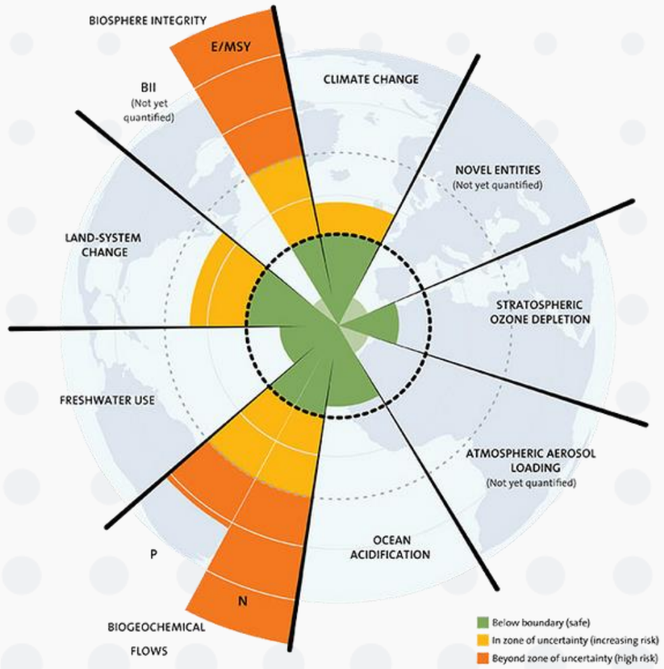
A Framework to Unleash Mission-Oriented Science

A planet on “red alert”



Photos: Photos (t/l > b/r): BBC, The Atlantic, CNN, Al Jazeera

Source: Steffen et al. (2015)

… and society far off-track on the SDGs

Substantial progress | Fair progress | Limited / no progress | Deterioration | Distance to target

Source: UN (2020) SDG Progress Chart (pre-pandemic status)

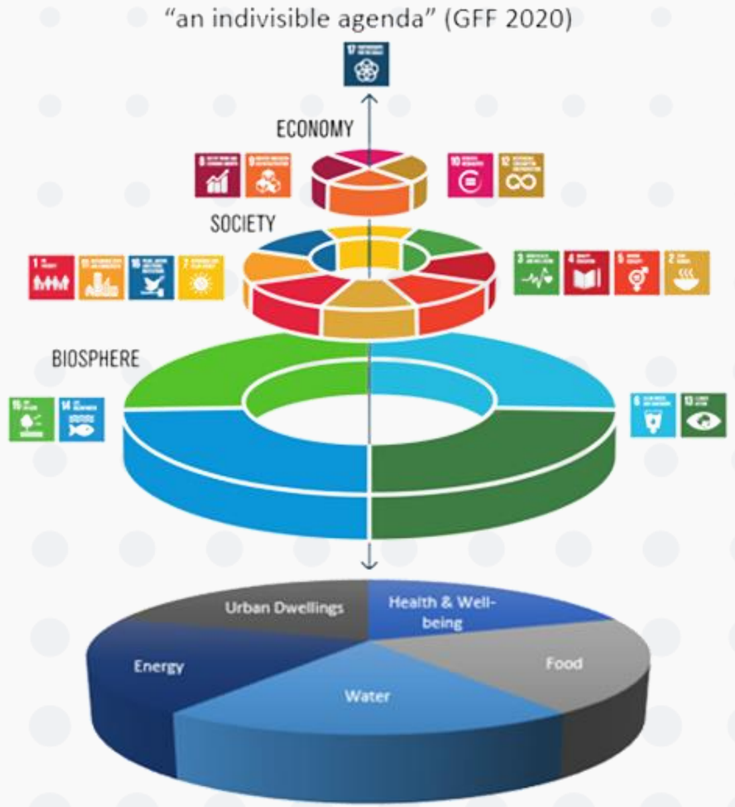
Focus on five “basic needs” areas

The charge to ISC:

- Identify key areas for mission-driven science

Methodology:

- **Inputs from ISC-led call** (239 valid responses, 61 countries)
- **Agenda-setting reports** (20 reports, including 2018 IIASA TWI2050 Report, 2019 UN Global Sustainability report, UN Research Roadmap for the COVID-19 Recovery)
- **Synthesis of scientific literature**



Source: Adapted from Stockholm Resilience Center

If we don’t address these…

… they will kill us

A business-as-usual science

The Dominant Science System

- **Elements** (institutions - e.g. universities, research institutes, non-governmental and governmental organizations - and structures)
- **Organized in silos** (natural sciences, social sciences, applied sciences, humanities, and the arts, sometimes with industry)
- **Reinforced by cultures** (assumptions, values, incentives, standards, promotion criteria)
- **Functionally interrelated** (via the funding, generation, validation, evaluation, communication and application of knowledge)
- **In particular contexts** (organizational, operational, political)
- **Shaping what and how scientific knowledge is produced and used, and by whom**

