UN environment programme

Conceptual Framework for the Development of a Global Environmental Data Strategy

Version 2.0

May 2023

Terms and Definitions

1 Towards a Global Environmental Data Strategy

This document at this stage presents a conceptual framework for the development of a Global Environmental Data Strategy, which by request of Member States, should be finalized by UNEP by 2025. This is a first draft to begin a wide and long process of consultation.

1.1 Context and Scope

We are now living in a time of unprecedented climate emergency and environmental crisis, facing critical consequences of rising temperatures, climate change, environmental pollution, species extinction and natural resources destruction. The climate crisis has already become one of the most significant humanitarian challenges. The solutions needed to address the climate challenge requires strong science-based decision-making and powerful action towards transformational change for the lives and health of people, places, and planet.

The guidance from the UN Secretary-General's Strategy Data Strategy[1] indicates the general direction and strategic focus of this Global Environmental Data Strategy as a vehicle for data action by everyone, everywhere in the UN family and establish a solid foundation for insight, impact, and integrity. Three major recommendations are raised to shed light on the next steps for a data-driven transformation, which includes: 1) Create value with data action and priorities; 2) Foster enablers; and 3) Nurture capabilities, which consolidate the scope towards a coalition and overarching approach to help everyone in the UN family deliver more value from data as a comprehensive guide. To bridge this high agenda strategy, the strategic positioning of the Global Environmental Data Strategy will be:

- A data strategy to advance digitalization of the process and services.
- An adaptive dynamic strategy to facilitate the future structural changes.
- Guiding the sub-ICT strategy to generate value involves everyone.
- Enhance the engagement with new technologies.
- A comprehensive digital cooperation that mobilizes resources beyond UN system.

At the same time, there has never been an epoch in human history with such digital capacity, where and when the use of emerging technologies such as information and communication technologies; human computer interfaces; big data; internet of things; and machine intelligence can empower humans towards transformational change.

1.1.1 What is this and what this is not

This is a strategy that was designed with a coalition-based and overarching approach to help everyone in the UN, partner organizations and civil society deliver more value from data through a collective data ecosystem with a justice data supply chain. In assembling best practice, concepts, and assessments from leading organizations internally, the public and private sector, it is meant as a comprehensive action guide to bridge UNEP divisional sub-data action framework with general agenda data strategies:

- Define UNEP data principles and outcomes.
- Provide adaptive scenarios and optional pathways to synergy divisions' efforts and expertise as a one.
- Guide the division's endeavor to develop action-driven sub strategies and digital transformation sub-programme under One UNEP data structure.
- Raise consensus within UNEP to follow a common phase roadmap, finance model with options and a digital integration strategy.

With many strategic domains, priorities and levels of organizations are being covered, it is important to note:

- This is not a "data technology strategy" to advance the technical actions.
- This is not an "action plan" to clarify the frameworks that lead the action on the ground.
- This is not an "assessment and monitoring strategy" to identify the gaps in the current operation.

1.2 Mandate

The United Nations Secretary-General has asserted that climate change and the environment represent one of the biggest challenges for humanity and consequently the availability of quality, timely and disaggregated data is fundamental to support nations in the achievement of Agenda 2030 and the Sustainable Development Goals.

1 The documents available at: https://www.un.org/en/content/datastrategy/images/pdf/UN_SG_Data-Strategy.pdf

The United Nations Environmental Assembly, in March 2019, through its Ministerial Declaration and Resolutions, provided a clear and strong mandate to work with the UN system entities. The United Nations Environment Programme (UNEP) is tasked with having a global environmental data strategy by 2025, with progress reports to Member States by 2021 and 2023.

This can be achieved by harnessing big data on the environment for sustainable development, peace and security and humanitarian action, and by providing a digital transformation platform, the World Environment Situation Room, to support decision-making and action for tackling environmental challenges. As part of the UNEP Medium Term Strategy (2018-2021), UNEP is implementing projects A4 – Knowledge Platform on the Environment and Project A5 – Foresight and Emerging issues which constitute the programmatic base for the implementation of the World Environment Situation Room. The following Medium-Term Strategies, for the periods 2022-2025 and 2026-2029 will consider Data, Information and Knowledge on the Environment as a core pillar for UNEP strategy and programmatic activities.

Our Global Environmental Data Strategy should be built on an approach combining two complementary and simultaneous Transformational Pathways: one inward looking, aiming at integrating data and knowledge across UNEP; and one outward looking, aiming at the provision of a digital transformation platform with our member states and through a one global partnership.

1.3 The Relevance and Strategic Linking

In March 2019, the United Nations Environmental Assembly (UNEA) issued a powerful mandate through its Ministerial Declaration and Resolution 4/23, urging UNEP to collaborate with other entities within the UN system to develop a comprehensive global environmental data strategy (GEDS) by 2025. Responding to this call, UNEP launched two key initiatives: Project A4, the Knowledge Platform on the Environment, and Project A5, Foresight and Emerging Issues, both of which were integral components of the UNEP Medium Term Strategy (2018-2021). These initiatives laid the groundwork for the World Environment Situation Room (WESR), which is poised to be a pivotal tool in the effort to create a sustainable and environmentally conscious future. Besides the two key components, others being closely attended listed as below (Figure 1.3.1):

- Data Strategy of the Secretary General for Action by Everyone, Everywhere: With Insight, Impact and Integrity.
- Report of the Secretary-General – Roadmap for Digital Cooperation.
- UNEP Roadmap on Environmental Statistics, Accounting and Analysis.
- For people and Planet: The UNEP Medium Term Strategy for 2022-2025 to tackle climate change, loss of nature and pollution.

The Executive Action Plan 2023 - 2027 - Early warning for all - The UN Global Early Warning Initiative for the Implementation of Climate Adaptation.

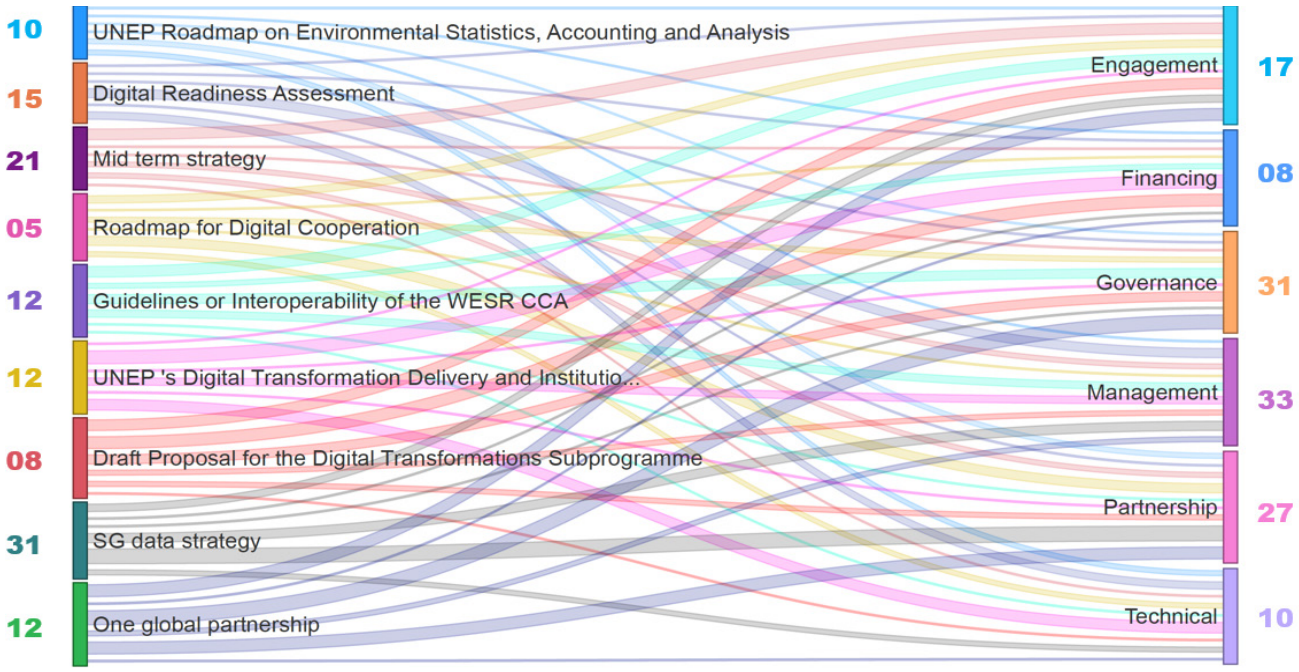


Figure 1.3.1 – Relates documents contribution to the current GEDS edition

2 Introduction of the Global Environmental Data Strategy

The Global Environmental Data Strategy is designed to develop a federated data ecosystem that coalited by a hybrid governance structure, collective intelligence powered action framework and an adaptive vision calibrating mechanism that shared the common standard across UNEP and the consensus with the public. It will become a powerful tool to unite the efforts of organizational digital practices, minimize the negative impacts in competition which generates great threats to the alignment of the UN high-level agenda strategy and data supply justice to people, places, and the planet.

To tackle the climate and extinction crises with science-supported action, and achieve humanitarian action, sustainable development, and peace and security, UNEP needs to lead one clear Global Environmental Data Strategy. This document outlines the principles and objectives of such a strategy, the pathways leading there, a roadmap for implementation, and the expected impacts on the ground.

2.1 Approach

The methodology for formulating the Global Environmental Data Strategy (GEDS) is rooted in a comprehensive analysis of key materials provided by UNEP, which encompass a thorough examination of the successes and setbacks of the UNEP-Live initiative as well as the antecedent to the WESR. By leveraging insights gleaned from this extensive review, the GEDS is poised to be a robust and forward-thinking framework that will facilitate the seamless integration of data and digital technologies to further advance the global environmental agenda.

Through the desk review, case study, and use cases analysis, the major findings are included:

- Facilitated by across sectors' funding mechanism.
- Holistic and systematic capacity building strategy.
- Enhance collaboration and communication between divisions.
- Transform from a supply-driven to a demand-driven method.
- Responsive and collective governance and management structure.

The core of GEDS covers the recommendations for structural components which include governance, technology, operational facility, and institutional environment which targeted at guiding the internal divisions, external partners, stakeholders, and civil society through demand driven approach to co-design the downstream action frameworks on prioritized themes. The GEDS is composed by three major sections:

2.1.1 Section I: Designing the Foundation of an Adaptive GEDS

This section emphasizes the foundation of GEDS which includes the vision, objectives, and mechanism necessary to create an adaptable and up to date solution with the means to achieve a desirable future. It outlines the ways in which institutional and technical connectivity can be established with higher-level strategies to ensure that there is synergy between UNEP priorities, member states' demands, stakeholder interests, and civil society's needs. A demand-driven transition approach is employed to achieve this.

2.1.2 Section II: Recommendations for Implementing GEDS

This recommendation section is tailored to address the actionability and interoperability of the strategy. It is not an action framework package but a holistic, thematically and technically overarching, and cohesive recommendation set to guide actions from UNEP divisions, member states, stakeholders, and civil society to jointly deliver One UN Map that keeps the world environment under review, which powered by a demand-driven and collective data ecosystem to everyone, everywhere at any time.

Photo credit: Shutterstock / metamorworks

2.1.3 Section III: Align GEDS with UNEP Current Workstreams

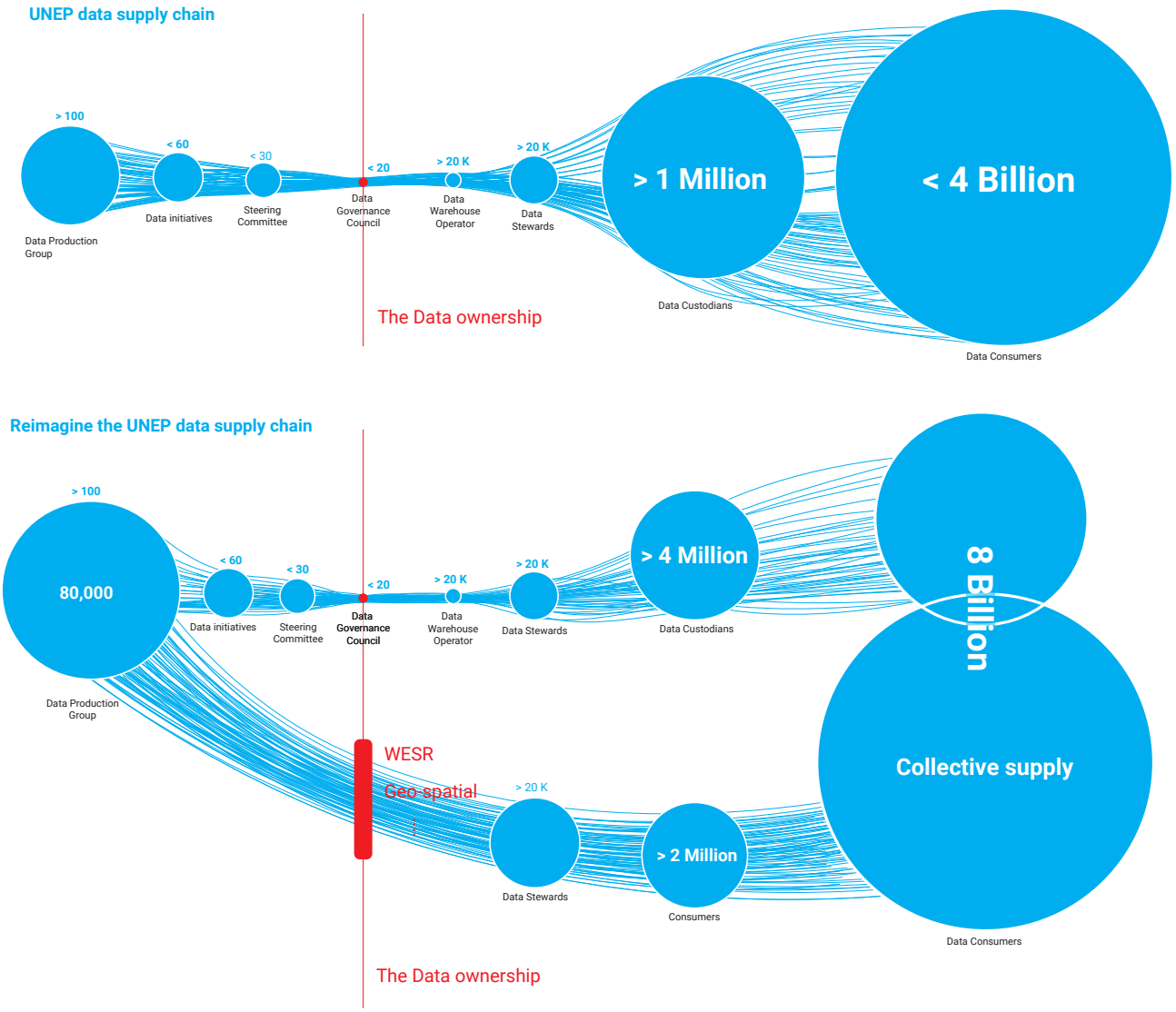
The Global Environmental Data Strategy (GEDS) is intended to be implemented by all divisions of the United Nations Environment Programme (UNEP) as a basis for collaboration with external partners. It is important to pinpoint the sub-programme that has the potential to attract resources and align with the requirements of Member States and stake-holders, while also taking into account the prevailing political circumstances. Identifying the most suitable incubational sub-programme is crucial in achieving this goal. The major workstreams can be concluded into three categories:

- Geospatial and earth observation data.
- Environmental data and statistics.
- Publications, documents, and media.

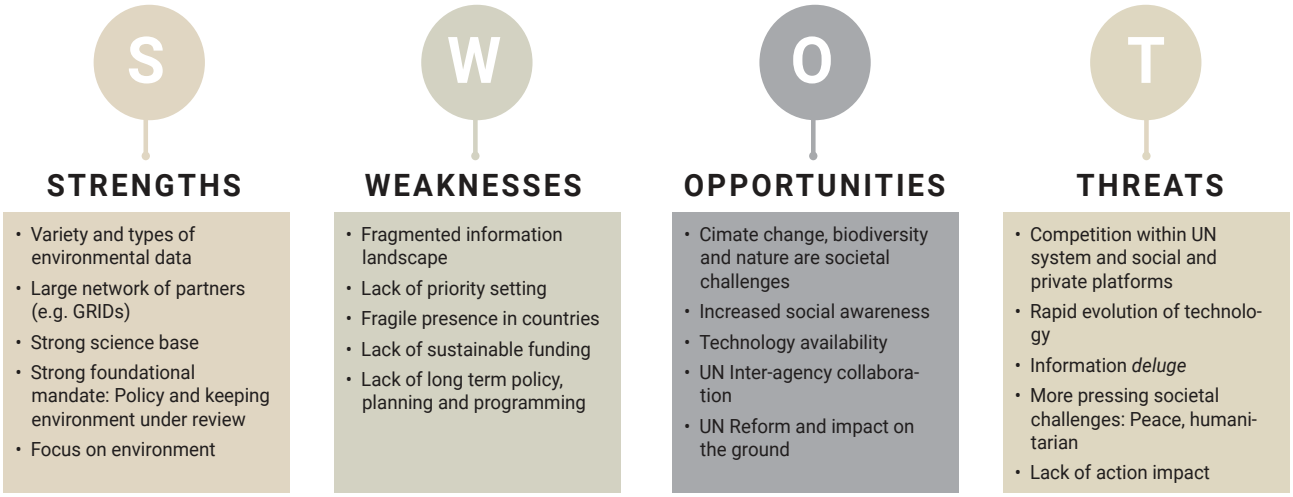
2.2 The Challenge and Opportunities of the current UNEP Data Ecosystem

The challenge and opportunity analysis are based on the current assessment of divisional data assets, management mechanism, and strategies if deemed, also its upper stream SG data strategy, a Digital Cooperation Roadmap and a Common Agenda which leads the way of upgrading the UN system into version 2.0 to make it fit for purpose and objective.

Among many conceptual frameworks, WESR is the vehicle that is being designed as a mechanism, to facilitate data and knowledge sharing through federated approaches to keep the environment under review and mobilize countries' capacity to monitor and achieve SDGs and Multi-lateral Environmental Agreements (MEAs). Moreover, one of the digital transformation strategic actions in the UNEP's medium-term strategy for 2022-2025 is for UNEP to contribute to building a digital ecosystem of data and platforms for the planet. Thus, this analysis is highlighted by WESR to shed light on the general actions and impact performance and reflect on the current data strategy.



SWOT Analysis: The following initial SWOT Analysis is a dynamic instrument, guiding the strategic assessment of internal Strengths and Weaknesses as well as external Challenges and Opportunities.



