 102576. https://doi.org/10.1016/j.gloenvcha.2022.102567

Clark, W. C., van Kerkhoff, L., Lebel, L. and Gallopin, G. C. 2016. 'Crafting usable knowledge for sustainable development'. *Proceedings of the National Academy of Sciences*, Vol. 113, No. 17, pp. 4570–78. https://doi.org/10.1073/pnas.1601266113

Emmelhainz, R., Zarychta, A., Grillos, T. and Andersson, K. 2021. 'Linking knowledge with action when engagement is out of reach: Three contextual features of effective public health communication'. *Health Policy and Planning*, Vol. 36, No. 10, pp. 1534–44. https://doi.org/10.1093/heapol/czab105

Hakkarainen, V., Mäkinen-Rostedt, K., Horcea-Milcu, A., D'Amato, D., Jämsä, J. and Soini, K. 2022. 'Transdisciplinary research in natural resources management: Towards an integrative and transformative use of co-concepts'. *Sustainable Development*, Vol. 30, pp. 309–25. https://doi.org/10.1002/sd.2276

Heyl, A. 2020. 'Engaging diverse groups for better policymaking'. International Institute for Applied Systems Analysis (IIASA). *Options*, Summer 2020, pp. 10–11. https://iiasa.ac.at/options-magazine/summer-2020/engaging-diverse-groups-for-better-policymaking

Heyl, A. 2022. 'Building trust in science for a sustainable future'. IIASA. *Options*, Winter 2022. https://iiasa.ac.at/options-magazine/winter-2022/building-trust-in-science-for-sustainable-future

Hynes, W., M. Lees et J. Müller (dir. pub.). 2020, Systemic Thinking for Policy Making : The Potential of Systems Analysis for Addressing Global Policy Challenges in the 21st Century, New Approaches to Economic Challenges, Éditions OCDE, Paris, https://doi.org/10.1787/879c4f7a-en.

International Science Council (ISC). 2021. *Unleashing Science: Delivering Missions for Sustainability*. https://council.science/current/news/unleashing-science/

Kumar, R., Verma, A., Shome, A., Sinha, R., Sinha, S., Jha, P. K., Kumar, R., Kumar, P., Shubham, Das, S., Sharma, P. and Vara Prasad, P. V. 2021. 'Impacts of plastic pollution on ecosystem services, Sustainable Development Goals, and need to focus on circular economy and policy interventions'. *Sustainability*, Vol. 13, 9963. https://doi.org/10.3390/su13179963

Liu. S. 2004. Strategic Typology of Impact Pathways for Natural Resources Management: A Case Study of the Alternatives to Slash-and-Burn Programme Report. Alternatives to Slash-and-Burn (ASB), World Agroforestry Centre, Consultative Group on International Agricultural Research (CGIAR). (Cited in PA Matson, WC Clark and K Andersson. 2016. Pursuing Sustainability: A Guide to the Science and Practice. Princeton University Press.)

R&D World. 2021. '2021 Global R&D funding Forecast'. https://forecast.rdworldonline.com/product/2021-global-rd-funding-forecast/

Staples, K., Fresque-Baxter, J., Andrews, E., Kelly, E., Slave River and Delta Partnership, and Steelman, T. 2021. 'Mobilizing transdisciplinary sustainability science in place-based communities: Evaluating saliency, legitimacy, and credibility in northern Canada'. *Environmental Challenges*, Vol. 5, 100314. https://doi.org/10.1016/j.envc.2021.100314

Statista. 2022. 'Percentage of global research and development spending in 2021, by industry'. Statista Research Department. https://www.statista.com/statistics/270233/percentage-of-global-rundd-spending-by-industry/

United Nations. 2021. National institutional arrangements for implementation of the Sustainable Development Goals: A five-year stocktaking, World Public Sector Report 2021, Division for Public Institutions and Digital Government, Department of Economic and Social Affairs, New York, August.

United Nations Department of Economic and Social Affairs (UN DESA). 2022. *The Sustainable Development Goals Report 2022*. United Nations. https://unstats.un.org/sdgs/report/2022/

Walker, T. R. 2021. '(Micro) plastics and the UN Sustainable Development Goals'. *Current Opinion in Green and Sustainable Chemistry*, Vol. 30, 100497. https://doi.org/10.1016/j.cogsc.2021.100497

Wellcome. 2021. 'The cost of not preparing for infectious diseases'. https://wellcome.org/news/cost-of-not-preparing-for-infectious-diseases

Willaarts, B. 2021. 'Cooperation and joint investments are key to sustainable development in the Indus basin'. Policy Brief #28, International Institute for Applied Systems Analysis. https://previous.iiasa.ac.at/web/home/resources/publications/IIASAPolicyBriefs/pb28.html

Annex I: Members of the Global Commission and Technical Advisory Group

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