Can’t Deliver the Science We Need

Self-organization & Foci

- Narrowly focused
- Fragmented, distant and abstracted
- Compartmentalized

Attitude

- Exclusionary and disconnected from society’s needs
- Elitist
- Dominated by western thinking

Normative Orientation

- Uncritical
- Captured by an economic growth-mindset

A science for societal transformation

A Support System That Enables

- Institutional concentration of extensive brain trust
- Cross- and transdisciplinary integration
- Science for the common good
- Full-time immersion
- Research shielded from teaching, admin, fundraising, promotional pressures and uncertainties
- Sustained support (financial, institutional, technological/infrastructural, political)
- Linked and accountable to policy and practice

To Produce the Science We Need

Self-organization & foci

- Integrative
- Systems-focused
- Networked and flexible
- Transformative
- Social-science led
- Globally and regionally connected
- Strength-based and capacitating

Attitude

- Collaborative and inclusive
- Embracing transdisciplinarity and different knowledge systems
- Open and accessible to all

Normative orientation

- Critical, innovative and reflective
- Driven by the common good
- Solutions-focused
- Societally accountable

The vision

Source: Deloitte.com

For science to support the urgent societal transformations towards a more sustainable, equitable and resilient future, we need

A nimble, targeted, mission-oriented set of scientific initiatives and associated support structures that harness the best of what science can do, but do so in a completely different (albeit largely proven) way, connecting seamlessly with other parts of society to implement necessary policies, practices and behavioral changes.

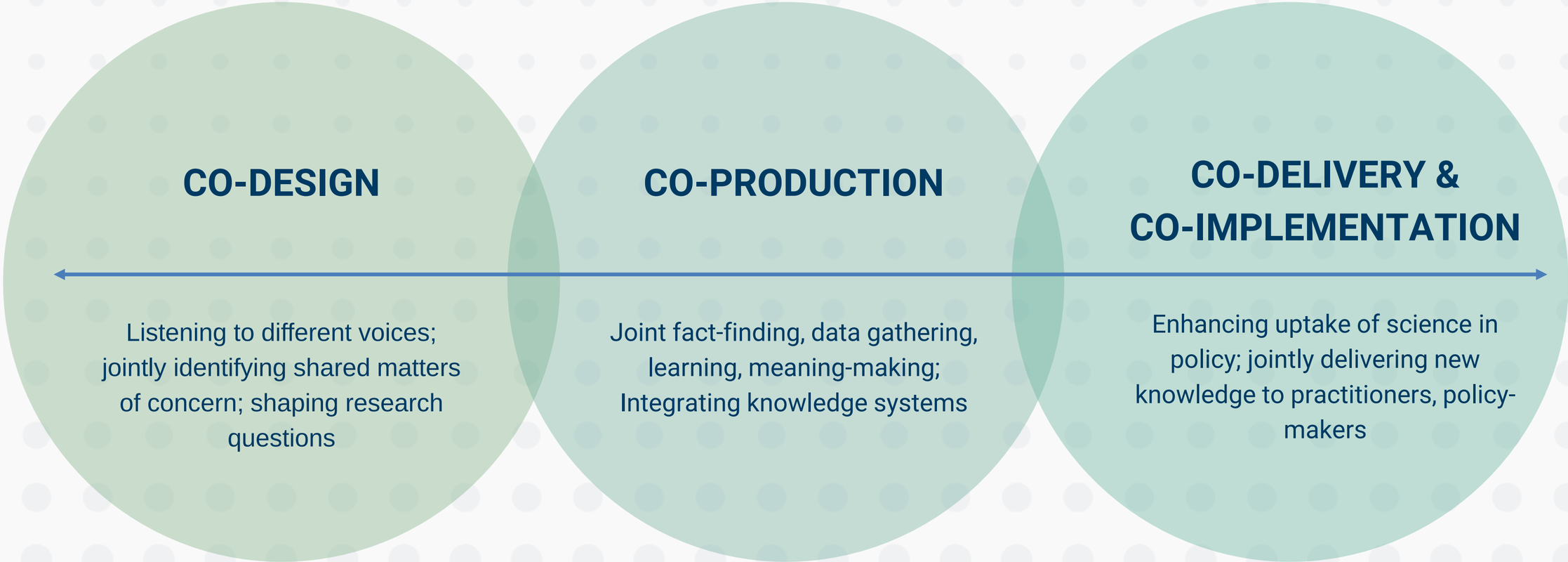
What is mission science?