Challenge:

- Duplicated work streams generate competition among divisions.
- Lack of credible data due to the severe fractured data governance structure.
- Tech capacity limitation due to the strategic data architecture.
- With strong implementation driven partners.
- Complete the cycle of the data flow, for example, GRID Geneva's role in downstream data processing center, it needs a complete monitoring framework to ensure the data flow back to the WESR and assessed by the countries.
- The barrier and competition between divisions.
- Current data strategies are mostly designed as supply driven model rather than demand driven model.
- Lack of understanding digital transformation, GEDS and WESR, and how these initiatives are coordinated. Actions are particularly needed to articulate the alignment clearly.

Opportunity:

- Geo-spatial network as the technical partnerships platform to act as one.
- The internal demands for WESR as the vehicle to deliver one UN map.
- The demands from member states of scientific decision-making tools.
- Moving to the NESR is a perfect timing to promote WESR as the major vehicle to implement and consolidate GEDS through on-the-ground practice.

2.3 The Foundation of GEDS

2.3.1 Purpose

The goal of establishing a Global Environmental Data Strategy is to create a mechanism that brings together the endeavors of UNEP, Member States, civil society, and the private sector to promote data, information, and knowledge sharing through federated approaches. It is designed to keep the environment under review, enhances countries' ability to monitor, track and attain the environmental goals set forth in the SDGs and Multilateral Environmental Agreements (MEAs).

To leverage the benefits of the digital era and enhance its capability to provide global environmental data, information, and knowledge to support its mandate, the United Nations, Member States, the private sector, and civil society are actively working towards this goal. As part of this effort, the UN Secretary General has adopted a Data Strategy, a Digital Cooperation Roadmap, and a Common Agenda to modernize and improve the UN system. The development of the Global Environmental Data Strategy (GEDS) and the World Environmental Situation Room (WESR) as strategic frameworks is taking place against this backdrop to effectively facilitate this mission.

The promptness and availability of data and information are crucial in facilitating evidence-based policymaking and decision-making, promoting innovation, transparency, and encouraging mutual accountability in the pursuit of the 2030 Agenda and its Sustainable Development Goals (SDGs). To that end, UNEP has included "Digital

Transformation" as one of its seven sub-programs in its medium-term strategy for 2022-2025. As part of this subprogram, one of UNEP's strategic initiatives is to help establish a digital ecosystem of data and platforms that will benefit the planet.

2.3.2 Vision

To address the worldwide climate crisis and uncertainties, we are developing an adaptive and actionable strategy to provide a federated data system and empower science - based multilateralism and a gateway of informed decisions for people, places, and planet.

This vision is a long-term plan that defines our ambition in developing a federated data ecosystem across UNEP. It provides the insights, scope and mechanisms that will guide actions across divisions to 'acting as one'. This strategy outlines the pathways of managing data as strategic asset, transforming frameworks, and upscaling mechanisms to ensure its actionability.

2.3.3 Objective

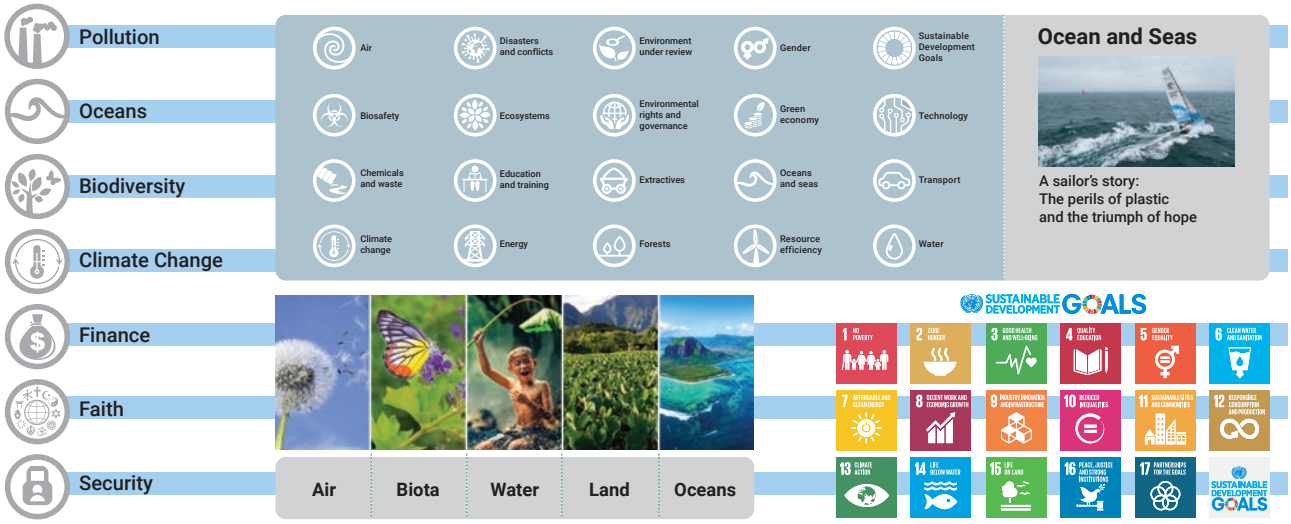
The objective of this strategy is to align with the UN Secretary General Data Strategy[2], Midterm Strategy for 2022 – 2025[3] and related upstream documents, UNEP mandate and more importantly, develop an actionable plan and enable the connection with ground actions. Thus, to pursue of our vision, the strategy will focus on three overarching domains:

- Data for action: The availability of timely, reliable, and disaggregated environmental data supporting decision-making and action for countries to achieve Agenda 2030 and the Sustainable Development Goals.
- Data for good: Data, information and knowledge on the environment for the Common Good. Supporting the transformation of lives of People, Places and Planet, at all levels of countries, regions and worldwide. This will support coherence and coordination realizing the United Nations mandate across the pillars of peace and security, sustainable development, and humanitarian action.
- Data for Future: The short medium-and-long term policies, strategies and programmes should be informed by a very long-term vision of possible and desired futures, adopting global environmental monitoring systems, early warning and a foresight strategy into designing scenarios and visions for the future.

2.3.4 Define the priorities

The intelligent dynamic platform supports and aligns with UNEP's priority setting, providing transparent access, sharing and use of information and knowledge on overall priorities, frameworks of action as the permanent Global Environmental Monitoring Systems and Agenda 2030 and Sustainable Development Goals. To move forward with a demand-driven approach with considering the three objectives, the priorities are formulated into three groups, including:

1) **Priorities under the 'Data for action':**
   - Develop a multi-stakeholder approach to governance inclusive of Member Countries, partners, private sector, and the civil society. The sub strategies and action frameworks should address:
   - Increase cooperation across divisions. (Key)
   - Establish a sustainable and flexible funding system to incubate broader collaborations.
   - A comprehensive digital cooperation that mobilizes resources beyond UN system.
   - Roadmap for Data and Statistics.
2) **Priorities under the 'Data for good':**
   - Engage through regional mechanisms, pilot at country level, and scale up to complete the cohesive data ecosystem cycle. Its sub strategies and action frameworks will be tailored to tackle:
   - Develop a more inclusive governance and leadership approach.
   - Enlarge the decision-making group by inviting Member States to elevate the proposed strategy carrying initiative's role in consolidating the formulated 'Acting as One' and Data Governance Groups.
   - Guiding the sub-ICT strategy to generate value from evolves everyone.
   - A federated data strategy to advance digitalization of the process and services.
3) **Priorities under the 'Data for Future':**
   - Move technology development from a waterfall to an agile and user-centric approach.
   - Create a demand-driven approach from the current supply-driven approach. (key)
   - The existing operation strategy is largely based on supply-driven which is provide what we have. It requires a responsive mechanism to track users' need and adapt to the changes of demands.
   - Enhance the engagement with new technologies.
   - An adaptive dynamic strategy to facilitate the future structural changes.



2.3.5 Principles

The following Principles should guide the strategic implementation of the follow-up and review of the Global Environmental Data Strategy, which is organized by four major groups, including the governance group, technical infrastructure group, institutional environment group, and the operation approach group.

- Long-term vision: Adopt a long-term perspective into the possible and desired futures.
- Impact: Focus on key performance indicators, impactful, effective and efficient delivery on the ground and on people.
- Demand driven operation: Each strategy and plans should be considered both from agenda level and ground action guidance.
- Across scale partnership: Build on existing and innovative partnerships including citizens and civil society, business as well as the UN system bodies and entities.
- As goods that are beneficial for society as a whole.
- Holistic and corresponding capacity building: Transformations that empower citizens and organizations.
- Data collective supply ecosystem: To the extent possible, design a cost-effective system to build and operate based on the use.
- Common and consolidated standards: Avoid duplication of information and build on existing information and data sources as well as procedures, partnerships and intergovernmental processes already in place. Use of existing open-source software and related tools.
- Hybrid governance and deep management.
- Mappable and responsive monitoring.
- User-centered: Focus on responding to Member State requests and needs for evidence-based policy making and action.
- Multi-scenario solution package: the pathway of achieving the strategic goal needs to be multi - scenario based path leading.
- Simplification: Put in place a simple, easy to use knowledge system, providing transparent access, use and sharing of indicators for monitoring and follow-up and review.

2.3.6 Principles' impact mapping and evaluation

Principle Measurement Chart (Figure 2.3.6.1) is a method that aims to assess the performance of principles and their potential impact on certain actions, guided by specific principles. To evaluate the contribution of these principles, the mapping employs eight different dimensions, including transparency, accountability, robustness, actionability, adaptability, effectiveness, interoperability, and collectiveness.

Step 1: Locate the principles on the principle measurement chart.

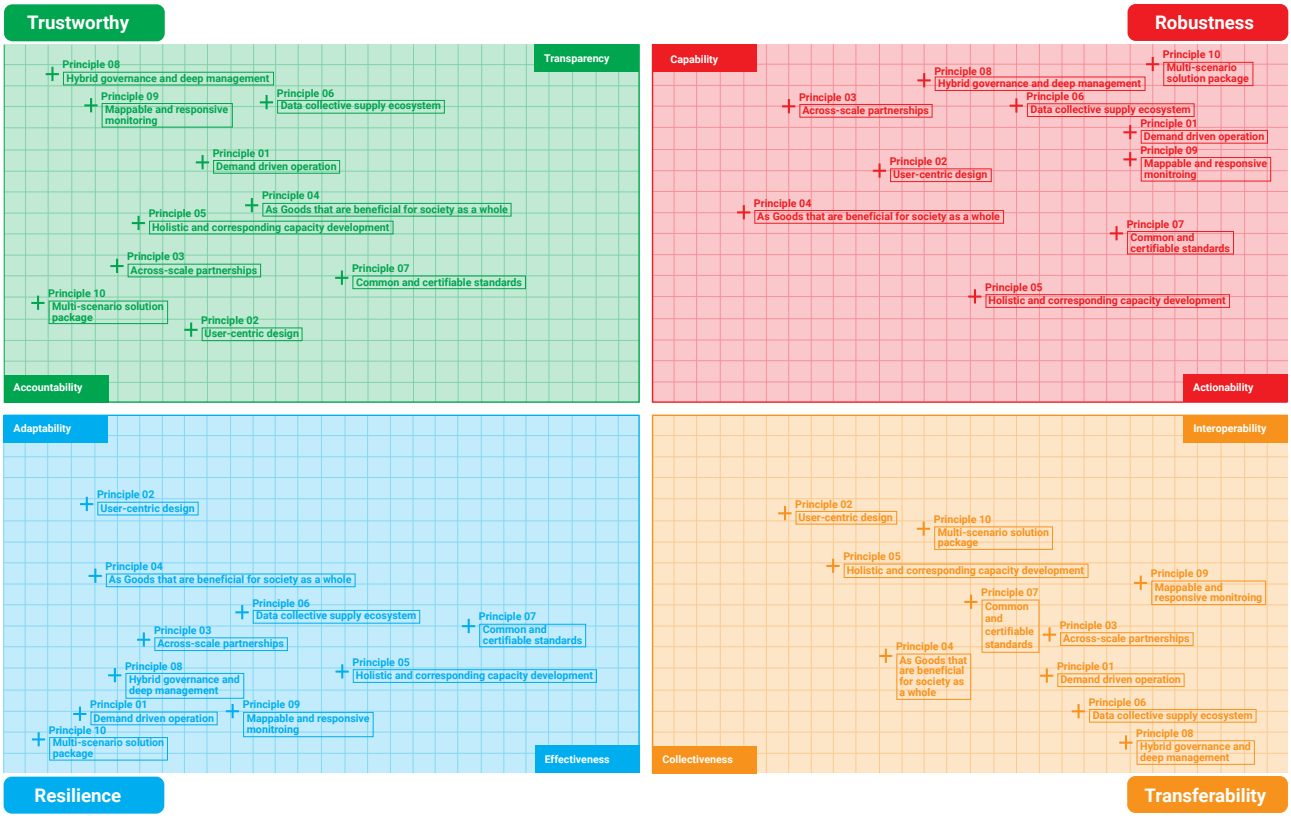


Figure 2.3.6.1: The outline of key principles under eight axes (domains)

Step 2: Identify the impact pattern of the ten principles across the dimensions.

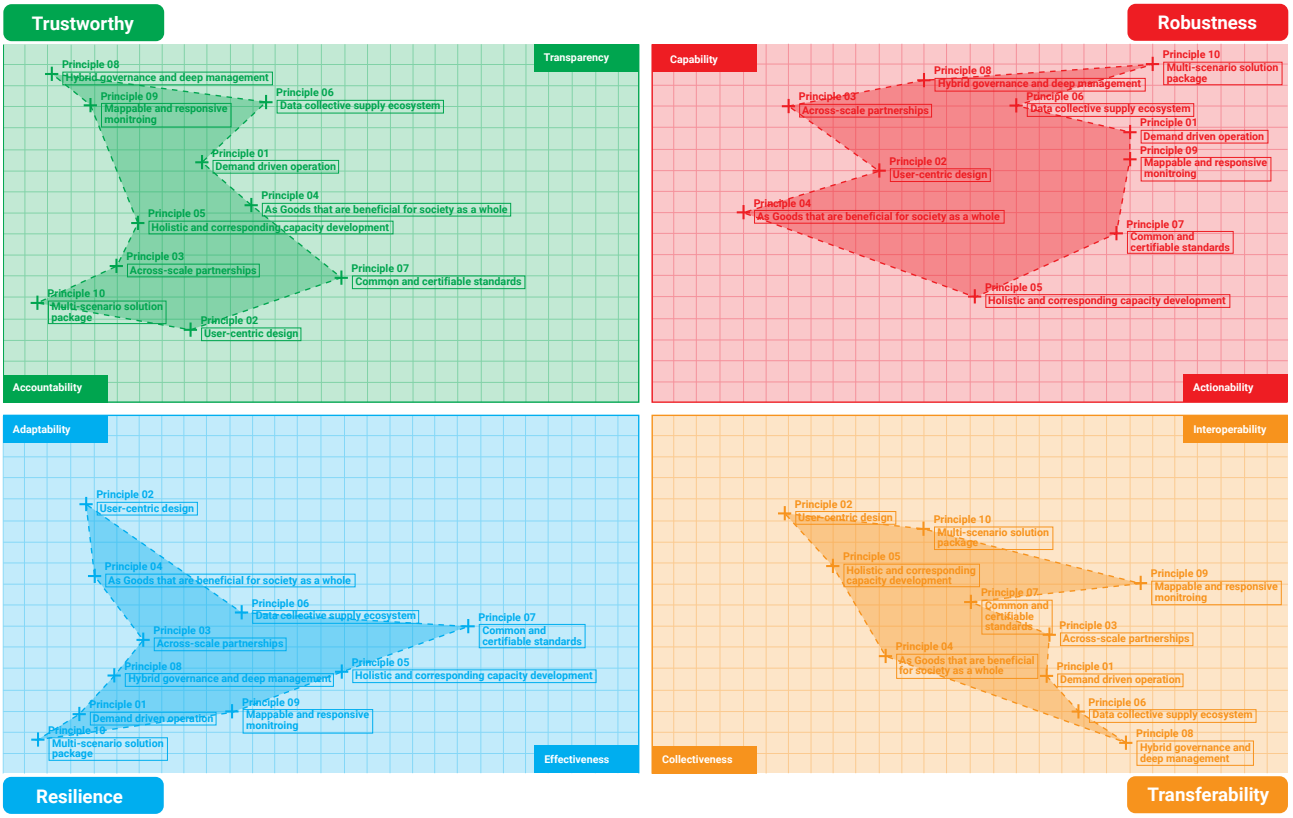


Figure 2.3.6.2: The impact pattern mapping

Step 3: Individual principle's impact evaluation across dimensions. (Demonstration by principle 01 & 02)