- Focused on a clearly defined topic, question or goal
- Singularly goal-oriented and solutions-focused
- Conducted for a limited period of time until a substantial challenge has been successfully addressed
- Significant size, scope and ambition
- Requires co-designed, inter- and transdisciplinary approaches
  - Input from a wide range of knowledge holders and stakeholders
  - Integration across disciplines and knowledge spheres
  - Applied and fundamental knowledge
- Direct engagement policy-makers and societal actors
- Accessible and used

Transformative

Source: National Geographic

The transdisciplinary heart of mission science



Unleashing science: making change happen

ASSUMPTIONS

- Achieving the SDGs is a political problem
- Current science system inhibits science from making a significant, constructive contribution to the SDGs
- Incremental reform is incommensurable with SDG timeline
- Mission-driven science in support of societal T2S is a design problem

PRIORITIES

- The soc.-ecol.-climatic trends that undo past & undermine future prospects for human development, dignified and just human existence.
- Basic needs must be met first
- “Rate-limiting“ questions co-determined with partners

SCIENTIFIC ACTIVITIES

- Being responsive to identified decision-making needs
- Being supportive of identified policy and action interventions
- Being generative in identifying innovative solutions
- Being constructively critical of inadequate policy approaches

APPROACH

- Holistic and integrative
- Systems approach
- Transformative, high-impact, transdisciplinary knowledge creation
- Mission-driven
- Enabling environment
- Ongoing engagement activities

SOCIETAL PARTNERS

- Champions
- High-level political leaders
- Decision-makers at all levels
- Thought and action leaders
- Relevant private sector
- Public science funders and philanthropy
- Non-profit leaders
- Civil society

RESULTS - Changing the Conditions that Hold Unsustainable, Unjust Systems in Place

- Mindsets, belief systems and associated cultural values and norms
- Relationships and connections
- Power dynamics, vested interests, politics
- Policies and governance systems
- Resource flows
- Practices and behaviors

OUTCOMES

- “Rate-limiting” problems resolved
- Basic needs and related SDGs are met
- Further improvements in soc./ecol./ climatic conditions beyond 2030
- More equitable, inclusive, sustainable economic models and financial systems
- Shift toward integrated, inclusive governance
- Emergence of functional, societally accountable public institutions at all levels

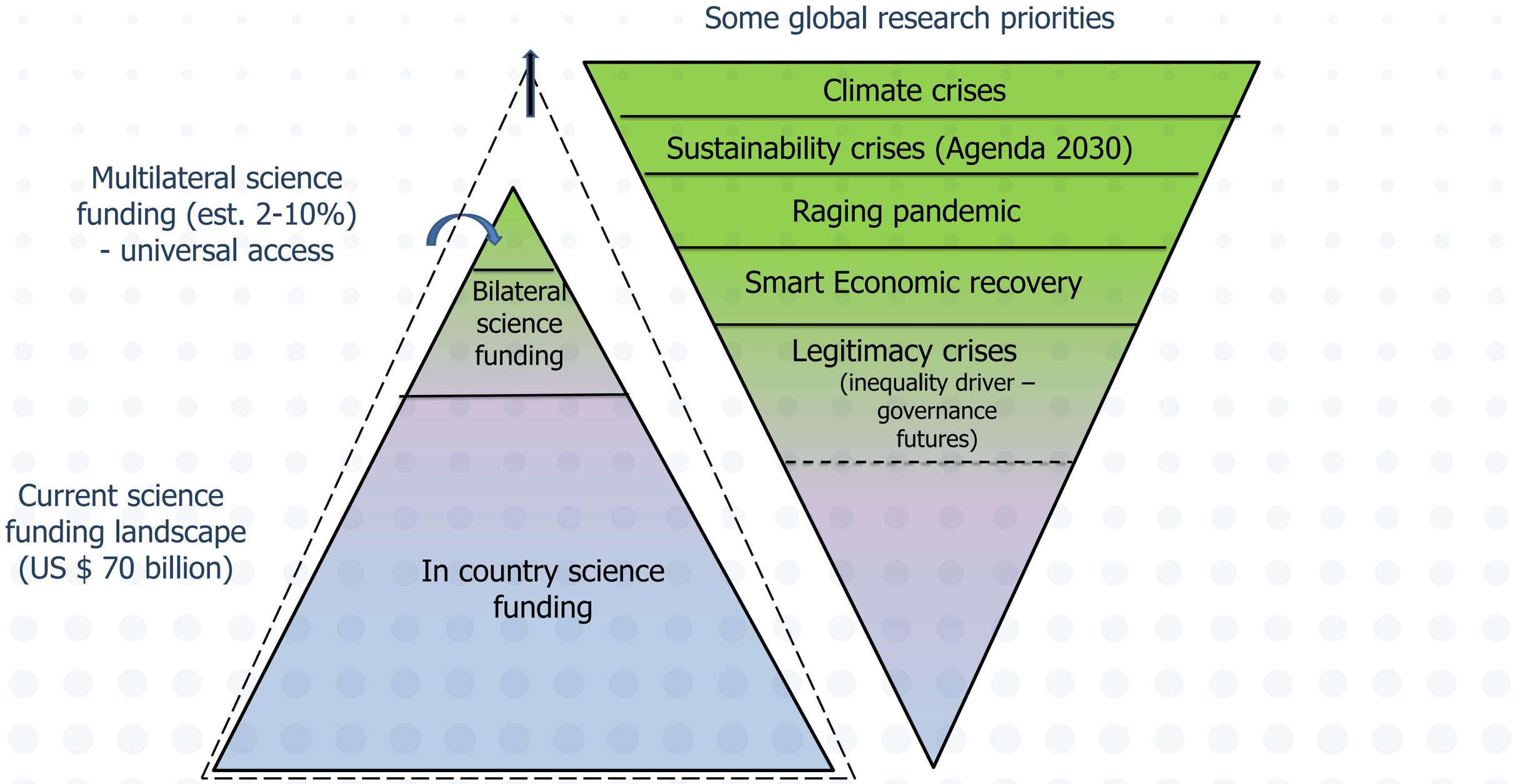
SUPPORT & INPUTS

- Adequate funding, institutional home, science infrastructure, etc.
- Dedicated leadership, top-notch scientists, time, support staff

The challenge

- Global research priorities cannot be achieved unilaterally
  - bottom-up and incremental scientific approaches will not suffice
- Urgency – most pressing multilateral mission-driven global priority research to be tackled at scale, timeously and collectively
- Multilateral and prioritized research coordination – low, indeterminate (national)
- Business as usual – will know exactly what we should have done
- Global multilateral science platform(s) for delivering on global science missions
- Global research priorities – will determine whether there is a dignified future for humanity or not (GRC – pretty basic)
- Large science infrastructures can bring together the science community and funders
- Shared and universal global research problems that require our collective effort, not yet

Research and funding priorities



Purpose of mission centres

- Gather the best thinkers around the key Global Science Missions
- Each mission to comprise a core group of scientific and science policy experts
  - fully committed and with total and collective emersion (core groups)
  - wholly virtual approaches will not achieve the required momentum
- Harness and optimize transdisciplinary approaches to tackle mission critical global change issues
- Identify most important rate limiting steps for global transformations
  - steer the necessary research and interventions to overcome them
- Identify catalytic interventions (research, policy, societal responses) to drive transformative societal responses to the Global Science Missions

Operational models (2023-2035)

I. Single Mission Center (~500 researchers): CERN for Global Sustainability Research

II. Five Global Mission Centers, one mission per continent, with a mechanism for learning across mission centres. Relative strengths emphasized.

- Cities - Asia
- Food - Africa
- Water - South America
- Health - North America
- Energy - Europe

III. Five Regional Mission Centers, one center per continent to implement all five missions in each region, with a global mechanism for coordination and learning across regions

Mixed operational modes (physical and virtual) for any of the above

Governance (2023-2035)

- Accountability Board
- Performance review of each mission - every 5 years.
- Given the scale of the global challenge, Mission Centers will need to be well-resourced over long period of time, 2023-2035.
- **Estimated annual budget US$ 100 million for five missions (US $ ~20 million per science mission/ annum) – CERN US $ 1.1 bn/ annum**
- Additional institutional, infrastructure and in-kind support offered by hosts
- Funding to be mobilized from the national science funders, foundations, development aid agencies, the private sector and governments.

Towards multilateral science missions research

Needs to be a co-designed and co-framed initiative

Step 1: Endorsement to embark on this collective process (ISC, GRC and partners)
Step 2: Identification and induction of Science Missions Champion(s) / Influencers
Step 3: Embark on building partnership: a coalition of the willing (CoW) – through high level political endorsement
Step 4: Create Science Missions Partnership to steer/ fund Science Missions Research
Step 5: Co-define mechanisms to establish a common funding pot
Step 6: Partnership to co-design the Science Missions Research process and modalities
Step 7: Co-define rate limiting step across priority Science Mission domains

- This initiative is about political leverage, influence, engaging governments – also science and funding modalities
- Are we up to the challenge?
- To step up to the level of ambition required?
- If so - ISC willing to take initiative forward together with partners

Thank you