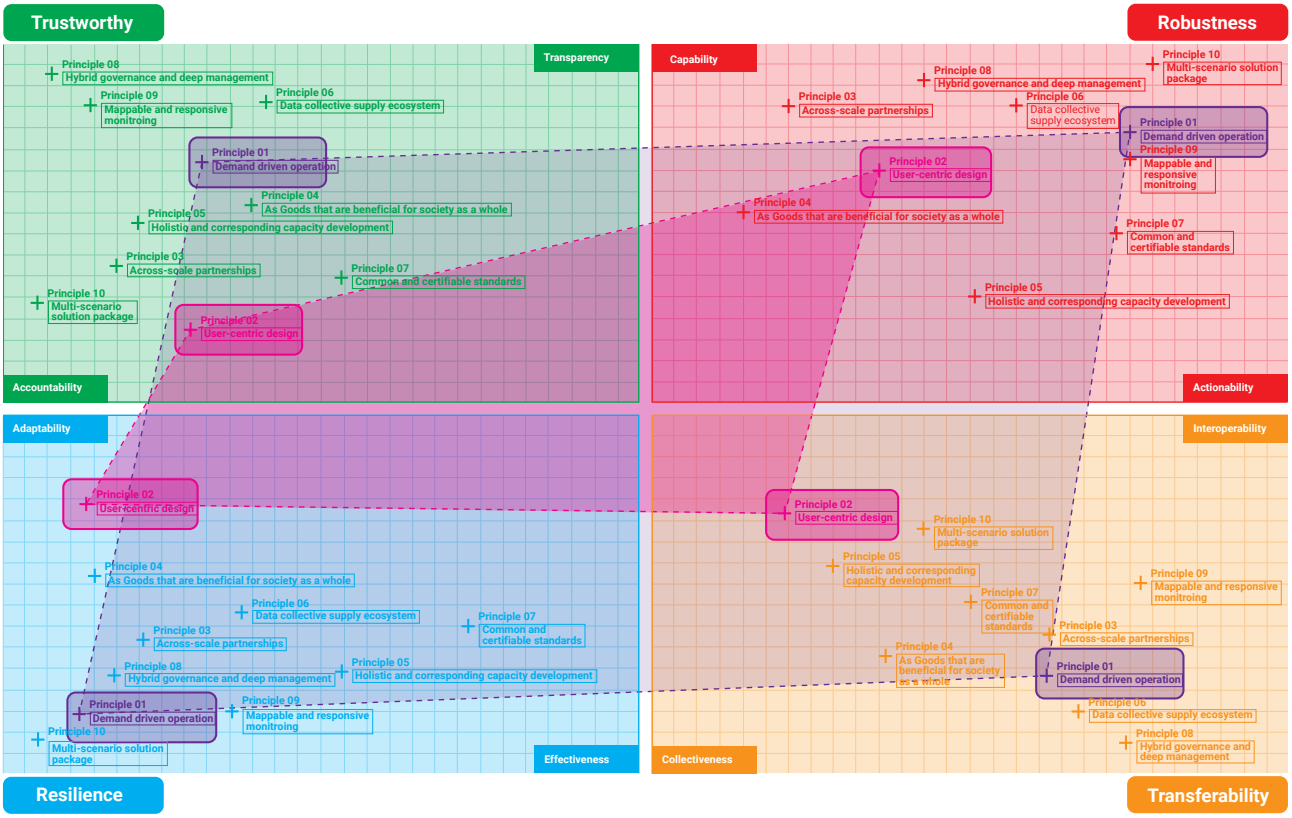


Figure 2.3.6.3: The individual principle's impact pattern mapping

Step 4: Impact measurement of action that supported by certain principles

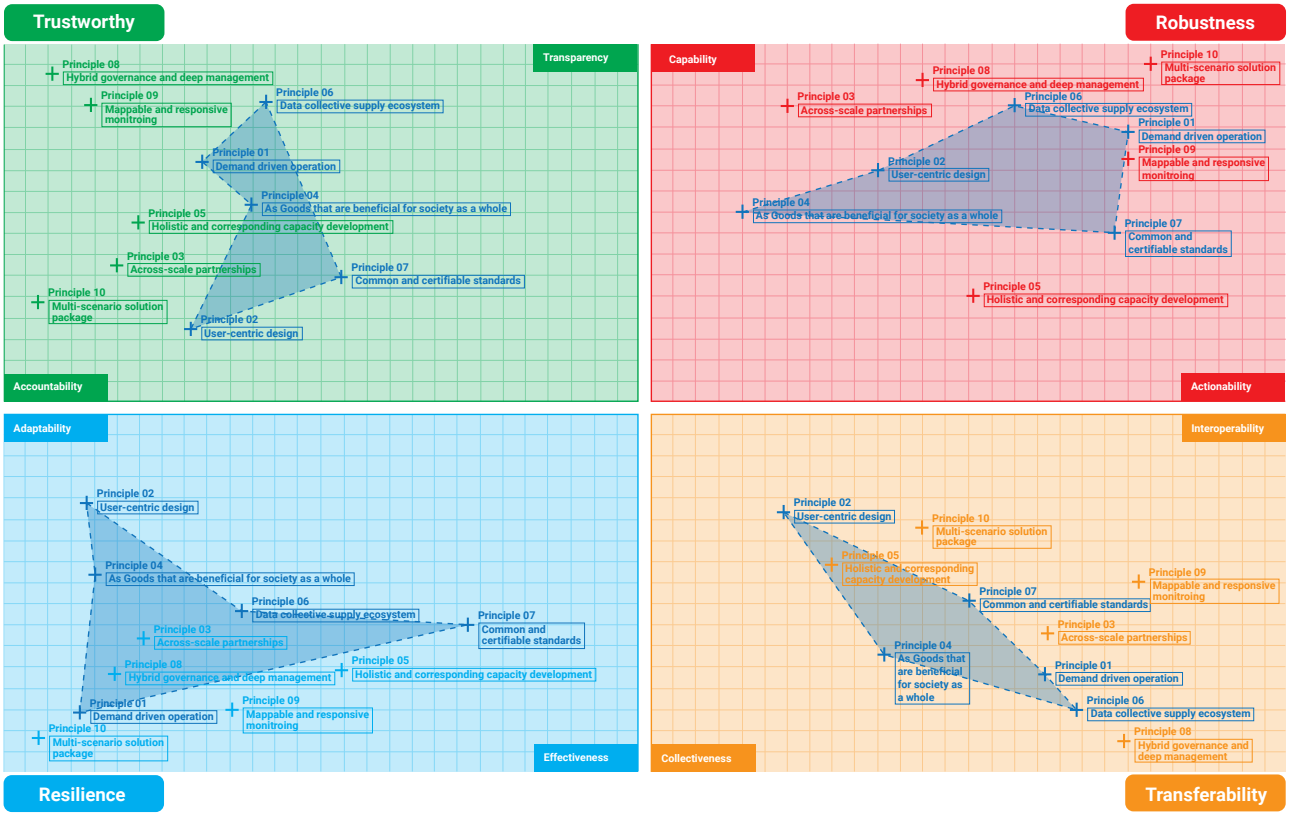


Figure 2.3.6.4: The individual principle's impact pattern mapping

2.3.7 Key outcomes

The strategy outlines key outcomes that are categorized under three major domains, which are 'Foster enablers', 'Nurture capabilities'[4], and 'Enhance adaptability.' These domains represent the foundation upon which the UNEP seeks to build its capacity to effectively address environmental challenges. By focusing on fostering enablers, nurturing capabilities, and enhancing adaptability, the UNEP aims to provide guidance for its divisions to formulate a unified roadmap and adaptive pathways to achieve these outcomes. This will involve developing a step-by-step implementation plan at each division level, which will enable them to effectively contribute to the achievement of the UNEP's overarching goals. Ultimately, the strategy aims to empower the UNEP to become a more agile, responsive, and effective organization, capable of navigating the complex challenges of the modern environmental landscape.

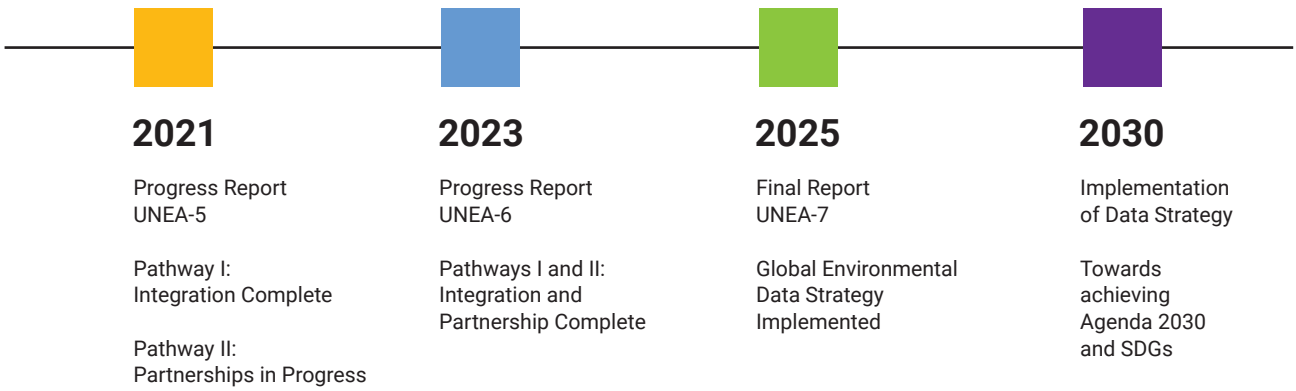
The outcomes of the UNEP's strategy are closely linked with the 'Data Strategy of the Secretary-General' and other related agendas[5]. This linkage enables the UNEP to contribute towards higher-level missions and drive actionable plans that have tangible impact on the ground. To achieve a federated data ecosystem that aligns with the priorities of the strategy, the outcomes are designed to strike a balance between being visionary and actionable. This means that they not only provide a vision for the future but also actionable steps to be taken towards achieving that vision. By striking this balance, the UNEP aims to create a sustainable and resilient data ecosystem that can effectively support the achievement of its goals. Ultimately, the strategy seeks to foster a culture of innovation and collaboration, enabling the UNEP to leverage its data assets to drive positive environmental outcomes at both the local and global level.

The key outcomes are categorized under three action pillars:

1) **Foster enablers to achieve 'Data for Good'**
   - Develop a cooperation framework to clarify the major existing strategic tool's mechanism in facilitating digital transformation sub-programmes in UNEP, WESR for instance.
   - Strengthened science-policy interface that enables the Identification and prioritization of the policy mechanisms and agreements that have the highest possibility of powering digital transformation.
   - Reform and consolidate the inter-divisional governance framework as the first step and forward with

2) **Naturing capabilities to achieve 'Data for Action'**
   - Enhance data infrastructure to create conditions for upgrading data implementation and innovation.
   - Establish a transparent operation monitoring framework to ensure the accountability and responsive to changes.
   - Develop one package of data management guidelines to transit UNEP from supply-driven data ecosystem, or project-based data supply to demand-driven data ecosystem.
   - Cultivate and establish engagement mechanism at the country level to deliver measurable impact.

3) **Enhance the adaptability to achieve 'Data for Future'**
   - Tailored finance facility facilitates the transition from project-base fund to corporate-based fund and guide the distribution across divisions.
   - Integrate the decentralized operation mechanism to increase the system's adaptability.



3 Designing an Adaptive GEDS

The overall Global Environmental Data Strategy and corresponding transformational paths should be constantly aligned with the existing vision and directions of the UN Secretary General Strategy on New Technologies[4] as well as the UN initiative on Big Data for Sustainable Development and Humanitarian Action (Global Pulse[5]), including the decisions and resolutions of the ECOSOC Committee of Experts on Global Geospatial Information Management[6] (UN-GGIM) and the Steering Committee of the UN System Network.

In order to tackle the climate crisis and achieve sustainable development, peace and security, and humanitarian action, a single-entry geospatial and intelligent socio-technical distributed platform on environmental data, supporting strategic foresight and early warning for a preparedness and prevention – a World Environment Situation Room - is vital for urging the global climate action to impact people's lives now and into our common future.

3.1 Apply Triple Overarching Mechanisms

This component summarizes the backbone of the strategy by providing actionable guidance that includes using mechanisms, theoretical concepts, and frameworks throughout the data chain, based on an understanding of the strategy's focus and vision. To create a strategy that is flexible, agile, and adaptable, three major mechanisms were utilized to guide both its structural and implementation aspects (Figure 3.1.1). By incorporating the Adaptive Scenario Making (ASM) mechanism into the development of the data strategy, a more resilient and innovative strategy can be formulated to handle rapid changes and uncertainty. The concept of triangle mechanisms involves implementing multiple levels of strategic operations while maintaining harmony, coherence, and creating a mosaic-guided structure to support one another (Figure 3.1.2). The ASM mechanism addresses governance issues while also facilitating the application of DAO in operational guidelines and on-ground implementation.

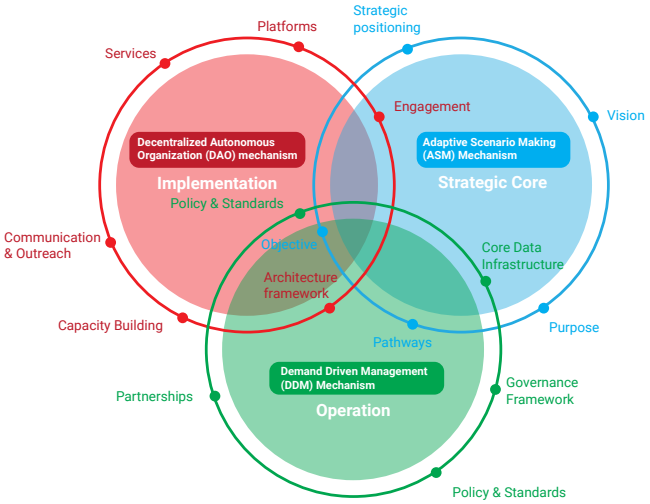


Figure 3.1.1: The triple mechanisms of operational framework.

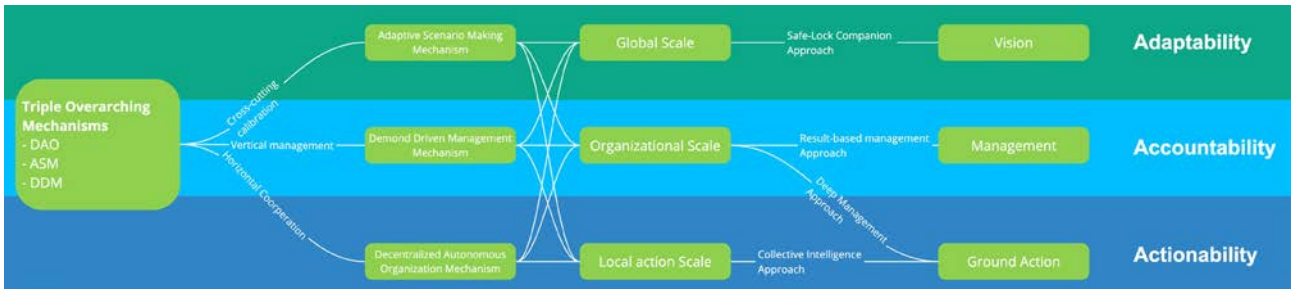


Figure 3.1.2: The triple mechanisms priorities and application domain.

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4 Inherited the action framework category from the 'Data Strategy of the Secretary-General for Action by Everyone, Everywhere 2020-22'. The Document is available at: https://www.un.org/en/content/datastrategy/images/pdf/UN_SG_Data-Strategy.pdf

5 The major linking strategies and agendas, besides the SG Data Strategy, include: Roadmap for Digital Cooperation, June 2020; UNEP Medium Term Strategy for 2022-2025; Keeping the World Environment Under Review: Enhancing the UNEP Science-Policy Interface and Endorsement of Global Environment Outlook.

6 Inherited the action framework category from the 'Data Strategy of the Secretary-General for Action by Everyone, Everywhere 2020-22'. The Document is available at: https://www.un.org/en/content/datastrategy/images/pdf/UN_SG_Data-Strategy.pdf

3.2 Visioning Desired Futures

The Strategy is developed under a dynamic system of Foresight and Visioning, anticipating and imagining possible and desired futures, with multiple scenarios. Three scenarios are proposed by combining and balancing the pro and cons. The ASP mechanism developed the three scenarios through the identification of key driving factors. Each scenario's impact is evaluated at the dimension of impact and the sustainability of system operation.

3.2.1 The key driving factors of change

The GEDS puts forth three main groups of driving factors, each aligned with one of the overarching objectives of the strategy: 'Data for Good', 'Data for Action', and 'Data for Future'. The 'Data for Good' driving factors aim to increase the strategy's impact on society, particularly in the areas of general public data supply, data justice, and collective action. The 'Data for Future' group focuses on integrating new technologies, implementing responsive data governance, and creating a self-evolving data architecture that validates long-term visioning.

- Data for good group factors: Data literacy, infrastructure implementation capacity.
- Data for action group factors: Priorities changes, country changing demands, UN within competition, changing regulations.
- Data for future group factors: Partnership shift, Technology innovation.

3.2.2 Applying adaptive scenario making (ASM) mechanism

The concept underlying the Adaptive Scenario Making (ASM) mechanism acknowledges that scenarios may not be entirely accurate, but they can still be useful in informing decision-making. This approach involves the continuous updating of scenarios based on new information and feedback from stakeholders. The ASM mechanism aims to provide a responsive framework for dealing with rapidly changing data ecosystems and unforeseen environmental issues. To achieve this, the strategy must have a capacity for self-evolution and be open to self-updates. This will enable UNEP's data ecosystem to respond quickly and effectively to changing circumstances, providing a unique advantage in today's rapidly changing business environment by offering multiple pathways for adaptation.

3.2.3 Searching the adaptive and future proof scenario through the ASM mechanism

By applying the ASP, the strategy identified three scenarios (Triple 'P') that categorized as the 'Preferred' scenario, 'Possible' scenario and 'Probable' scenario based on the key driving factors evaluation.

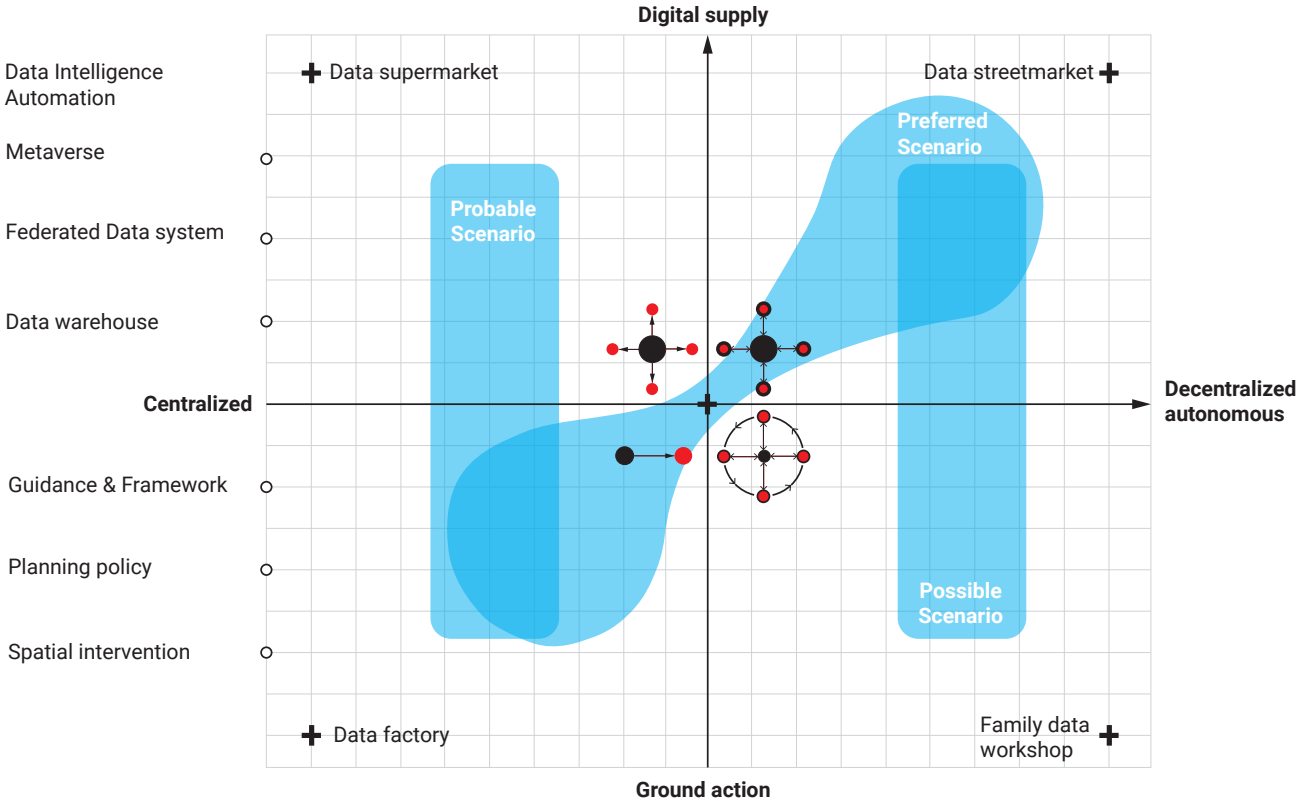
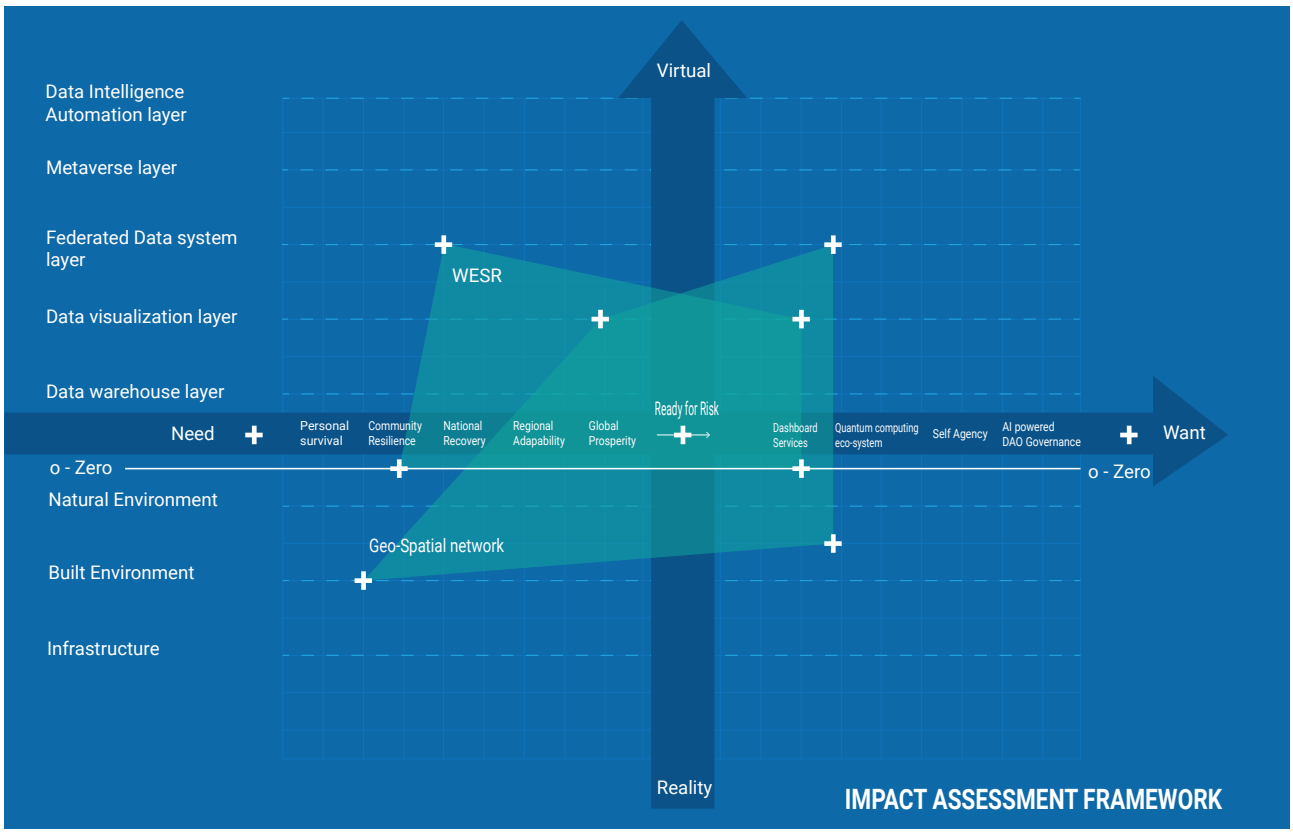
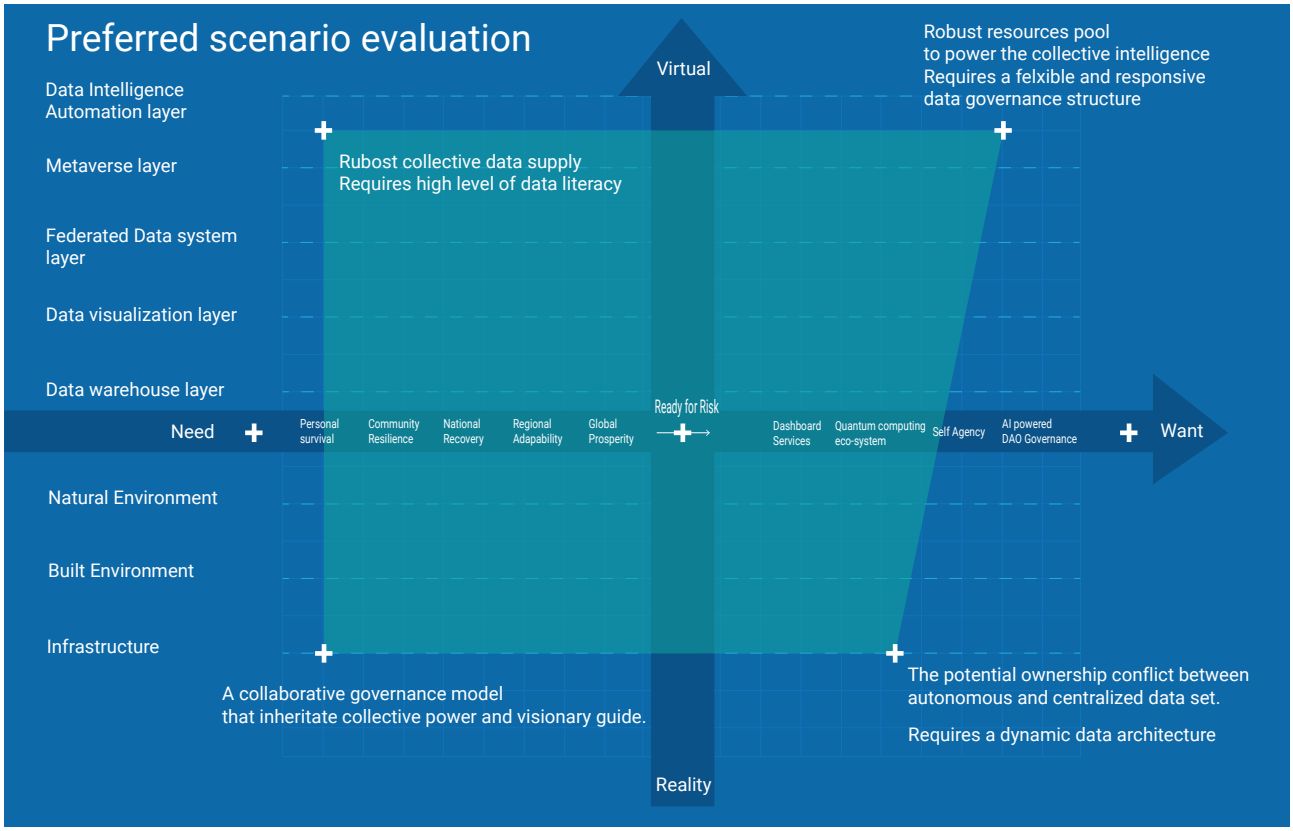


Figure 3.2.3.1: Scenario performance and impact evaluation chart – take WESR as example



1) The 'Preferred' Scenario - An adaptive and proactive data operation hub that prioritizes actionable insights



The preferred scenario is a balance model of the decentralized collective data action and top-down macro - management. It is empowered by the bottom billion who are providing a robust collective intelligence to sustain the system as an adaptive and resilient ecosystem with strong self-calibration capacity. But it needs a highly responsive, proactive and systematic governance body, which makes it heavily reliant on the consistent monitoring, and high level of data literacy social group. The risk is high due to the potential conflict and governance challenges regarding data ownership, authority boundary, divergence of interest, security vulnerabilities, and legal clarifications.

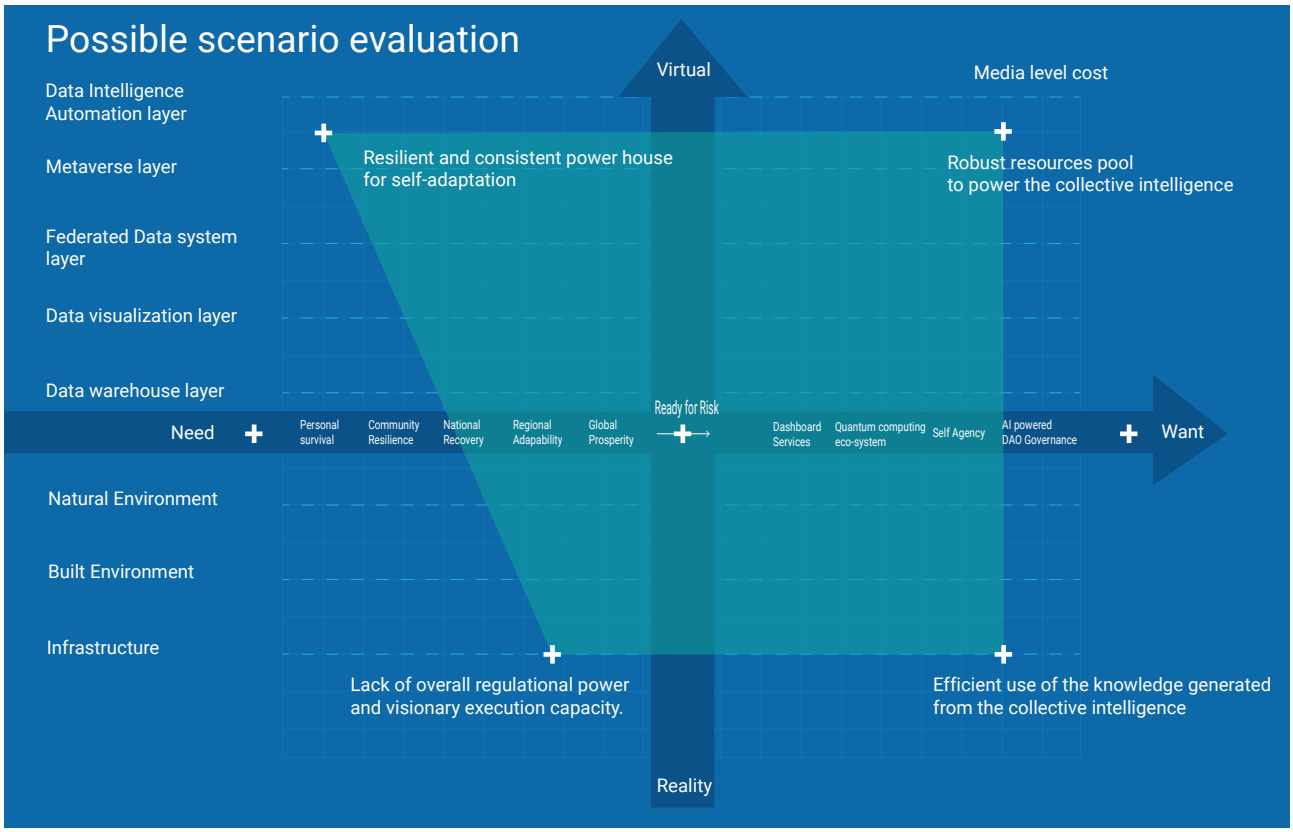
Pros:

- A balanced combination of high agenda-based governing structure and touch-ground data supply engines.
- An incremental and practical strategy to integrate emerging technologies.
- Increase the agility through diverse data source and collective intelligence, it enables quicker decision-making, while centralized governing structure still can ensure the oversight.
- High-quality data produced through the collective actions, while monitored and guided by the governance body.

Cons:

- Increase the complexity of operation which requires additional resources and expertise to manage effectively.
- Potential interest conflict which may lead to complicated negotiation on data ownership and community resources mobilization, etc.
- Requires major investments in developing technology infrastructure, which includes the software, hardware and security measures.

2) The 'Possible' scenario - A future-proof and autonomous data supply ecosystem



By considering the objective of 'data for good' and 'data for action', this scenario prioritized the "DAO" over centralized management approach. It is a highly responsive, efficient and low cost data ecosystem that powered by a diverse and low cost resources pool. The challenge is leading a tailored data set without sufficient governance authorities. Its decision-making power are distributed among the individuals which is lack of macro - intervention. The individual powered mechanism do have risks in the data accountability due to the uneven capacity and ethical standards to data. Thus the development of implementation driven dataset provides low performance as indicated at the third quadrant.

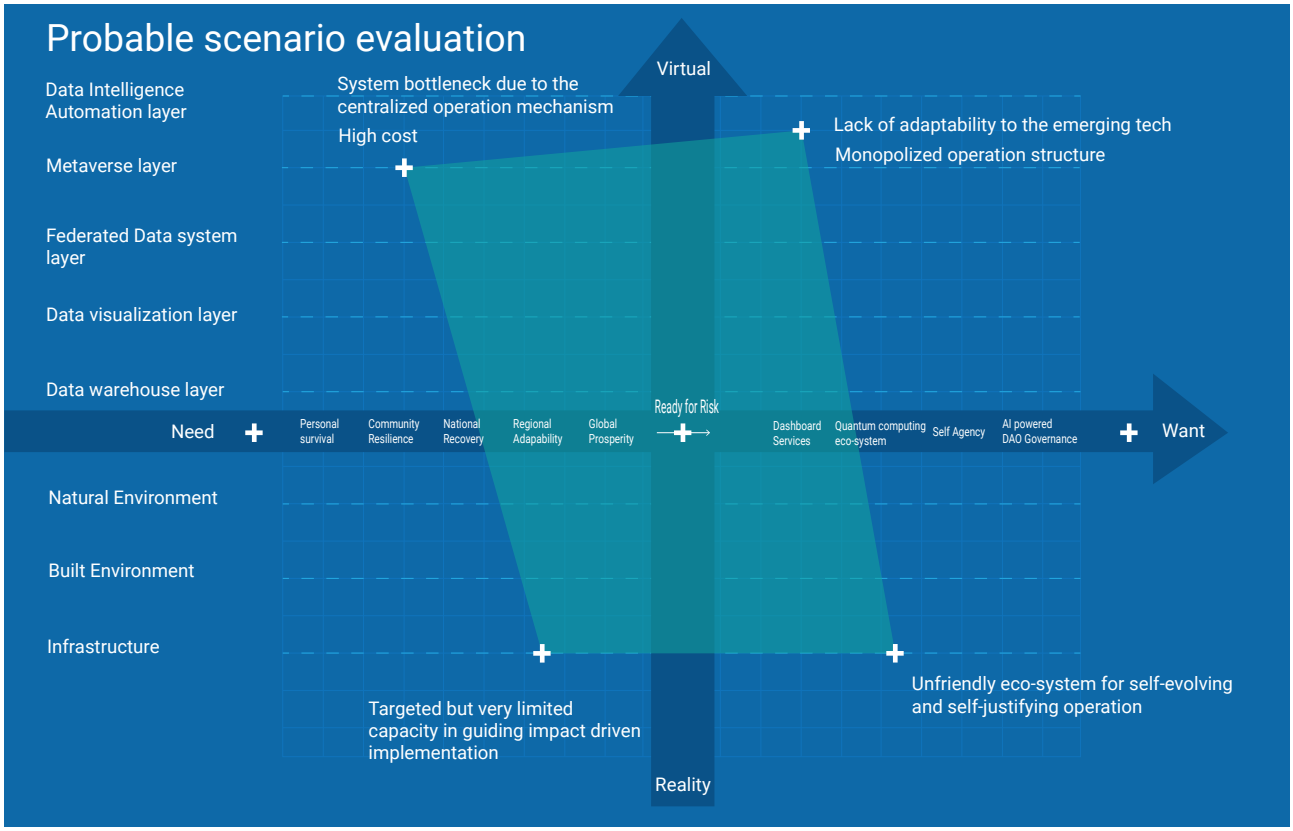
Pros:

- High transparency of the data management and life cycle.
- Automated processes which are self-executing and enforceable. This automation reduces the need for manual Interventions and increases the efficiency of data management.
- Reduced the operational cost.
- Community-driven. The decentralized strategy is often governed by community of stakeholders, which helps to build trust and ensure the data for common good.

Cons:

- Potential risk in lacking alignment with the data strategy.
- Security risk due to the data collection and storage are outside the centralized system, making it more difficult to monitor and control access.
- Limited flexibility in changing data management needs. The decentralized operation is based on set of rules encoded in smart contracts, which can limit the adaptability and agility to strategic priority change.
- Regulatory challenges. The regulatory landscape around decentralized operation mechanism is still evolving, which may challenge the divisions to navigate the legal and compliance associated.

3) The 'Probable' Scenario - A highly efficient and federated data circulation system (Figure 4.1.1)



The 'Probable' scenario is developing a centralized data ecosystem that allows efficient data supply among partners. This scenario doesn't require a radical change in data architecture or governance structure, but it operates at higher cost comparing to the first two scenarios. It is a consistent and secured strategy with high accountability of data supply and action through the full control of the top down process. Yet, the system will endure the low adaptability in front of emerging technologies, changing environmental priorities as such. Also this system has to run at high operational cost.

Pros:

- The safest approach to organize and establish a basic and functional data sharing ecosystem.
- Consistent and efficient data management practice.
- Secured and robust security measures.
- High level of accountable data production and supply.

Cons:

- Lack of flexibility.
- Chain failure consequences.
- High operation cost.
- Limited access for public.
- Low capacity in adapting to emerging tech.
- Compliance risk due to the monopoly management and monitoring.

3.3 Design Pathways of Reaching the Desired Scenario

Based on the analysis of each scenario, develop a plan for how UNEP would respond to each potential future. This plan should outline the actions that would need to be taken to adapt the data strategy to each scenario. Three scenarios are proposed at this stage for future discussion.

The goal is to establish an action driven federated data ecosystem that streamline the data flow without duplicating the process and creating competition, with a broader partnership, powered by the decentralized governance mechanism, diverse data source, with a sustainable finance mechanism.

Among the different drivers of change, the GEDS proposed three major groups of driving factors that followed the three objectives (Data for good / for action / for future), also overarching. The 'data for good' group driving factors are targeting on promote the strategy impact in the dimension of people, particularly on the aspects of general public data supply, data justice and collective actions. The 'Data for future' group is tailored to tackle the aspects of integrating new technologies, responsive data governance, and future proof self-evolving data architecture which ensures the validation of long term visioning.

3.3.1 Transformational pathway I: Integrating data and knowledge, 'Acting as One' across UNEP

Focused on developing a robust and hybrid governance body and a distributed data management network to navigate the digital transformation from both top down and bottom up directions.

On 30 September 2018, the acting Executive Director approved the nomination of focal points for a task team across UNEP comprising all Divisions, Regional Offices and four Secretariats of Multilateral Environmental Agreements (MEAs). This task team of 26 focal points has been actively engaged in capacity building and the integration of previously fragmented content across UNEP (geospatial, publications, SDG statistics and MEA indicators, global monitoring systems, assessments, citizen science and private data, foresight analysis, among other streams of data).

The Senior Management Team is being requested to endorse this 'delivering as one' strategy across UNEP, as outlined in the attached Government document (Decision of Endorsement by Senior Management Team) Follow-up on this activity is available at: https://wecollaborate.unep.org/display/wesr

3.3.2 Transformational pathway II: A digital transformation platform, through a 'One Partnership'

Focused on decentralizing the governance body to mobilize partners and the public as the vehicle to deliver digital transformation outcome through collective intelligence.

The 'One Global Partnership': 17 worldwide partners in 2019, 25 partners (2021), 35 partners (2023). Only through a global worldwide partnership, including member states and their support in terms of common country data analysis and the UN Reform, can we achieve the fundamental transformations or capacity building required to empower individuals, leaders, organizations, and societies to tackle the challenge to provide timely, reliable, and disaggregated environmental data to support decision-making, policy and action. The 'One Global Partnership', comprising of a diversity of partners, GRID centers, Businesses, UN System entities, Geospatial agencies, NGOs and Citizen science. This network will facilitate the timely access to reliable data (geospatial, satellite imagery, in situ data, statistics and indicators - including SDGs and MEAs) and the transformation of data into information and knowledge supporting assessments, the governance and actions regarding a wide range of environmental solutions. UNEP's role in geospatial has been recognized by the more than 25 UN entities who nominated UNEP as the Chair of the UN System Network (GGIM).

The current strategy and roadmap for the 'One Global Partnership' is attached, including the funding business model, during an initial action plan (2018-2021) and in the long-term (until 2030). Follow-up of these activities here: https://wecollaborate.unep.org/display/wesr

3.3.3 Transformation companion pathway: A safety lock to address the uncertainties

Focused on initiating a robust centralized governance group to guide the transformation process and gradually distribute its management components to the ground level. It is the programmatic incubating process to create conditions for collective intelligence powered autonomous groups to release the capability from the management bottleneck by changing linear operation structure to circular co-operated supply structure. It is a safety lock to consolidate and support both transformation pathways, reducing the risk by providing the model.

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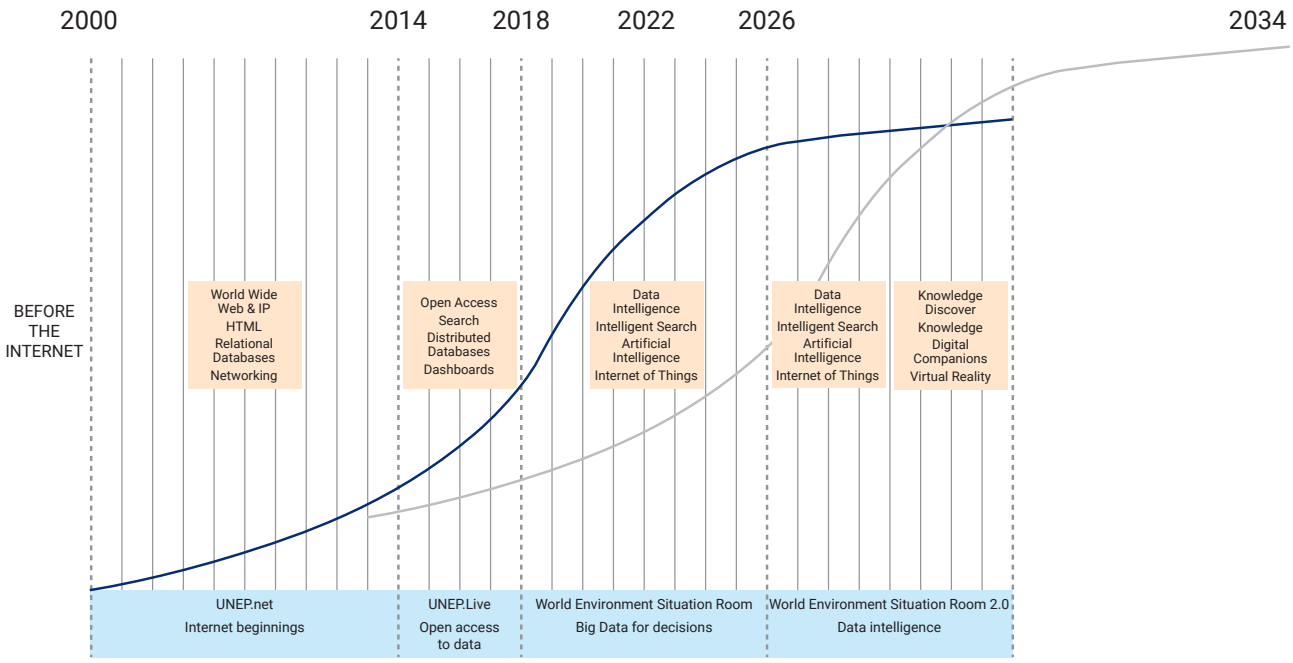
Recommended actions:

- Across division management team that led by the UNEP Chief Scientist.
- Thematic based advisory board to track the changing patterns of the digital transformation needs and priorities through scanning vertically and horizontally.
- Integrate Data infrastructure development into the action framework to gradually approaching the end to end data ecosystem.



4 Recommendations for Implementing GEDS

This framework aims to guide each UNEP Division to develop their tailored management strategies, but through a joint data action portfolio systematically. Identify the connecting interface division program with the carrying program at the UNEP organizational level. The framework is designed to clean the operation barrier through articulating decentralized action strategy under a centralized governance structure. It will address the current issue of internal data resources duplication and competition by 'Acting as One',

4.1 Apply Decentralized Autonomous Organization (DAO) Mechanism

DAO can be used as a design pattern for managing and accessing data in a standardized way across an organization. This can help ensure consistency and accuracy of data, while also promoting reusability of code and reducing development time. DAOs can be implemented using a variety of technologies, including databases, APIs, and web services. The DAO mechanism could potentially be used to enable decentralized decision-making and management of data assets. This could involve creating a DAO that represents a decentralized network of stakeholders, such as government agencies, research institutions, non-governmental organizations, and the public, who are involved in generating, sharing, and using data.

Advantages of applying DAO in data strategy making includes:

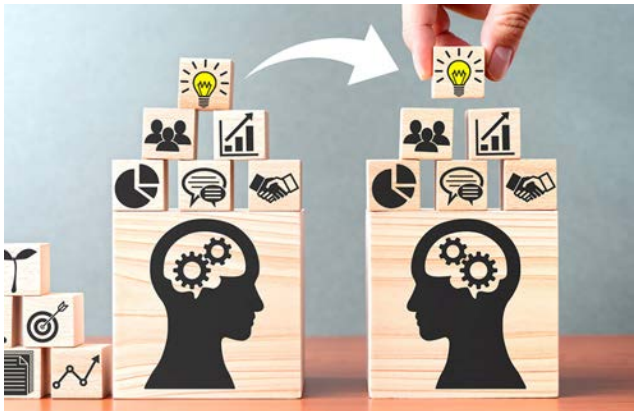
- Transparent framework for dataset management, which can help to improve data quality, security, and privacy. Build trust and confidence in data and increase its value.
- Increase efficiency and innovation at the dataset operational level, by enabling stakeholders to collaborate and share knowledge in a decentralized and agile way. This can help UNEP to quickly identify and capitalize on new data opportunities and to develop innovative approaches to data governance and management.
- Reduce costs and risks associated with data management, by eliminating the need for centralized intermediaries and third-party service providers.

Ways in which a DAO could be applied in data strategy includes:

- Create a decentralized platform for sharing data among stakeholders in a secure and transparent manner.
- Enable decentralized data analytics and modelling.
- Facilitate decentralized funding of data-related initiatives. The smart contracts governing the DAO could enable participants to contribute funds and vote on proposals for funding data-related projects, such as research studies or data infrastructure investments.
- Ensure that data is shared, governed, analyzed, and funded in a more inclusive and participatory manner.

4.2 Three Pillars of Transforming GEDS from Strategy to Action

The three pillars refer to the main areas of focus, which are formalized as action objectives. These objectives are summarized as action frameworks for divisions, partners, and private sectors. This chapter will provide detailed actionable frameworks to bridge the strategic guidance and practical steps. The goal is to set up an adaptive and flexible action plan at the UNEP organizational level that guides each division to operate their data system as a cohesive unit. The three objectives, also known as the three pillars, will be prioritized, and corresponding action framework packages will be developed for each. The Global Environmental Data Strategy (GEDS) will use an assessment to evaluate different scenarios by measuring the key drivers of change.



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4.3 Pillar One - Cultivate Enablers

Cultivating catalysts for data strategy's action can help drive change, encourage innovation, facilitate collaboration, build expertise, and foster a data-driven culture within organizations, leading to improved performance and better decision making.

Cultivate Enablers

High Prio Link Initiate Enhance
Mid Prio

Guidlines	# Recommendations & Next Step Action	Priorities	Category
1 Partnerships	1 Geospatial network as the core power engine and carrying infrastructure to incubate more diversed partnership eco-systems.		
	2 Highlight the implementing partnerships. A potential collaborator capable of assisting in achieving program objectives on a national and regional scale, which may involve contributing specialized knowledge, engaging users in the design process, enhancing capabilities, communicating effectively, and garnering political backing.		
	3 Technology Partners. The partnership is dedicated to fostering progress in the realms of technology, infrastructure, and standards, with a strong emphasis on innovation and the implementation of cutting-edge solutions. By harnessing the power of collaboration, this partnership seeks to drive meaningful change and create a lasting impact, paving the way for a more dynamic and efficient future.		
	4 Domain Partners. Seek partnerships with organizations and companies possessing specialized knowledge in UNEP's key priority areas, as well as those who can address the identified needs and priorities at the country level, offer capacity development opportunities, or provide expertise in data and technology.		
2 Governance	1 Hybrid governance mechanism to integrate top-down and bottom-up structure.		
	2 Provide strategic guidance on pathway calibration, use cases, and partnerships priorities at different phases.		
	3 Apply Result-based management to regulate the Governance Group workstream and develop the Integration monitoing framework to provide feedbacks.		
	4 Combine our Digital Governance, Strategic Advisory, and Technical Advisory groups to establish a triple monitoring structure and efficiently mobilize our resources for better digital initiatives.		
3 Communication & Outreach	1 Create flexible communication guidlines to ensure tailored communication plans for different groups of partners.		
	2 To maximize the impact of data, prioritize efforts to engage both data users and producers, create a communication network through partner organizations, and develop user personas and targeted communication tailored to the specific needs and preferences of different types of users.		
	3 Guide user-centered and co-design approaches with a social media strategy, efficient communication, and eliminating less impactful actions. This optimizes engagement, co-creation, and impact.		
	4 Maximize the relevance and impact of WESR by conducting stakeholder mapping and defining a user-centered engagement approach with member countries.		
4 Technology Environment	1 Create a governance approach that is inclusive and involves multiple stakeholders, provides expert guidance, and incorporates representation from member countries to ensure buy-in.		
	2 Enhance collective data decision-making by empowering users through a policy that supports mainstream self-service analytics tool sets, as well as improving the available tool sets for data integration.		

4.3.1 High Priorities in the Recommendation

1) Hybrid governance and management

Governance deals with a broad range of important issues, including program direction, partnerships, priority setting, and cross-divisional collaboration. It also encompasses decision-making processes related to data development, and touches on aspects such as interoperability, quality, and security.

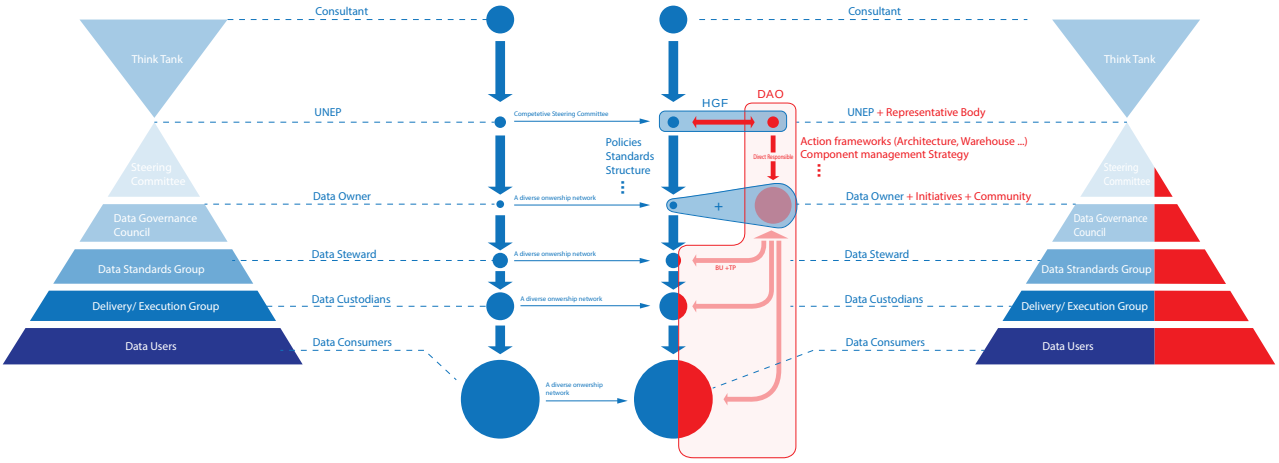
The HDG framework aims to strike a balance between centralized governance and decentralized access to data within organizations. To achieve this, a centralized data governance team is established to develop and enforce policies, standards, and procedures for data management. However, the framework also permits decentralized teams to access and analyze the data as needed, as long as they comply with the established guidelines. This approach empowers decentralized teams to work more autonomously and adapt to evolving business requirements more efficiently.

To improve GEDS governance's alignment with the GS data strategy, Midterm strategy 2022-2025, and the digital transformation sub-programme, accountability, transparency, and collaboration with stakeholders are essential. Understanding Member Countries' needs and priorities is crucial to ensure relevance, and involving them in governance functions can ensure buy-in at the country level. Partnerships with the private sector, academia, and civil society can provide expertise in various areas, such as data and technology, outreach, and policy. Strong partnerships and advocacy efforts are necessary to influence the application of environmental data and technology at the country level and support normative global processes facilitated by UNEP.

Therefore, the GEDS recommended to integrate decentralized stakeholder structure with the centralized high level governing body. The strategic advisory function of centralized high level governing body approach involves garnering support for the program at a higher level, while the decentralized stakeholder group approach focuses on ensuring compatibility with existing initiatives, establishing communication channels for feedback, promoting work programs, and fostering new opportunities for engagement. Following is a list of recommended responsibilities of such governing body:

- Establish protocols and guidelines for onboarding new members to UNEP's data partnerships.
- Provide guidance on work program priorities.
- Discover prospects for synchronization with current programs, projects, data, and technology.
- Create conditions for collective monitoring and agile to the feedbacks.
- Develop a holistic and common data governance framework, which include data architecture, data storage, data security, privacy and access, data quality, data interoperability, analytics model, and metadata.

Hybrid Data Governance Structure - Parallel Governing + Vertical Deep Management



2) Demand driven engagement and partnerships

It recommends exploring a demand-driven approach that involves engaging with national ministries and stakeholders instead of relying solely on regional offices and UN Country Teams. The level of engagement outside established processes like UNEA and CPR should be considered, and experimentation may be required to identify effective strategies.

To do so, it requires:

- Clarify the value proposition of the proposed services.
- Create a bridging mechanism to engage with local organizations and institutes, which can help facilitate the scaling of implementation, promote collective efforts, and reduce the technical operation costs.
- Create a partner classification system that includes technology partners with an interest in infrastructure and standards, implementing partners with expertise in delivering on-ground actions, and thematic partners who share UNEP's priorities and objectives under their various workstreams.

3) Communication and outreach

A robust communications and outreach strategy is vital for the success of the demand-driven approach, as it provides a framework for engaging and communicating with stakeholders and users of UNEP data platforms. To achieve this, the strategy should begin by conducting a stakeholder mapping exercise to clearly define the audience and users of UNEP data platforms and their outputs. The strategy should also define an engagement approach with member countries, which includes:

- Design an agile stakeholder mapping mechanism to keep defining the audience and user under different work streams.
- Establish a cutting across programme and governance body structure engagement strategy with Member States to well acknowledge their needs and priorities and deliver the demand driven / user centered services.
- Make engaging data users and producers a top priority.

Additionally, the strategy should aim to increase awareness of environmental challenges and opportunities aligned with UNEP's vision and mission, while promoting the use of UNEP data platform products and services. By achieving these objectives, the communications and outreach strategy will enable UNEP to effectively deliver its demand-driven approach and ensure that its data platforms are utilized effectively by stakeholders and users.

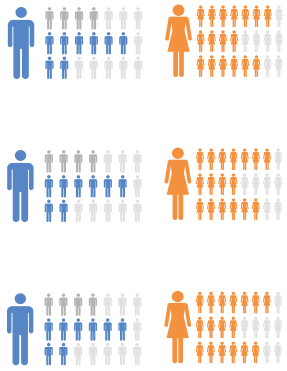
Five actor groups or target audiences have been identified for our Global Environmental Data Strategy with specific needs and aspirations in terms of the access, use and sharing of Environmental Data:

- Policy Makers: Environmental policy makers at the global, regional, and national levels
- Scientific Community: Academics and environmental-related scientists and technologists
- International Organizations: UN System and interested international organizations
- Business and Innovators: Business companies with an interest on Environment
- Citizens and Civil Society: Civil society including the Youth and new Generations

Personalized communication at the appropriate scale; use of frontier technologies for optimal communication to different target audiences; environmental data as digital public goods within a digital ecosystem for the planet; communication; access and transparency; are all key for Transforming the Lives of People Places and Planet. Moreover, the availability of quality, reliable and timely Environmental Data is crucial for People, for Action and for our common Future. Our Global Environmental Data Strategy aims to be an active contributor to the wider UNEP Digital Transformation process and to harness UNEP's digital technologies.

Communication outreach this is a dynamic table with updatable with outreach cycles 2019 - 2020.

Year	Month	Meeting/Event	Location
2019	September	High Level Dialogue with Resident Coordinators in Africa [54 countries]	Nairobi, Kenya
	November	African Ministerial Conference on the Environment [54 countries]	Durban, South Africa
	December	UN Climate Change Conference (COP 25) [193 countries]	Madrid, Spain
2020	20-24 January	World Economic Forum (WEF)	Davos, Switzerland
	6-8 February	World Urban Forum (WUF)	Abu Dhabi, United Arab Emirates
	12-13 May	Science Technology and Innovation (STI) Forum	New York, United States of America
	2-6 June	UN World Oceans Conference	Lisbon, Portugal
	7-16 July	High Level Political Forum (HLPF) – Side Event of HLPF to Launch of 9 World Environment Situation Rooms (physical rooms)	New York, United States of America
	20 October	Dubai World Expo 2020	Dubai, United Arab Emirates
	9-19 November	26th Session of the Conference of the Parties (COP 26)	Glasgow, United Kingdom
	...	...	..



Policy Makers

Scientific Community

International Organizations

Business and Innovators

Citizens and Civil Society

Sep 2019: High level Dialogue UN RC in Africa, Nairobi

Nov 2019: AMCEN African Ministerial, Durban

Jan 2020: World Economic Forum (WEF), Davos

Feb 2020: World Urban Forum (WUF), Abu Dhabi

Jul 2020: HLPF, Situation Rooms Launch, New York

Oct 2020: Dubai World Expo 2020, Dubai

Feb 2021: United Nations Environmental Assembly, Nairobi

4) Strategic budgeting and sustainable financing

A Strategic Initiative for UNEP, with funding cycles of 4 years (2018-2021; 2022-2025 and 2026-2029). Assist the Member States in providing adequate and predictable core funding, serve as critical financial instruments to deliver on the three thematic funds outlined in UNEP's Medium-term Strategy 2022-2025.

Integrate the Social impact Bond (SIB) and Rapid finance facility. Reinforcing the urgent need to tackle climate change, biodiversity and pollution matters, this combo facility is designed to packaging the private sector's partnership within the country proposals and fit into the umbrella program which will dramatically shorten the legal process and enable the 'Act agile as One'. Cultivating a Data Partnership Ecosystem requires to leverage technology vendors, data providers, consulting firms, academic institutions, and industry organizations to develop and implement effective data strategies as carrying structure.

- Expanding and deepening relations with UN Member States.
- Diversifying the donor base through new funding streams.
- Mobilizing strategic advocates.
- Strategic communication and donor visibility.

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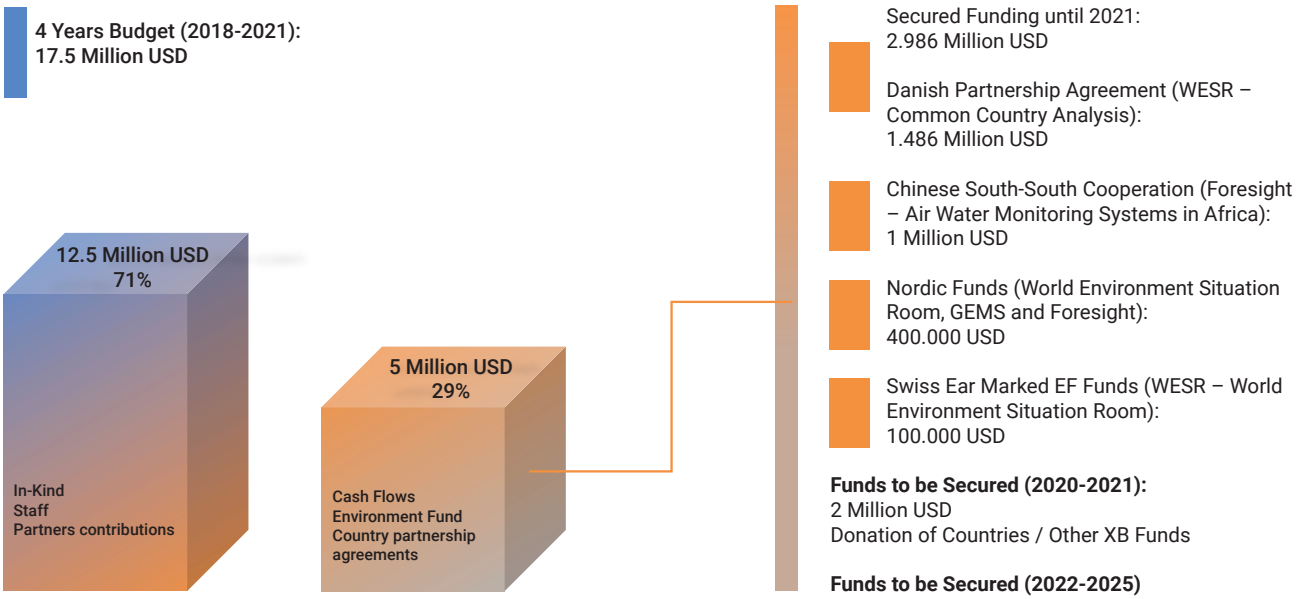
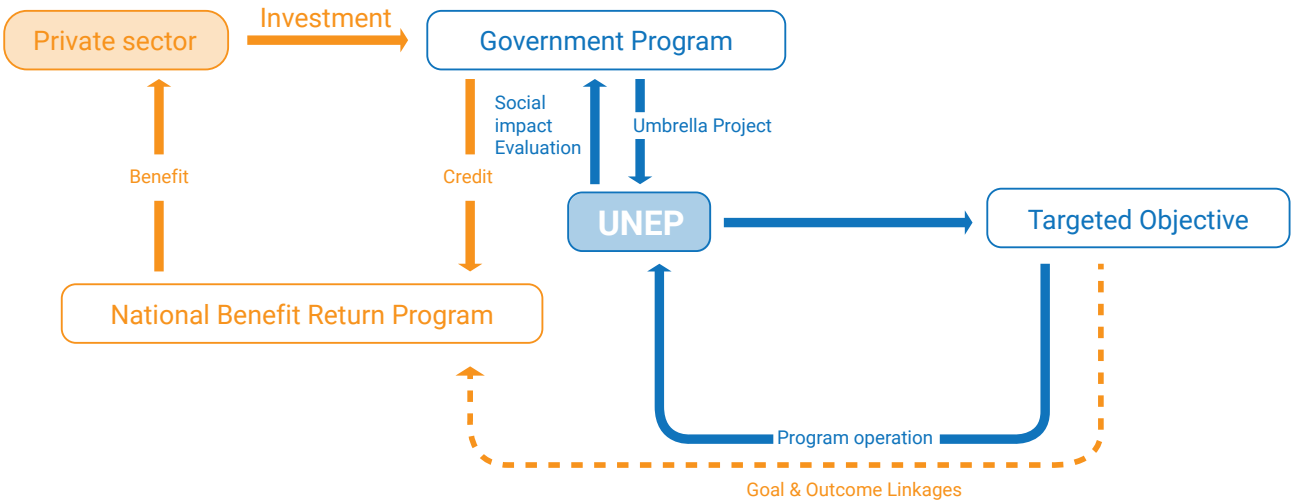
This is a dynamic finance table, updatable with budget cycles (2022-2025)



Recommended models as show case:
Social impact Bond (SIB) funding mechanism. It particularly targeted on the mobilizing and integrating the private sector resources through the national channel. It is a national government leading combo financing mechanism that has two levels of collaboration.

Social Bond Funding Model



4.4 Pillar Two - Naturing Capabilities

This pillar aims to address and explore methods on the data technical side, it provides framework and guidance of the actions that needs to be taken to promote the action capabilities through the data life cycle. It refers to the availability of timely, reliable, and disaggregated environmental data supporting decision-making and action for countries to achieve agenda 2030 and the Sustainable Development Goals.

Naturing Capabilities

High Prio | Link | Initiate | Enhance | Mid Prio

Guidlines	# Recommendations & Next Step Action	Priorities	Category
1 Data Management	1 Use WESR to power the geospatial data ecosystem as the core data structure.		
	2 A structured framework for managing APIs that enables access to data from member states.		
	3 Digitalization and knowledge transfer for publications can be made public goods through demand-driven approaches.		
	4 Digitalization and knowledge transfer for publications can be made public goods through demand-driven approaches.		
2 Technology support & Capacity Building	1 Holistic capacity development strategy across global, regional, and national scales.		
	2 Apply phased approach with consistent and accountable monitoring mechanism.		
	3 Capacity development should be directed towards ministry staff, university personnel, and research institutes at the national level, with a particular emphasis on managing digital data in alignment with the established national data transformation strategy.		
	4 Regionally, capacity building is required for executing the engagement strategy in selected countries. Technical training workshops can be conducted by national or regional institutions. Capacity building should focus on UNEP staff, regional commissions, and research institutes to coordinate national initiatives.		
3 Services	1 Provide geospatial mapping interface as interoperable system to connect with external broader resources.		
	2 Develop analytics service environment for geospatial data and statistics data operation.		
	3 Public operable back-end platform to incubate collective data supply.		
4 Platform	1 Create the consolidated platform as the vehical to carry cloud computing, diverse operation interface, Metadata management.		
	2 Interoperable mapping interface to mobilize diverse data resources and incubate crowd-sourcing data supply ecosystem.		

4.4.1 High Priorities in the Recommendation

1) Interoperable carrying platform

To achieve the level of integration, scalability, and accessibility envisioned by GEDS, a platform that employs an integrated approach is necessary. This platform should feature a collective computing infrastructure that is interoperable, API-enabled, and adheres to industry standards, thus allowing universal access to everyone.

2) Result driven management and collective design

Deploy a consistent and collaborative assessment toolset that can be performed by the governing body, partners and public to ensure the accountability, efficiency, and agility. Shorten the structural reflection period to ensure the agile and responsive calibration on the vision, operation system and financing facility.

Drawing upon the knowledge and expertise of the local community is vital when creating products. Regional institutions frequently have established methodologies that should be leveraged. By engaging in a collaborative design process, potential challenges related to partiality, impartiality, and confidentiality can be recognized. Additionally, this process promotes stakeholder engagement, ownership, trust, and relationship-building, resulting in a sense of shared purpose among users. Ultimately, the primary aim of a co-design process is to interact with and learn from users. This facilitates a more comprehensive comprehension of the problem at hand, how users are presently addressing it, and what enhancements are necessary.

3) Diverse services

GEDS is designed to create downstream platform that is capable of offering tailored services such as applications, visualizations, and tools based on user requirements. This platform enables seamless sharing and delivery of services, and encourages users to contribute by creating their own services. This approach indicates the core design principle of such platform that emphasizes user collaboration and participation in the development process. As the convening organization, UNEP facilitates the creation of mechanisms for users to collaborate and build a robust environmental digital ecosystem. Key components and functionalities to be considered include Mapping engine, Analytical collective network, and User interface and visualization.

4) Capacity development

To enhance national capacity, key stakeholders such as Ministry staff, universities, NGO partners, and environmental data experts should be targeted. The focus should be on managing digital data within the current framework while

developing the capacity to analyze data for reporting. The training program should progress from data capture, sharing, and reporting, to data analytics and foresight, with increasing complexity at each phase. This approach will helps to ensure effective and efficient national-level capacity development without the need to create a new national data strategy.

To strengthen country-level engagement, capacity development initiatives at the regional level should focus on implementing engagement strategies in selected countries. Technical training workshops may be organized through national or regional institutions to enhance the capacity to manage regional environmental data networks and coordinate national initiatives. These efforts should target the UNEP workforce, regional commissions, NGO partners. The goal of these initiatives should be to promote regional-level capacity development and enable effective coordination among stakeholders involved in managing the environment.

4.5 Pillar Three: Enhance the Adaptability

Cultivate Enablers

High Prio | Link | Initiate | Enhance | Mid Prio

Guidelines	# Recommendations & Next Step Action	Priorities	Category
1 Core Data Infrastructure	1 Geospatial network as the core power engine and carrying infrastructure to incubate more diverse partnership eco-systems.	High Prio	Link
	2 Cost effectiveness: design a cost-effective system to build and operate based on the use.	Mid Prio	Initiate
	3 Rationality: Avoid duplication of information and build on existing information and data sources as well as procedures, partnerships and intergovernmental processes already in place. Use of existing open-source software and related tools.	High Prio	Enhance
	4 Domain Partners. Seek partnerships with organizations and companies possessing specialized knowledge in UNEP's key priority areas, as well as those who can address the identified needs and priorities at the country level, offer capacity development opportunities, or provide expertise in data and technology.	High Prio	Enhance
2 Use Cases	1 Testability: Use cases should be designed in a way that allows them to be easily tested, ensuring that they meet the required functional and non-functional requirements.	Mid Prio	Enhance
	2 Consistency: Use cases should be consistent with each other and with the overall system design, ensuring that there are no contradictions or conflicts between different parts of the system.	Mid Prio	Enhance
	3 Completeness: Use cases should cover all possible scenarios and interactions between the user and the system, ensuring that all relevant functionalities are included.	High Prio	Enhance
3 Policy & Standards	1 Alignment with the upstream guidelines and regional and country level policy context.	High Prio	Link
	2 Clarifying the roles, responsibilities, standards, and policies pertaining to data is essential for ensuring accountability with regard to data assets, insights, and actions.	Mid Prio	Enhance
4 Adaptive Scenario Making	1 Adaptive: the pathways for achieving the strategic goal needs to be multi-scenario based path leading.	High Prio	Initiate
	2 Optimization and calibration: Establishing a companion pathway can act as a safeguard for the planned pathway, ensuring that the journey towards the ultimate goal is secure and seamless.	High Prio	Initiate

4.5.1 High Priorities in the Recommendation

1) Responsive analytics

Currently the analytics capability is highly restricted by insufficient resources distribution. The GEDS will recommend applying CRISP-DM framework which will help to develop a iterative structure. It is designed to respond to changing needs through a very well-defined process.

Recommended models as showcase:

- Augmented analytics framework involves using machine learning and artificial intelligence to automate the process of data preparation, analysis, and visualization, as well as providing recommendations and insights to users. This approach allows analysts to quickly identify patterns, anomalies, and trends in data, and make data-driven decisions in real-time. It reduced the need for manual data manipulation and analysis, which can save time and increase accuracy. It can also democratize data analysis, making it accessible to non-technical users who may not have expertise in data science or programming.

2) Use cases

To gain an understanding of the diverse needs and challenges faced by various stakeholders, it is imperative to conduct a thorough user assessment. Such an assessment entails identifying specific scenarios, or use cases, in which the UNEP data platform or service can be effectively utilized. This process enables the translation of priorities and needs into a strategic and prioritized set of use cases that can inform the development of UNEP platforms.
It is crucial to prioritize quality over quantity, thus focusing on essential and strategic use cases that can enhance the platform's value proposition. To accomplish this, the data team should concentrate on a few select use cases and engage in co-design, communication, and implementation to ensure successful outcomes. By building iteratively through specific use cases, the team can learn from the process, improve as necessary, and deliver an end product that can be effectively adopted and utilized.

3) Data quality

Provide guidance on action framework to ensure that data is accurate, complete, and consistent. It covers data validation techniques, data cleaning processes, and other best practices for maintaining high-quality data. It requires to identify and diverse the data sources. Two frameworks can be suggested for showcase:

Recommended models as show case:

- Data Management Association (DAMA) Data Quality Framework, which outlines a comprehensive approach to managing data quality through six dimensions: completeness, accuracy, consistency, timeliness, validity, and uniqueness.
- The Total Data Quality Management (TDQM) framework, which incorporates elements of Six Sigma and DAMA to provide a comprehensive approach to data quality management. TDQM focuses on five key areas: data profiling, data quality assessment, data quality improvement, data quality monitoring, and data quality control.

4) Cohesive data architecture

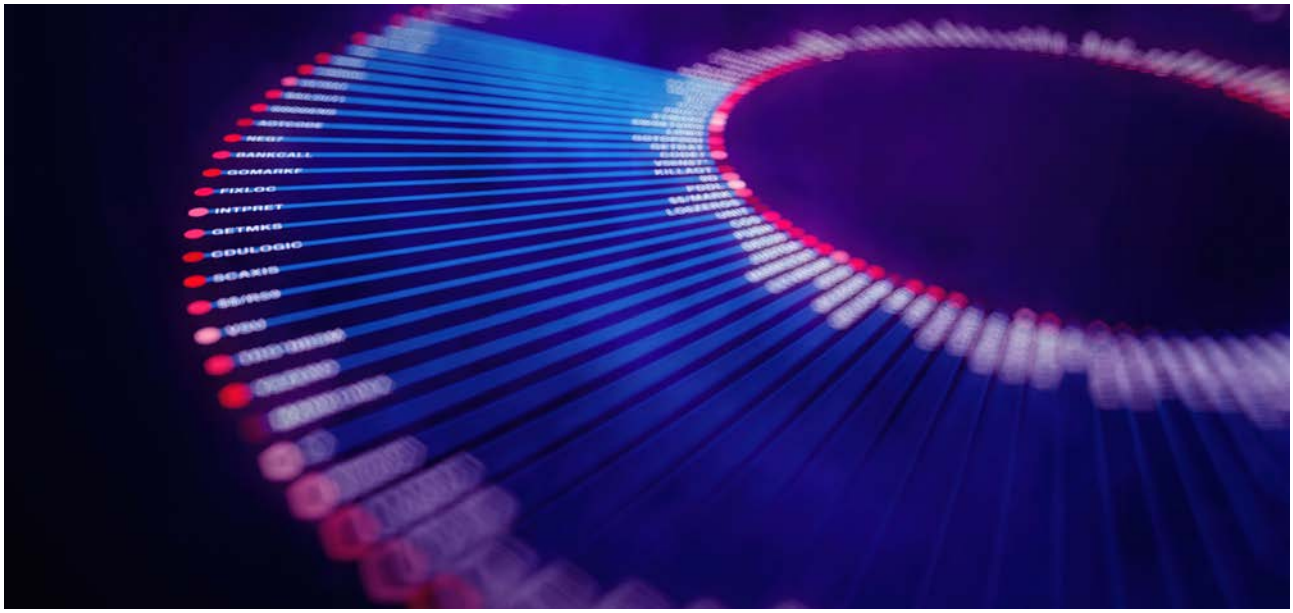
To achieve the goal of facilitating high cloud-based capacity for processing real time data through collective actions, it requires a highly flexible data architecture to allow the data to be transferred and operated with various operational ecosystems. Use a cloud- based infrastructure to provide scalable and flexible recourses for POCs (Proof of Concepts). Implement the API-driven approach to allow for a flexible and modular architecture which create a wider channel to integrate with new technologies and processes. It will expose data and functionality to external applications and services.

Recommended models as show case:

The Adaptive data architecture (ADA) is designed to be able to quickly adapt to changing business needs and technological advancements, by providing a flexible and adaptable foundation for data management. ADA involves building a modular and agile data architecture, with well-defined data domains and interfaces that can be easily reconfigured or replaced as needed. The goal is to create a data architecture that can evolve and adapt to changing business requirements, without requiring a complete overhaul of the system. ADA also involves implementing advanced analytics and AI capabilities, such as machine learning and natural language processing, to enable more advanced data processing and analysis. By incorporating these capabilities into the data architecture, organizations can gain deeper insights into their data, and use this knowledge to drive the UNEP value.

4.5.2 Responsive monitoring and assessment framework

The annual cycle of monitoring performance at all levels of the Organization (up to the Compact of the Executive Director) should be used as means of follow-up and review of the progress in terms of implementation of the Data Strategy as aligned with the Priorities of the Organization. This monitoring framework will closely companion with the " --- '. Most importantly, the monitoring and assessment needs to close the loop of data quality reflecting, identifying improvement on the architecture and governance of the data strategy. Ensuring data quality and agile to the new technology integration.



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5 Align with UNEP Current Workstreams

5.1 Support for Environmental Assessments

Environmental assessments are an important decision-making tool for policymakers. Assessments use environmental data and the analysis conducted by experts to provide the proper context and interpretation of data, trends and implications. This 'science for decision-making' is a key pillar of UNEP's science-policy interface.

All major Multilateral Environmental Agreements (MEA) have an assessment body that compiles the latest science and interprets it in a way that is useful for decision-makers engaged in the MEA processes. In addition, a few independent scientific bodies (e.g. IPCC, IPBES, UNEP) produce their own environmental assessments which support decision-making processes such as the UNFCCC, UNCBD and the United Nations Environment Assembly (UNEA). These experts who are involved in these assessment processes are asked to review and compile existing literature and data into a scientifically credible, politically legitimate and policy relevant narrative.

In order for the Global Environmental Data Strategy to support these types of assessments it must first understand the type of data that are used in environmental assessments and then catalogue these data sets for easy access and graphical representation. This way experts involved in assessment processes will feel comfortable using these authenticated data sets in their analysis. In addition to storing and presenting the data, the online platform should also store and present the narratives around the data that have been produced by various assessments. This approach can act as an institutional memory of sorts, allowing experts engaged in new assessment processes to understand the interpretation of the data that was produced in the past. This will help foster easy access and continuity in interpretation so that a coherent and consistent narrative is produced over time.

Through these two main avenues the Global Environmental Data Strategy will strengthen and support assessments processes moving forward.

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5.2 An integrated Approach to Environmental Data

By providing an integrated approach to Environmental Data, UNEP is contributing to:

- The identification of comparable methods for data collection and analysis and the promotion of their harmonization, taking into account existing standards, including those of the United Nations Statistical Commission System of Environmental-Economic Accounting, in coordination with other parts of the United Nations system and other relevant scientific institutions, building on international environmental data and statistical standards;
- The improvement of platforms that provide a repository function, to allow open access to up-to-date, quality-assured, credible and relevant data, including geospatial data, statistics, indicators and data analysis on the environment, including the work of the Global Resource Information Database (GRID) centers;
- The provision of tools and policy advice for integrated approaches to support evidence-based decision-making;
- The acceleration of efforts to assist Member States in developing their national environmental data management capacities and their environmental monitoring systems with regard to air and water quality, deforestation, marine litter and environmental security, and their ability to use data analysis to support evidence-based decision-making;
- The coordination of efforts with the Group on Earth Observations and other UN entities to fully utilize Earth observations;
- The encouragement of citizen science and its potential contribution as a complementary resource to fill data gaps;
- The underpinning of common country analyses with robust environmental data and statistics, in line with Sustainable Development Goal indicators, by United Nations resident coordinator offices, and the integration of national environmental data management, geospatial information management and statistical capacity into United Nations Development Assistance Frameworks.

5.3 WESR as Carrying Infrastructure to Transform GEDS into Action

UNEP focuses on addressing priority areas related to climate change, nature, and pollution through its services to its Member States. Being a science-based organization, UNEP places great importance on ensuring the accuracy, relevance, credibility, and timeliness of the environmental data that underpin its normative functions. To achieve this, one of UNEP's main objectives is to integrate and utilize data from various sources in the most effective manner possible. The availability of timely data is crucial for informed decision-making, enhancing transparency, and promoting mutual accountability. WESR is designed under such demands. Three essentially components that are required to move forward with a demand-driven approach:

- Develop a multi-stakeholder approach to governance inclusive of Member Countries.
- Engage through regional mechanisms, pilot at country level, and scale up to complete the cohesive data ecosystem.
- Move technology development from "Using what has been developed" to an agile and user-centric approach.

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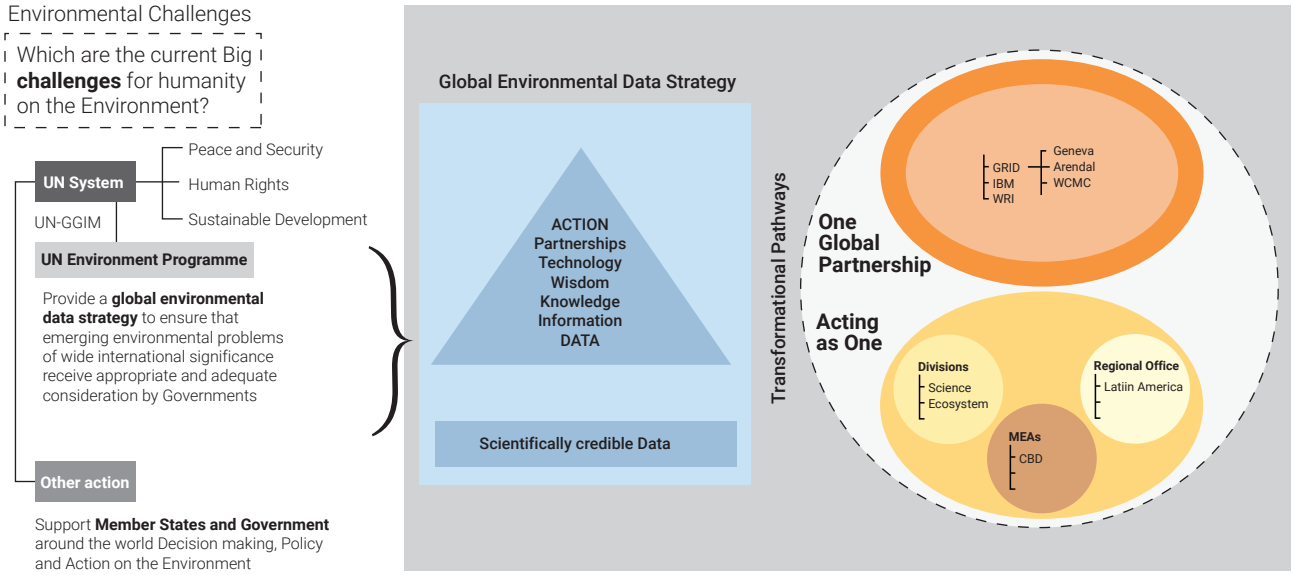
6 Deliver the Desired Scenario through WESR

The use of the World Environment Situation Room as UNEP's Data and Knowledge platform on Environmental Data supporting member States on the Common Country Analysis (CCA), the overall UN Development Cooperation Framework (UNDCF) and overall complementary areas of States of Environment Reporting (SER) and Voluntary Reporting of members states. A pilot application in at least 15 countries (WESR CCA) should be implemented in 2020 and 2021 to be extended based on lessons learnt until the roadmap timelines aiming at 2030.

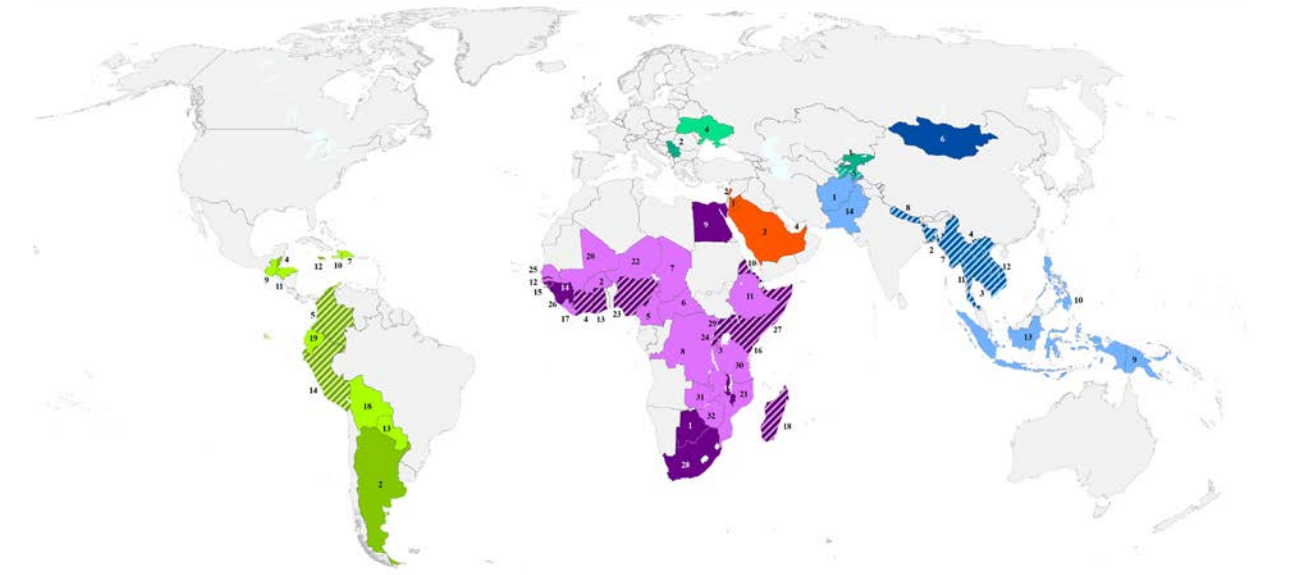
6.1 An Architecture for Implementing the GEDS through WESR



Foundational mandate for UNEP, since 1972: 2997 (XXVII): To keep under review the world environmental situation

6.2 Impacting on Countries, People and Places

Common Country Analyses in Selected Countries in All Regions



Latin America and Caribbean

WESR CCA | EC Fiches projects | Overlap

1. Antigua and Barbuda
2. Argentina
3. Barbados
4. Belize
5. Colombia
6. Dominica
7. Dominican Republic
8. Grenada
9. Guatemala
10. Haiti
11. Honduras
12. Jamaica
13. Paraguay
14. Peru
15. Saint Kitts and Nevis
16. Saint Lucia
17. Saint Vincent and the Grenadines
18. Bolivia (Plurinational State of)
19. Ecuador

Europe

WESR CCA | EC Fiches projects

1. Kyrgyzstan
2. Serbia
3. Tajikistan
4. Ukraine

Africa

WESR CCA | EC Fiches projects | Overlap

1. Botswana
2. Burkina Faso
3. Burundi
4. Côte d'Ivoire
5. Cameroon
6. Central African Republic
7. Chad
8. Democratic Republic of the Congo
9. Egypt
10. Eritrea
11. Ethiopia
12. Gambia
13. Ghana
14. Guinea
15. Guinea-Bissau
16. Kenya
17. Liberia
18. Madagascar
19. Malawi
20. Mali
21. Mozambique
22. Niger
23. Nigeria
24. Rwanda
25. Senegal
26. Sierra Leone
27. Somalia
28. South Africa
29. Uganda
30. United Republic of Tanzania
31. Zambia
32. Zimbabwe

West Asia

WESR CCA

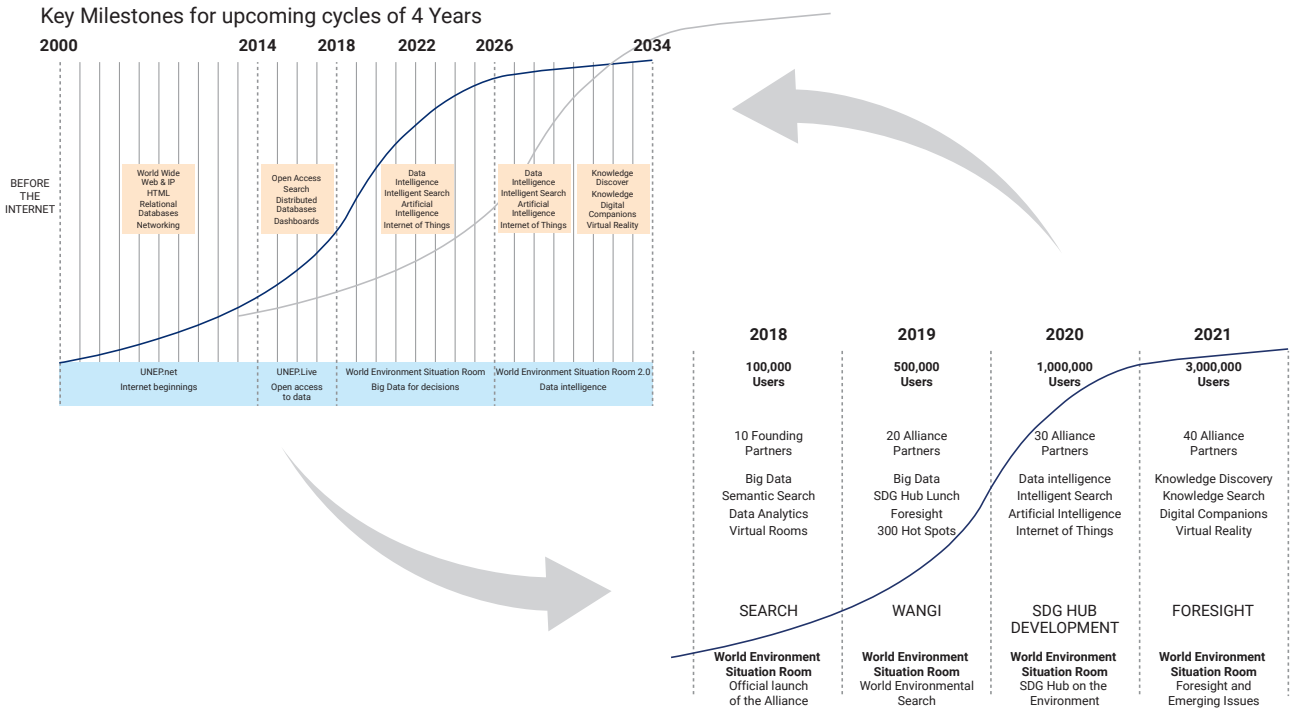
1. Jordan
2. Lebanon
3. Saudi Arabia
4. United Arab Emirates

Asia-Pacific

WESR CCA | EC Fiches projects | Overlap

1. Afghanistan
2. Bangladesh
3. Cambodia
4. Lao People's Democratic Republic
5. Maldives
6. Mongolia
7. Myanmar
8. Nepal
9. Papua New Guinea
10. Philippines
11. Thailand
12. Viet Nam
13. Indonesia
14. Pakistan

6.3 From Data Strategy to Ground Action



- Realizing this Vision

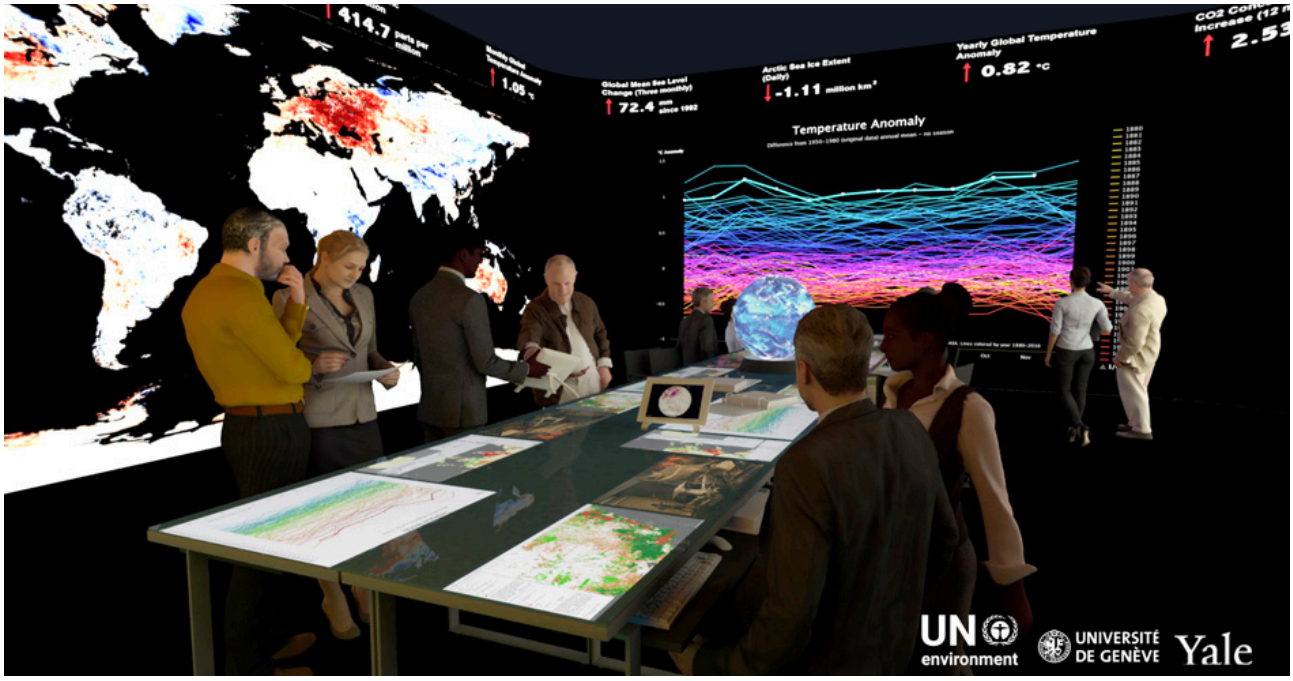
Physical Situation Room

Online Platform

Mobile Access

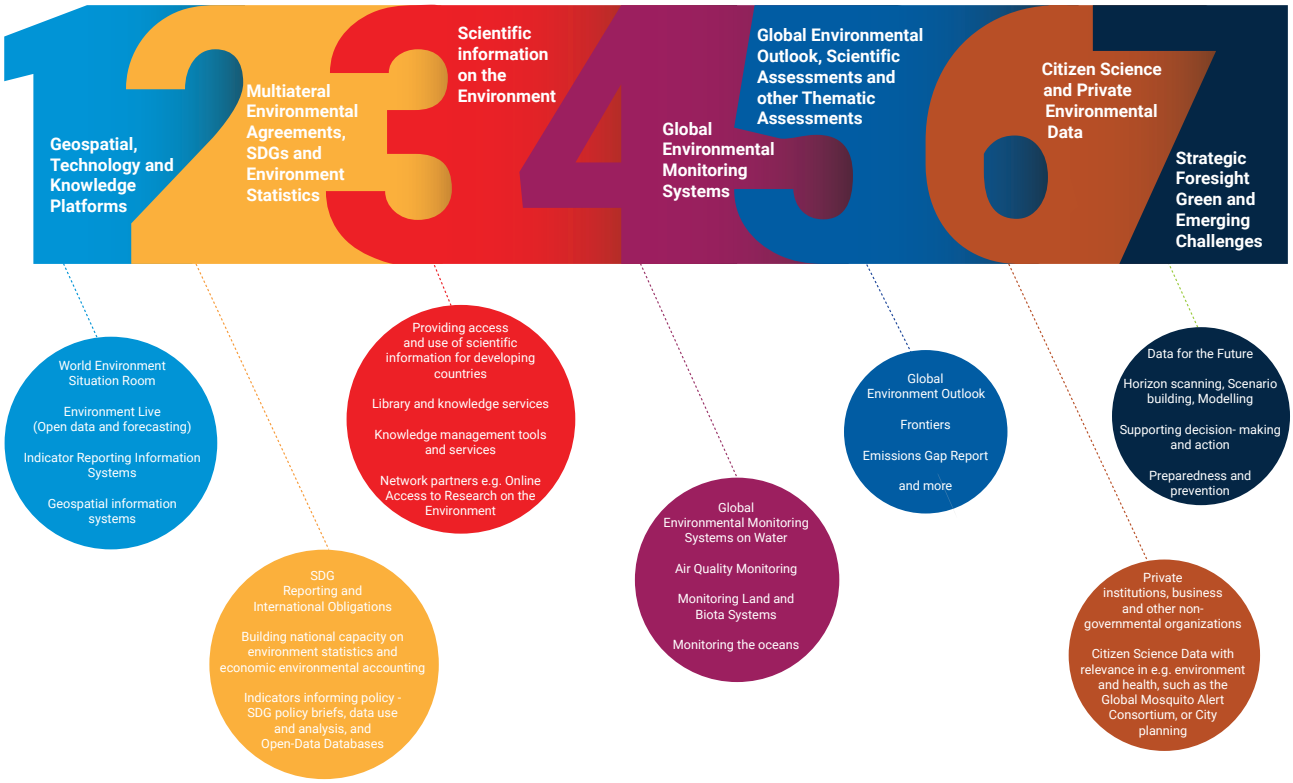
Accessible to Everyone, from Everywhere, Anytime.

- Frontier Visualization Technologies



https://wesr.unep.org: Single Entry Door to UN Knowledge Platform on the Environment

- Intelligent Dashboard of Services



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7 Impacts on the Ground and Demonstration Projects (Use cases)

7.1 WESR-CCA (Countries)

One of the aims of the WESR is to link data to action on the ground. One of the best opportunities for this is through the UN reform and working with the UN country teams to support the cooperation framework, starting by the Common Country Analysis (CCA).

The cooperation table is a dynamic table and updatable with cooperation cycle

Period	Work plan for network
2020-2021	Selection (done*) and support to at least 15 countries for the CCA process in 4 regions. Demonstration and capacity building. Finalization of a WESR-CCA platform.
2022-2023	Selection and support to 30 countries for the CCA process in 5 Regions.
2024-2025	WESR-CCA fully operational for all countries.
...	...

*Countries selected: LAC: Argentina, English speaking Caribbean | Africa: Kenya, Tanzania, South Africa, Ethiopia, Egypt, Somalia, Mali and Côte d'Ivoire | Asia: Vietnam, Lao, Mongolia | West Asia: Jordan | Europe: pending

7.2 Impact and Demonstration Projects - Use Cases

The demonstration project table is a dynamic and updatable with project cycle

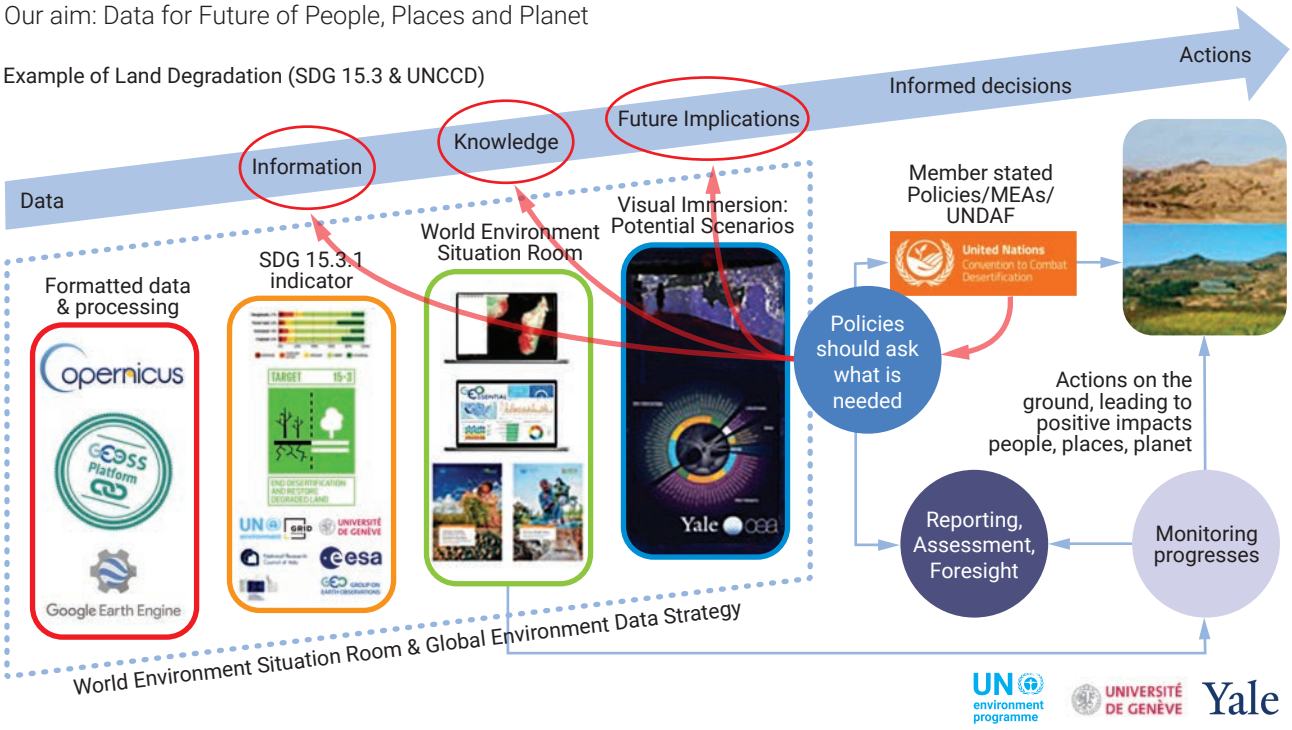
Project	Work plan for network
WESR CCA	Across UNEP, All Regional Offices and Policy Division, GRIDs, Yale University
InforMEA	MEAs and Law and Governance Division
SCP-HAT	Economy Division, IRP and 10YFP Network
Biodiversity	Ecosystems, WCMC, CBD, IUCN, IPBest, JRC, ...
Ozone	MEA Secretariat Ozone
Climate Change	Ecosystems, GRID Geneva
3 Cities in Africa	Regional Office for Africa, Yale University, GRIDs (including GRID Warsaw)
Hotspots	GRID Sioux-Falls, GRID Geneva
Environment & Security	Policy Division and Crisis Management Branch
Illegal Killing Elephants	CITES and MIKE Team and EAD/AGEDI Abu Dhabi
Oceans Regional Seas	GRID Arendal and oceans team
Forest Fires Monitoring	GRID Geneva
SDG Data and Statistics	Early Warning Assessment Division
Knowledge Repository	Science Division
Air Quality Monitoring	Science Division
Foresight	Science Division, IPCC, IRP, IPBest and UN CEB - HLCP Foresight Network
NASA Globe	UNEP and NASA
SDG Hub on the Environment	ESRI and UN Statistical Division, UN Open Data Platform
Belt and Road Big Data	GRID RADI, CEAC, EarthCase Networks
UNEP and Copernicus	GRID Geneva, EC, ESA Copernicus
Blueprint Geospatial Hub	UN Geospatial Network, UN - GGI
...	...

Several relevant demonstration projects and use cases should be implemented as demonstrating both transformation pathways of the Data Strategy - the transformation pathway I: "Integration", as well as the transformation pathway I: members states on the ground' applications and "partnerships".

7.3 Data for Action and Data for Future: Impacting on People, Places and Planet

The digital transformation platforms realize the potential for decision supported actions on the ground, at the country, regional and global levels. The dynamic framework for using data, information and knowledge is supporting an overall set of tools and methods guiding strategic planning and foresight analyses for action, establishing scenarios and exploring alternative possible and desired futures on a variety of environmental topics and priorities.

Our aim: Data for Future of People, Places and Planet



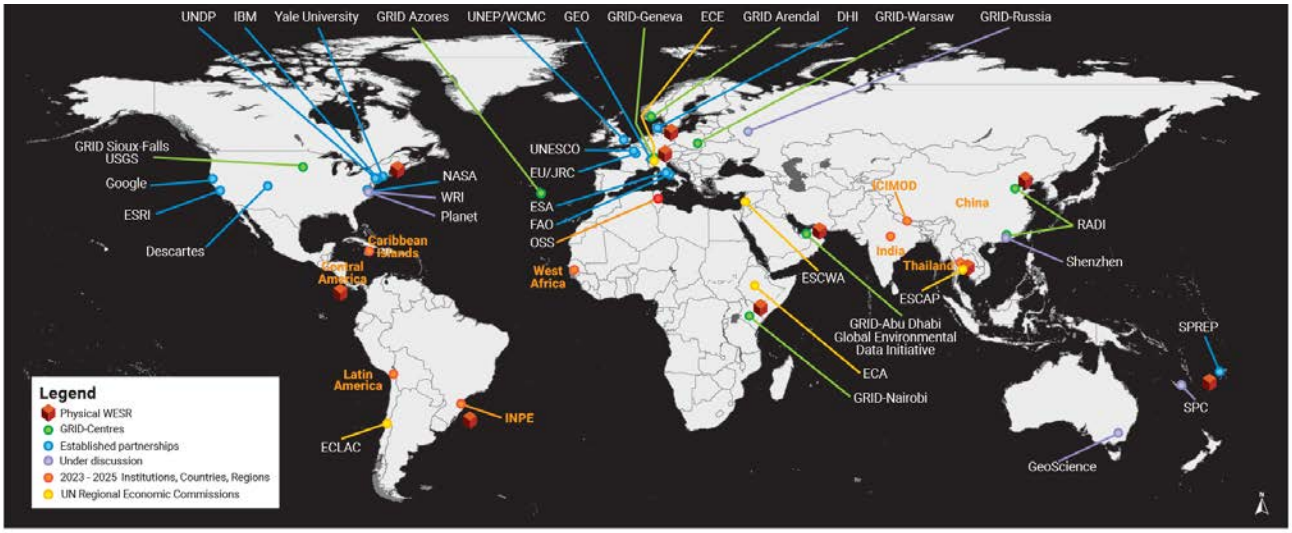
As the Data Strategy implementation evolves according to the Roadmap (progress report in 2021; progress report in 2023 and final reporting in 2025), the 5 categories of identified User Groups or Target Audience (Policymakers in Member States, Scientific Community, UN System and other International Organizations, including NGOs and Citizen Science as well as Citizens and Civil Society with a particular attention to the engagement with the Youth, and Business actors), will evolve more from the Transformation Pathway I (Integration and inward approach) into the Transformation Pathway II: Outward looking and Partnerships. The different types of potential end users will get more involved and active in interacting with platforms of the global environmental data strategy and geared towards action towards sustainable development and a sustainable planet.

7.4 Our "One Global Partnership"

The 'One Global Partnership' is the worldwide partnership co-developing with UNEP the Big Data on the Environment Initiative for Sustainable Development and Humanitarian Action. This Initiative aims to promote transparent access and sharing of 'environmental data' supporting policy and action for sustainable development and humanitarian action at the global, regional and national levels. This vision is realized through implementing a digital transformation strategy, which includes a global environmental data strategy, supported in a distributed worldwide partnership. The strategic objectives are the provision through a global digital platform, the World Environment Situation Room, of timely, reliable and disaggregated environmental data supporting decision-making and action for the achievement of Agenda 2030 and the sustainable development goals as well as humanitarian action.

Currently, 22 partners have already established formal Agreements, Memorandum's of Understanding or Contract arrangements with UNEP which in a variety of competences support the Big Data initiative. In the coming future, until 2021, this partnership will be institutionalized as a 'Consortium' with a corresponding 'Consortium Trust Fund', ensuring the long-term sustainability of this initiative. UNEP endows the Trust Fund with an initial investment of 17.5 Million USD for the first Action Plan of 4 years, 2018-2021. The overall estimated budget for the 4 year's totals 25 million USD. The long-term plan is aligned with the 2030 Agenda

7.4.1 Current and Future Partners - First 4 years Action Plan: 2018-2021 and Beyond



The cooperation table is a dynamic table and updatable with cooperation cycle

Period	Work plan for network
2020-2021	Selection (done*) and support to at least 15 countries for the CCA process in 4 regions. Demonstration and capacity building. Finalization of a WESR-CCA platform.
2022-2023	Selection and support to 30 countries for the CCA process in 5 Regions.
2024-2025	WESR-CCA fully operational for all countries.
2026-2030	Support to 193 countries for the achievement of Agenda 2030 and SDGs in All Regions.
...	...

7.4.2 Global Resource information Database Centres and Other GRID Collaborating Centres

Key role: Public-Private partnership on environmental data. Exploring the frontier of advanced ICTs (Information and Communication Technologies). Including the integration of Internet of Things (IoT), Big Data, Artificial Intelligence and advanced human computer interface technologies.

- Geneva
- GRID Arendal
- GRID Warsaw
- GRID Sioux-Falls
- RADI, China
- GRID Abu Dhabi *
- SPREP, Samoa, Apia *
- UNEP WCMC, Cambridge *
- DHI, Denmark *
- GRID Moscow **
- CSIRO, Canberra, Australia **
- INPE, Brazil **
- ECLAC, Chile **
- Secretariat Countries in the Pacific, SUVA **

7.4.3 Business and Companies

Key role: Public-Private partnership on environmental data. Exploring the frontier of advanced ICTs (Information and Communication Technologies). Including the integration of Internet of Things (IoT), Big Data, Artificial Intelligence and advanced human computer interface technologies.

- ESRI
- ADEC Innovations
- Google
- Huawei
- KT Technologies

Descartes
IBM *
Microsoft *
Apple **

7.4.4 United Nations System bodies and Other International Organizations

Key role: To coordinate efforts and roles within the overall United Nations system. Including the integration of UN networks (Geospatial, innovation, digital technologies, foresight and statistics)

- Office of Information and Communication Technologies (OICT)
- United Nations Statistical Division
- Global Geospatial Information Management (GGIM) – United Nations System Network
- Online Access to Research on the Environment (OARE) *
- World Meteorological Organization (WMO) *
- World Health Organization (WHO) *
- International Union for the Conservation of Nature (IUCN) *
- Group on Earth Observations (GEO) *
- World Resources Institute (WRI) *
- European Commission – Joint Research Center *
- Environment Research France (ERF) *

7.4.5 Geospatial Agencies

Key role: To share knowledge and geospatial technologies, satellite imagery, earth observation and remote sensing. Globally, to create synergies and partnership for global geospatial information management.

- North American Space Agency (NASA)
- European Space Agency – Copernicus (ESA)

Other Non-Governmental Organizations and Citizen Science

Key role: To sensitize the public on key environmental challenges and their solutions including the frontiers of citizen science and the reliability of science data. Engagement with the youth and the use of ICTs with mobile and distributed functionalities or supporting citizen science.

- Global Consortia of Citizen Science Associations *

{Current partners in black}

* Partner agreements expected in the period 2019-2020

** Partner agreements expected in the period 2020-2021

Consortium Funds Sustainability Plan, 2018 - 2029			
Action Plan	**UNEP**	**Consortium**	**Total**
2018-2021	17.5 M (70%)	7.5 M (30%)	25.0 M
2022-2025	17.5 M (50%)	17.5 M (50%)	35.0 M
2026-2029	17.5 M (30%)	41.0 M (20%)	58.5 M

Consortium Funds in USD include the following types of contribution:

a) in-kind staff
b) in-kind non-staff
c) direct financial contributions of Partners to the Trust Fund
d) joint external funded projects
e) donations from countries
f) donations from other sources
g) Consortium Services
h) other

There is a clear funding model behind this allocation of resources. As time evolves in the Global Environmental Data Strategy, the external financial resources allocated to the initiative will represent a major proportion of the financial sustainability.

8 Follow-up and Review

This is a dynamic document with a follow-up and review cycles of 1 year in the first five years of implementation, and subsequently, every two years. The intention is to ensure that the strategy remains adaptable and responsive to emerging challenges and opportunities. As part of this process, the UNEP Data Governance Group, serving as the overarching strategy governance group, should regularly review and evaluate the effectiveness and relevance of the strategy. Their insights and recommendations will play a crucial role in refining and enhancing the strategy's implementation over time.

This document will answer to the Country Permanent Representatives (CPR) by providing an avenue for member states, to participate in a thorough examination of the strategy. This inclusive approach ensures that the strategy reflects the diverse needs and priorities of the countries and organizations involved. By engaging with inputs from the CPR, member states have the opportunity to shape and influence the direction of the strategy, fostering a sense of ownership and collective responsibility.

Given the evolving nature of global environmental challenges and the dynamic landscape of data governance, it is essential to periodically conduct an extraordinary review of the global environmental data strategy. This review should aim to align the strategy with the broader UN system Data Strategy and the overarching UN agendas, as required. By ensuring coherence and synergy with other global frameworks and initiatives, the strategy can effectively contribute to the achievement of sustainable development goals and address pressing environmental concerns. The extraordinary review process serves as a mechanism to assess the strategy's alignment with evolving priorities, enhance its effectiveness, and reinforce its role as a vital tool in advancing environmental data governance at the global level.

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